Fields of Instruction

Accounting and Business Law
(College of Business Administration)

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

Keith G. Stange, Head

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

Associate Professors:
Anderson, Kenneth E., CPA,
Ph.D. ............................................. Indiana
Massingale, Cheryl S., J.D. ........ Tennessee
Posey, Imogene A., CPA, M.S. ........ Tennessee
Slagle, Warren L. (Emeritus), CPA,
M.S. .............................................. Tennessee
Townsend, Richard L., CPA, Ph.D. ........ Texas

Assistant Professors:
Ayers, Susan, CPA, Ph.D. ........ Arizona State
Behn, Bruce K., CPA, Ph.D. ........ Arizona State
Carcillo, Joseph V., CPA, Ph.D. ... Georgia State
Gallan, Amy W., Ph.D. ...................... VPI
Hickcox, Kathleen B., Ph.D. ............... Oklahoma
Letsinger, M. Clyde (Emeritus), CPA,
M.S. ............................................. Tennessee
Murphy, Daniel, CPA, Ph.D. ........ North Carolina
Distinguished Lecturer:
Wolfe, Singleton B. (Emeritus), B.S. ......... VPI

Lecturers:
Hendrick, Lee W., CPA, J.D. ............. Houston
Hughes, Harry N., B.S. ............... Tennessee

THE MASTER OF ACCOUNTANCY PROGRAM

The objective of the M.Acc program is to provide persons who have a high level of ability and motivation with the depth and understanding of accounting that will enhance their probability of success in a career in professional accounting. Moreover, the student's educational experience should develop perspectives toward the discipline of accounting in a manner that will enable the student to spearhead innovation and change in response to needs in public accounting, industry, and government.

Admission Requirements
Application deadlines for international students are: Fall and Summer, January 15. Application deadlines for U.S. citizens and permanent residents are: Fall and Summer, March 1. The program is designed both for students who have completed an accredited baccalaureate degree program with a major in Accounting and others. Those with outstanding undergraduate records in areas other than accounting may earn the M.Acc degree by completing prerequisites in accounting and by including courses in other business and related disciplines to supplement the applicant's undergraduate background. Students entering the program should be computer literate and are expected to have completed coursework in calculus, principles of accounting, and introductory economics.

In addition to the general admission requirements for The Graduate School, M.Acc applicants are required to take the Graduate Management Admission Test (GMAT) and submit information on forms provided by the College of Business Administration. Applicants whose native language is not English must submit results of the Test of English as a Foreign Language (TOEFL).

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

A student with an undergraduate degree in accounting can usually complete the program in about three semesters. A student without an undergraduate accounting degree can usually complete the program in four semesters.

For students with an undergraduate accounting degree, the requirements are:
Accounting Concentration (9 hours): 511, 513, Business Law 511.

Accounting Concentration (9 hours):
Three concentrations are available:
3. Taxation: 531, 532, 533, 534, 539.

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

Accounting Electives (6 hours): Elective courses to be taken from concentration courses listed above.

Non-accounting Electives (6 hours): Non-accounting courses taken in either other business or non-business areas, upon approval of M.Acc advisor.

For students without an undergraduate accounting degree, the requirements are:
Prerequisites: Accounting 311, 341, 431, Management 301, 401, Finance 301, all for undergraduate credit.

Accounting Core (9 hours): 511, 513, Business Law 511.

Accounting Concentration (9 hours):
Three concentrations are available:
3. Taxation: 531, 532, 533, 534, 539.

Students must take at least three courses from the same concentration and one of the course numbers must end with 9.
Required Additional Courses (12 hours): Marketing 510, Accounting 411, 414, and 521.

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

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

BUSINESS ADMINISTRATION

CONCENTRATION

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

This degree provides a research-oriented terminal qualification for those seeking entry-level faculty positions in accounting. Students take approximately three years of coursework beyond the bachelor's degree, including a doctoral sequence designed to expose students to various areas of accounting research.

Courses in accounting and other areas are selected to supplement the student's individual background and to prepare the student in an area of accounting specialization (financial, managerial, auditing, tax, or systems). The final year is normally spent completing the doctoral dissertation.

Minimum course requirements are 12 hours including 611, 612, 619, and one other accounting course to be approved by Ph.D. accounting program advisor.

ACADEMIC STANDARDS

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

ACADEMIC COMMON MARKET

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

Accounting

GRADUATE COURSES

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

414 Financial Reporting by Business and Non-Profit Organizations (3) Continuation of 311: Liabilities, stockholders' equity, earnings per share, corrections, aggregation issues, international accounting, and governmental statements. Prereq: Corporate Financial Reporting with a C or better.

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

417 Governmental and Nonprofit Financial Reporting (2) Examination of the state and local government financial reporting system with an emphasis on local government financial statements. Prereq: 415.

451 Statistical Methods and Analysis (3) The basic tools of statistical reasoning, using the appropriate statistical methods to make inferences to support decision making. Prereq: Consent of instructor.

452 Auditing (3) Theory and practice of external financial reporting: earnings per share, income taxes, cash flows, leases, pension plans, earnings per share, controls, internal reporting, and advanced aggregation issues. Prereq: Financial Reporting by Business and Nonprofit Organizations and admission to M.Acc. program or consent of instructor.

511 Advanced Corporate Financial Reporting (3) Theory and practice of external financial reporting: earnings per share, income taxes, cash flows, leases, pension plans, earnings per share, controls, internal reporting, and advanced aggregation issues. Prereq: Financial Reporting by Business and Nonprofit Organizations and admission to M.Acc. program or consent of instructor.

513 Advanced Auditing (3) Theory and concepts underlying practice of internal and external auditing: fraud auditing, audit reporting, and other current auditing issues. Prereq: Auditing and admission to M.Acc. program or consent of instructor.

514 Auditing Practice (3) Design and performance of audits in computerized environments. Relates audit concepts among design of internal control, internal control effectiveness, and assessment of control risk. Problems in variety of auditing contexts, highly automated situations. Prereq: 414 and admission to M.Acc. program.

515 Seminar in Professional Auditing and Practice (3) Topics in financial reporting and auditing: taxation of business enterprises and emerging professional accounting standards. Development of written and communication skills. Prereq or coreq: 511 and admission to M.Acc. program.


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

522 Budgetary Planning and Control Systems (3) Alternative approaches to formulation and use of planning and control systems to meet organizational objectives. Control systems and corporate structure, discretionary expense centers, profit centers, transfer pricing, and control in manufacturing, service, and not-for-profit organizations. Prereq: Admission to a graduate business program or consent of instructor.

531 Tax Research, Methods, and Procedures (3) Development of expertise in tax research using authoritative sources through available technologies. Advanced study of tax accounting methods, periods, procedures, and review of fundamental tax concepts to provide foundation for tax practice. Prereq: 451 and admission to M.Acc. program.

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

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

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


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

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

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

590 Graduate Internship in Accounting (3) Full-time resident professional employment for one academic semester involving qualified job experience, written report of responsibilities, and evaluation of student performance. Prereq: Admission to M.Acc. program or consent of M.Acc. advisor. May be repeated. Maximum 6 hrs.

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

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

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

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

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

Business Law

GRADUATE COURSES

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

MAJOR DEGREES

Communications M.S., Ph.D.

Ronald E. Taylor, Head

Professor:

Taylor, Ronald E., Ph.D. Illinois

Associate Professors:

Hoy, Mariea, Ph.D. Oklahoma State

Hoy, Maria, Ph.D. Oklahoma State

Assistant Professors:

Haley, Eric, Ph.D. Georgia

Raman, Niranjan, Ph.D. Texas

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

GRADUATE COURSES

490 Special Topics (3) Topics vary: advanced media strategy, advanced creative strategy, direct marketing, and advertising and social issues.

510 Advertising and Society (3) Analysis of advertising as an institution in a free-enterprise democracy and its relationship 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. Market segmentation, copy appeals, media strategy. Prereq: Statistics 201 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.

Aerospace Engineering
See Mechanical and Aerospace Engineering

Agricultural and Extension Education
(College of Agricultural Sciences and Natural Resources)

MAJOR DEGREE

Agricultural and Extension Education M.S.

Roy R. Lessly, Head

Professors:

Carter, Cecil E., Jr., Ph.D. Ohio State

Dickson, Lewis H. (Emeritus), Ed.D. Cornell

Lessly, Roy R. (Liaison), Ed.D. Oklahoma State

Todd, John D., Ed.D. Illinois

Associate Professor:

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

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

THE MASTER’S PROGRAM

Thesis Option

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

1. A minimum of 30 hours of graduate credit in courses approved by the student’s advisory committee. Six hours of thesis may be counted toward this requirement.

2. A minimum of 20 hours of graduate credit in courses numbered at or above the 500 level.

3. A minimum of 12 hours of graduate credit in courses appropriate to the area of concentration taught in the department and a minimum of 6 hours taught from outside the department.

4. A minimum of 3 hours of graduate credit in coursework in either research methodology or statistics.

5. A final oral examination.

Non-Thesis Option

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

1. A minimum of 36 hours of graduate credit in courses approved by the student’s advisory committee.

2. A minimum of 24 hours of graduate credit in courses numbered at or above the 500 level.

3. A minimum of 12 hours of graduate credit in courses appropriate to the area of concentration taught in the department and a minimum of 6 hours taught from outside the department.

4. A minimum of 3 hours of graduate credit in coursework in either research methodology or statistics.

5. A creative component designed by the student and approved by the student’s advisory committee for 3 hours of graduate credit.

6. A written and oral comprehensive examination.

GRADUATE COURSES

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

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

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

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

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

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

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

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

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

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

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

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

530 Special Topics in Agricultural and Extension Education (1-3) Current issues. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

531 Extension History, Philosophy and Objectives (2) 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: 411 or consent of instructor.

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

593 Special Problems in Agricultural and Extension Education (4) Special research and special reports based on supervised independent study. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.
Agricultural Economics and Rural Sociology

(College of Agricultural Sciences and Natural Resources)

MAJOR DEGREES

Agricultural Economics ............................................. M.S., Ph.D.

Handy Williamson, Head

Professors:

Badenhop, M. B. (Emeritus), Ph.D. ........... Purdue
Brooker, J. R. (Laison), Ph.D. ............ Florida
Cleland, C. L. (Emeritus), Ph.D. .......... Wisconsin
Eastwood, D. B., Ph.D. ..................... Tufts
English, B. C. (Emeritus), Ph.D. .......... Iowa State
Keller, L. H. (Emeritus), Ph.D. .............. Kentucky
Klindt, T. H., Ph.D. .................................. Kentucky
Klindt, T. H. (Emeritus), Ph.D. .......... Wisconsin
Klindt, T. H. (Emeritus), Ph.D. .......... Minnesota
Mundy, S. D., Ph.D. ....................... Tennessee
Park, W. M., Ph.D. ......................... Virginia Tech
Pentecost, B. H., J. D. .................... Tennessee
Ray, Daryl E. (Bernard Balsingame Chair of Excellence), Ph.D. ........ Iowa State
Roberts, R. K., Ph.D. ....................... Iowa State
Sappington, C. B. (Emeritus), Ph.D. ....... Illinois
Wathey, T. J. (Emeritus), Ph.D. ........... Purdue
Williamson, H., Ph.D. ................. Missouri

Associate Professors:

Jensen, K. L., Ph.D. ................................ Oklahoma State
Pompelli, G. K., Ph.D. .................... California (Davis)

Assistant Professors:

Jakus, Paul M., Ph.D. ............... NC State
Leather, J. A., Ph.D. ............... Oklahoma State
Stokes, J. R., Ph.D. ..................... Texas A&M

The Department of Agricultural Economics and Rural Sociology offers programs of graduate study leading to the Ph.D. and M.S. The doctoral program includes concentrations in agricultural marketing and price analysis, agricultural policy, farm management and production economics, natural resource economics, and rural development. The M.S. program may be completed under a thesis option with concentrations in agricultural economics or rural sociology. A non-thesis option is available with a concentration in agricultural economics only. For specific information, contact the department head.

THE MASTER'S PROGRAM

Thesis Option

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

Non-Thesis Option

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

Minor

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

THE DOCTORAL PROGRAM

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

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

Minor

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

MINOR IN ENVIRONMENTAL POLICY

The department participates in a program designed to give master's level 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) Macroe-finance, financial objectives, acquisition of debt and equity funds, capital investments, capital allocation, credit analysis, borrower and lender loan application analysis, insurance strategies, computer applications, kinds and sources of agricultural credit, and financial intermediation. Prereq: Intermediate Agricultural Economics or consent of instructor. Sp

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

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

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

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

450 Agricultural Price Analysis (3) Analysis of demand and supply mechanisms in agriculture; price determination; spatial equilibrium; temporal price patterns; pricing issues. Prereq: Intermediate Agricultural Economics, Marketing of Agricultural Products and Statistical Methods. F

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

470 Natural Resource Economics (3) Nature of natural 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: 210 or consent of instructor. Sp

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

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

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

520 Research Methodology (1) Nature of scientific method and research processes; role of assumptions, hypotheses, theory and models; methodological problems of social sciences; establishing research priorities. Prereq: Consent of instructor. F

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

524 Econometric Methods in Agricultural Economics (3) Application of statistical techniques to agricultural economic models; estimation of supply, demand and production functions; microeconometric forecasting models; interpretation of results. Prereq: Statistics 461 or consent of instructor. F

530 Agricultural Policy Analysis (3) Evaluation of public policy as related to agricultural industry and rural areas. Prereq: 505 and Economics 813 or consent of instructor. F

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

550 Advanced Agricultural Marketing (3) Analysis of structure, conduct and performance of agricultural mar-
Agricultural Engineering Technology ........ M.S.

C. Roland Mote, Head

Professors: Bledsoe, B. L., PE, Ph.D. ......... Oklahoma State
Henry, Z. A., PE, Ph.D. .................... NC State
Luttrell, D. H. (Emeritus), Ph.D. ........... Iowa State
McDow, J. J. (Emeritus), PE, Ph.D. ......... Tennessee
Mote, C. R., PE, Ph.D. ..................... Michigan State
Sowell, J. I., PE, Ph.D. ..................... NC State
Shelton, C. H. (Emeritus), M.S. ............ VPI
Tomkins, F. D., PE, Ph.D. .................. Tennessee
Wilhelm, L. R., PE, Ph.D. ................. Tennessee
Wills, J. B., M.S. ......................... Tennessee

Associate Professors: Freeland, R. S., PE, Ph.D. ......... Tennessee
Grandle, G. F., Ph.D. ........................ Tennessee
Hart, W. E., Ph.D. ........................... Purdue
Wilkerson, J. B., Ph.D. ..................... Purdue

Assistant Professors: Baxter, D. O., M.S. ........... Missouri
Burns, R. T., Ph.D. .......................... Tennessee
Busche, M. J., Ph.D. .......................... Illinois
Hultberg, G. J., Ph.D. ........................... Illinois
Prather, T., M.S. .............................. Georgia
Raman, D. R., Ph.D. ........................... Cornell
Womac, A. R., Ph.D. ........................... Tennessee
Yoder, D. C., Ph.D. ............................ Purdue
Yoder, R. E., PE, Ph.D. ........................ Colorado State

Graduate programs leading to the Master of Science and Doctor of Philosophy with a major in Agricultural 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 Agricultural Engineering Technology is available to graduates of a recognized curriculum in agriculture or other related fields. Each applicant will be advised about any prerequisite courses before entering a program. The student's program of study must be approved by the department.

The following courses are required in addition to the Graduate School application.

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

THE MASTER'S PROGRAMS

Agricultural Engineering 

Applicants who have not previously earned a degree from a professionally accredited program with the U.S. must submit scores from the GRE general examination. Applicants accepted into the program must complete at least 33 semester hours to earn a degree. Of these 33 hours, 20 must be in courses numbered 500 or greater (6 hours of thesis plus 14 hours of other courses). Other specific requirements for the 30 hours are:

Agricultural Engineering 504 (1), 505 (1), and other major subject courses 12 hours

Coursework in computational methods (mathematics, computer science, statistics, or any course containing appropriate computational components that may be approved by the department) 6 hours

Program electives 6 hours

Thesis 500 6 hours

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

Non-Thesis Option: A non-thesis option in Agricultural Engineering Technology is available to qualified students. Applicants who have not previously earned a degree from a professionally accredited program must submit scores from the GRE general examination. Applicants accepted into the program must complete at least 33 semester hours to earn a degree. Of these 33 hours, 20 must be in courses numbered 500 or greater (6 hours of thesis plus 14 hours of other courses). Other specific requirements for the 30 hours are:

Agricultural Engineering 504 (1), 505 (1), and other major subject courses 12 hours

Coursework in computational methods (mathematics, computer science, statistics, or any course containing appropriate computational components that may be approved by the department) 6 hours

Program electives 6 hours

Thesis 500 6 hours

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

THE DOCTORAL PROGRAM

Departmental Requirements

Students applying for admission into the doctoral program must submit evidence of ability to perform and report independent research to the satisfaction of the faculty of the department. An approved master’s thesis will usually be acceptable for this purpose. Scores on the GRE general and engineering subject examinations also are required for applicants who have not received a degree from an ABET-accredited engineering program.

To earn a degree, each doctoral student must complete at least 75 hours of approved graduate credit (beyond the baccalaureate degree) in agricultural 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 500) and 6 hours of courses at UT Austin numbered greater than 600. Other specific requirements for the minimum 75 hours are:

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

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

Agricultural Engineering

GRADUATE COURSES

413 Component Design and Machine Synthesis (3) Synthesis of design: structural, kinematic, power, control-system development, preparation of design drawings, specifications, model of device, written and oral report on project. Prereq: Agricultural Engineering Design Fundamentals, 1 hr and 2 labs. Sp

423 Irrigation and Waste Management System Design (3) Design of irrigation and agricultural waste management systems with consideration given to livestock waste characteristics, climate, water quantity, system characteristics, and impact on crop yield and water quality. Prereq: Soil and Water Conservation and Engineering Lab. 1 hr and 2 labs. M,S

430 Mobile Hydraulic Power System Design (3) Functional and operational characteristics of mobile hydraulic system components; pumps, valves and actuators; analysis and synthesis of power transmission and control circuits. Prereq: Fluid Mechanics or Hydraulics. 2 hrs and 1 lab. So,A

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

451 Electronic Systems (4) Basic electronics with biological applications. Analog and digital electronics, sensing and controlling principles and environmental parameters; sensor selection and interfacing; signal conditioning; process control, laboratory experiments and design projects. Prereq: Circuits and Electromechanical Components. 3 hrs and 1 lab. Sp

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

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

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

506 Physical Phenomena (3) Properties of materials, materials and their components. Prereq: Physics 121. 2 hrs and 1 lab. Sp

510 Similitude in Design and Research (3) Dimensional analysis; governing equations; theory of models; static, distorted, similar models; prediction equations; interpretation of data applications to machinery, soil and water structures, agricultural buildings and other agricultural engineering related problems. Prereq: Engineering Science and Mechanics 511, 541. 2 hrs and 1 lab. F,A

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

530 Research Problems in Agricultural Engineering (1-3) Theoretical and experimental studies relating to current problems in agricultural engineering. May be repeated. Maximum 8 hrs. E

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

543 Instrumentation and Measurement (3) Modern instrumentation techniques. Static and dynamic response of instrumentation; test systems conditioning; temperature, moisture, optical radiation, displacement, strain, pressure, velocity, acceleration, and flow measurements; data acquisition and control. Prereq: 413 or Electronics and Computer Circuits or Equivalent. 2 hrs and 1 lab. (Same as Environmental Engineering 543.) F,A

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

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

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

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

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

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

630 Feedback and Control Systems (3) Differential equations for physical systems: solutions, transforms, and system response. Types of control, frequency response, system compensation, and system analysis. Application to agricultural systems. Prereq: 451, Mathematics 231, Basic Engineering 101, 201, or equivalent. 2 hrs and 1 lab. F,A

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

Agricultural Engineering Technology

GRADUATE COURSES

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

432 Agricultural Machinery and Tractors (3) Agricultural machinery and power systems in relation to agricultural practices; management considerations; field efficiencies; capabilities; adjustment and servicing. Prereq: Calculus 2. 2 hrs and 1 lab. Sp

442 Agricultural Waste Management and Pollution Control (3) Waste renovation fundamentals; characteristics of animal manure; techniques for collection, transportation, storing, and utilizing livestock waste. Prereq: Introductory Physics or consent of instructor. 2 hrs and 1 lab. Sp

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

455 Instrumentation and Measurement (3) Modern instrumentation techniques. Static and dynamic response of instrumentation; test systems conditioning; temperature, moisture, optical radiation, displacement, strain, pressure, velocity, acceleration, and flow measurements; data acquisition and control. Prereq: 413 or Electronics and Computer Circuits or Equivalent. 2 hrs and 1 lab. (Same as Environmental Engineering 543.) F,A

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

509 Special Problems in Agricultural Engineering Technology (1) Same as Agricultural Engineering 509. S/NC only.

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

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

522 On-Site Domestic Water Supply and Wastewater Renovation Technology (1) Biological and chemistry, selection and design of pumps and delivery systems, and design of and use water treatment processes; soil-based wastewater renovation principles, and design and operating criteria for on-site wastewater renovation systems. Prereq: 506. 2 hrs and 1 lab. Sp,A

542 Simulation of Agricultural Systems (3) Synthesis and analysis of agricultural systems using computer simulation, philosophy of system simulation, critical paths, discrete and continuous systems. Prereq: 506 and scientific computer programming. 2 hrs and 1 lab. F,A
Waller, J.C., Ph.D.............................. Nebraska
Associate Professors:
Tugwell, R.L. (Emeritus), Ph.D........ Kansas State
Grizzle, J.M., Ph.D................................. Florida
Assistant Professors:
Kattesh, H.G., Ph.D.................................. VPI
Heitmann, R.N., Ph.D............................. Maine
Backus, W.R., Ph.D........................ Tennessee
Shirley, H.V. (Emeritus), Ph.D................. Illinois
Robbins, K.R., Ph.D.................................. Illinois
Oliver, S.P., Ph.D................................. Ohio State
Richardson, D.O., Ph.D............................ Ohio State
Robbins, K.R., Ph.D.................................. Illinois
Saxton, A., Ph.D..................................... NC State
Shirley, H.V. (Emeritus), Ph.D................. Illinois
Schultz, T.W., Ph.D............................... Tennessee
Sims, M.H., Ph.D................................. Auburn
Tugwell, R.L. (Emeritus), Ph.D.............. Illinois

Animal Science

(College of Agricultural Sciences and Natural Resources)

GRADUATE COURSES

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

Animal Science

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

MAJOR DEGREES

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

Kelly Robbins, Head

Professors:
Barth, K.M. (Emeritus), Ph.D. .................... Rutgers
Bell, M.C. (Emeritus), Ph.D. ................. Arkansas State
Bletter, J.K. (Emeritus), Ph.D. .................... Ohio State
Chamberlain, C.C. (Emeritus), Ph.D. ........ Iowa State
Erickson, B.H. (Emeritus), Ph.D. .............. Kansas State
Godkin, J.D. (Liaison), Ph.D. ..................... Massachusetts
Hall, O.G., Ph.D. .................................... Iowa State
Hansard, S.L. (Emeritus), Ph.D. .................. Florida
Henry, R.W., D.V.M., Ph.D. ...................... Ohio
Lidvall, E.R. (Emeritus), M.S. ................. Tennessee
McDonald, T.P., Ph.D............................... Ohio
McLaren, J.B. (Emeritus), Ph.D. ............... Auburn
Miller, J.K. (Emeritus), Ph.D. ..................... Georgia
Murphee, R.L. (Emeritus), Ph.D. ............... Wisconsin
Oliver, S.P., Ph.D. .................................... Ohio State
Robbins, K.R., Ph.D.................................. Illinois
Saxton, A., Ph.D..................................... NC State
Shirley, H.V. (Emeritus), Ph.D................. Illinois
Schultz, T.W., Ph.D............................... Tennessee
Sims, M.H., Ph.D................................. Auburn
Tugwell, R.L. (Emeritus), Ph.D.............. Illinois

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

Assistant Professors:
Grazzle, J.M., Ph.D..................................... Florida
Hollingsworth-Jenkins, K., Ph.D............. Nebraska
Mathew, A.G., Ph.D............................... Purdue
Schrick, F.N., Ph.D............................... Clemson
Smalling, J.D., Ph.D. ............................. Texas A&M

The Department of Animal Science offers graduate programs leading to the Master of Science and Doctor of Philosophy with a major in Animal Science. At the M.S. level, areas of concentration are nutrition, breeding, physiology (reproductive, mammary, and metabolic), and management with orientation towards beef cattle, dairy cattle, swine, and poultry. Since the department is also within the College of Veterinary Medicine, the areas of anatomy, systematic physiology (blood, cardiovascular, and neural), and histology are also available. The Ph.D. program offers concentrations in animal nutrition, animal breeding, animal physiology, animal anatomy, and animal management. For specific information, contact the department head.

During the first fall term of matriculation in each degree program, all graduate students are required to enroll in 512. All first- and second-year students are required to enroll in 512 each fall and each spring term.

THE MASTER'S PROGRAM

For admission to the M.S. program, a student must have obtained a 3.0 grade-point average on a 4.0 scale (or equivalent) 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 also present evidence 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 a minimum of 3 hours in statistics. These statistics courses must be chosen from the 400, 500, or 600 level of 600 level of courses approved for use in the Intercollegiate Graduate Statistical Program (IGCSP). 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 must be outside the Animal Science Department. The advisory committee approves the student's coursework and research problem and conducts the final oral examination which consists of a comprehensive oral examination and a defense of the thesis.

THE DOCTORAL PROGRAM

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

1. A minimum of 16 hours in related fields outside of animal science.
2. At least 24 hours credit at the 500 and 600 level, exclusive of doctoral research and dissertation, of which a minimum of 6 hours must be at the 600 level. Students in the nutrition, breeding, physiology, or anatomy concentration must complete at least 12 hours at the 500 and 600 level in the respective concentration or closely related area. Students in the management concentration must complete Animal Science 581 and 9 hours at the 500 or 600 level in two non-management concentrations for a total of 12 hours (including 581).
3. A minimum of 1 hour of Agriculture 512 in addition to that required at the M.S. level.
4. A minimum of 6 hours in 500-, 600-, or 700-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 is 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 committee approves the coursework and the dissertation research proposal and determines if there is to be a foreign language requirement. The advisory committee conducts the comprehensive written and oral examination and the final dissertation defense examination.

GRADUATE COURSES

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

430 Advanced Ration Formulation (2) Advanced ration 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. Prereq: 330 or equivalent and introductory computer science course. 2 labs. Sp

440 Advanced Animal Breeding (4) Computer simulation of genetic improvement for multiple traits in swine, beef, and dairy cattle; evaluation of alternative breeding strategies; industrial programs in swine, poultry, sheep, beef, and dairy cattle; breed development, improvement, and utilization. Prereq: 440 or equivalent. 1 hr and 1 lab. Sp, A

511 Beef Cattle Production and Management (3) Integration of principles of nutrition, breeding, physiology, and marketing into complete production and management programs. Structure of industry, enterprise establishment, systems of production, production practices, and improvement programs. Management evaluated in terms of production responses and economic

562 Selected Topics in Agricultural Engineering Technology (1-3) Lecture/group discussion on specialized topics. May be repeated. Maximum 6 hrs. E
Animal Science—Veterinary Medicine

See College of Veterinary Medicine and Comparative and Experimental Medicine (Same as Comparative and Experimental Medicine—Veterinary Medicine 552.) F

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

552 Anatomy of Domestic Carnivores (4) Gross dissection by systems and regions of dog with comparison to cat. Prereq: Consent of instructor. 1 hr and 3 labs. F

554 Comparative Hematology (3) Morphology, physiology and development of blood and blood forming organs: similarities and differences of major domestic and laboratory species. Prereq: Consent of instructor. 2 hrs and 1 lab. (Same as Comparative and Experimental Medicine—Veterinary Medicine 554.) Sp

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; covariate adjustment and regression. Prereq: Plant and Soil Science 471 or equivalent; knowledge of software package on micro- or mainframe computer. (Same as Plant and Soil Science 571.) Sp

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

581 Advanced Livestock Management (3) Objective functions to evaluate alternative livestock production management policies. Systems approach to analysis and management of reproductive management programs, genetic improvement policies, alternative feeding systems, and herd health programs. Consideration of time, risk, and laboratory species. Prereq: Undergraduate physiology and/or consent of instructor. Sp

595 Colloquium in Animal Science (1) Orientation; teaching, research and extension programs. Guidance in preparation of student's course of study and research plans. Required of beginning graduate students in animal science program. May be repeated. Maximum 6 hrs. E

596 Seminar (1) Advanced topics in animal science. Required of all first- and second-year graduate students. May be repeated. Maximum 4 hrs. S/NC only. Sp

600 Doctoral Research and Dissertation (3-15) Prereq: Completion of 300-level core courses or equivalent or consent of instructor. 2 hrs and 1 lab. S, N only.

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

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

627 Advanced Mammalian Reproduction (3) Current topics and new frontiers in reproductive biology. Prereq: 322, Sp A

634 Animal Nutrition and Metabolism (4) Comparative digestive physiology, digestion, absorption and metabolism of nutrients in ruminant and nonruminant species. Concepts and methodologies of animal growth and nutrient requirement; interspecies relationships, availability and deficiencies of nutrients. Prereq: Animal Nutrition, Feeds, and Ration Formulation or consent of instructor. F

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

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

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

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

643 Advanced Animal-Vitamin Nutrition (4) Chemical forms, digestion, absorption, intermediary metab- olism, deficiencies, toxicities, excesses and interaction of minerals and vitamins. Prereq: S33 or S34, and Biochemistry and Cellular and Molecular Biology 410 or Nutrition 511 or consent of instructor. Sp A

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

652 Disorders of the Endocrine System (2) Path- ological and physiological aspects of disease; endocrine glands of various animal species. Prereq: 521 or consent of instructor. (Same as Comparative and Experimental Medicine—Veterinary Medicine 652.) Sp A

656 Animal Science—Veterinary Medicine

See College of Veterinary Medicine and Comparative and Experimental Medicine (Same as Comparative and Experimental Medicine—Veterinary Medicine 552.) F
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 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 courses taken in the first year:
   a. 510 Method and Theory in Cultural Anthropology
   b. 560 Theory in Archaeology
   c. 590 Method and Theory in Biological Anthropology

   In addition, 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 as the final examination in each core class (during regularly-scheduled final periods) and are graded by all faculty within the appropriate subdiscipline for each course. At the end of the first year, all M.A. students will be evaluated by the entire faculty and will either be retained or dropped from the program based on their first year's performance and GEE scores.

4. All M.A. students must take 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 501 in the Fall semester of each year and fulfill all requirements for the course defined by the instructor. Attendance by visiting lecturers may appear on the GEE.

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

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

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

8. Two copies of the thesis are required by The Graduate School. In addition, bound copies of the thesis are to be provided to the department and to all members of the student's M.A. committee.

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

THE DOCTORAL PROGRAM

In addition to the Graduate School requirements, requirements for the Ph.D. degree in Anthropology, in the appropriate sequence of completion, are as follows:

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

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

Applicants to the Ph.D. degree program must meet the same academic standards as M.A. program applicants and furnish the same materials (see The Master's Program).

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 studies. 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 field(s) of the doctoral thesis, and oral comprehensive exam.

Residence and Coursework: Every potential Ph.D. candidate must complete two consecutive semesters of full-time residence prior to taking the doctoral comprehensive examination. The student must complete the minimum coursework requirements of the Graduate School, including at least nine hours of 500- 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;

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 must be required to take a comprehensive written examination. The exam will consist of three sections and be given by the student's committee. All three sections must be taken within seven consecutive days.

2. Comprehensive Oral Examination: This examination follows shortly after successful completion of the comprehensive written exam. The major professor acts as chairperson of the committee.

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

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

Defense of Dissertation Examination: When the dissertation has been tentatively accepted by the committee, a final oral examination will be held. The committee conducts the exam, which is ordinarily held as a colloquium in which the candidate will expound on the nature and significance of his/her contribution to anthropological knowledge as set forth in the dissertation.

ACADEMIC COMMON MARKET

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

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

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

411 Linguistic Anthropology (3) Basic linguistic concepts applied to research in cultural anthropology; investigation of relationships between language and culture. Prereq: 190 or Linguistics 200. (Same as Linguistics 411.)

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

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

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

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

435 Historical Archaeology Laboratory (3) Laboratory procedures for processing, identification, and interpretation of archaeological materials. Artifact material from historic East Tennessee sites used for class projects. Recommended prereq: Historical Archaeology 410.

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.

451 African Prehistory (3) African cultural history from earliest evidence of human activity to time of European contact. Stone age of African south of Sahara. Prereq: 120 or consent of instructor. (Same as Afro-American Studies 461.)

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

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

464 Principles of Zoarchaeology (3) Basic osteological studies of major vertebrate groups; aboriginal use of animals in subsistence and culture. Identification and interpretation of archaeologically derived musculature and vertebrae 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: 130, 410, 440, or 461.

480 Human Osteology (4) Intensive study of human skeletal remains. Prereq: 110 and consent of instructor. 5 hrs and 1 lab.

481 Museology I: Museums, Purpose and Function (3) (Same as Art 482.)

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

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


494 Primate Behavior (3) Social organization and behavior of selected primates: group composition, size, and structure; patterns of mating; other social interactions; communication and cultural behavior. Application of primate studies to human ethology. Prereq: 110 or consent of instructor. 5 hrs.


499 Human Response to Environmental Stress (3) Physiological perception of stress from psychosocial and environmental factors, and attributional behavioral responses to stress. Prereq: 110 (1-15) P/NP only. E

501 Graduate Research (1-9) Independent investigation of special problems in archaeology. May be repeated. Maximum 12 hrs.

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

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

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

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

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

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

515 Medical Anthropology (3) Cultural impact on disease patterns, 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 race, caste, class, ethnicity, and class; inequalities engendered by sex role structures. Construction of social divisions and after and 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 archaeological fauna. Intensive reading; evaluation and discussion of major faunal studies, guides to identification, methods of presenting faunal data. May be repeated. Maximum 6 hrs.

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

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

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

531 Quantitative Methods in Archaeology (2) Application of quantitative techniques to archaeological data critically examined through literature and problem solving. Prereq: Advanced statistical analysis and other mathematical methods. Prereq: Consent of instructor.

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

581 Archaeological Resource Management (3) Federal legislation and regulations affecting identification, protection, and management of archaeological resources. Protection of federal and state public interests, and professional archaeologists in conducting of federal sponsored archaeology. May be repeated. Maximum 6 hrs.

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

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

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

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

586 Forensic Anthropology (3) Application of physical anthropology to problems in human identification, determination of age, race, and sex of skeleton and preparation of reports for legal medicine. Prereq: 480.


588 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 units.

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

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

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

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

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

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

601 Advanced Graduate Research (1-6) Individual investigation of special problems in anthropology desired by advanced graduate students. May be repeated. Maximum 12 hrs. Only 3 hrs may count toward 600-level requirement.
Architecture
(College of Architecture and Planning)

MAJOR

DEGREE

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

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

Professors:

Anderson, G. I., M.Arch. ................. Illinois
Conley, G. (Emeritus), B.Arch. .......... Harvard
Davis, Marleen, M.Arch. .................. Pennsylvania
Griger, F., M.Arch. ....................... Virginia
Kezak, L., M.A. ......................... SUNY (Buffalo)
Lauver, W. J. (Liaison), M.S.Arch. .... Iowa State
Leser, A. J., M.Arch. ..................... Virginia
Lizon, P., Ph.D. ......................... Pennsylvania
Moffett, M. S., Ph.D. .................. MIT
Reub, J. S., M.A. ......................... Texas
Robinson, M. A., M.Arch. .............. Pennsylvania
Rudd, J., M.A. ......................... Northwestern
Shell, W. S., M.S. Arch. ............... Columbia
Watson, J. L., M.Arch. ................ Pennsylvania
Wodehouse, L. M. (On leave) . Ph.D. .... St. Andrews

Associate Professors:

Coddington, J., M.Arch. ................. Pennsylvania
Davis, T. K., M.Arch. .................. Cornell
Kaplan, M., M.Arch. .................... Harvard
Martella, W. E., B.Arch. .............. California
Schimmang, M. M., M.Arch. ........... Florida
vonBoullov, P., M.S. ..................... Tennessee

Assistant Professors:

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

Masters of Architectural Program

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

Admission Requirements

In addition to meeting the Graduate School's minimum requirements, the following specific admission requirements must be met.

For Track 1, a bachelor's degree with a GPA of 3.0 in a regionally accredited college or university is required. Applicants must have an equivalent 3-year degree and 3.0 GPA. Candidates with a GPA below 3.0 may be considered for conditional admission when evidence of exceptional promise is identified. Undergraduate work must include at least 24 semester hours of humanities, a basic understanding of physical sciences, systems and analytical procedures and an understanding of mathematical principles and analytical procedures as well as a general understanding of the use of computers. The School requires a separate application for Architecture including an essay and three letters of recommendation. A personal on-site interview is desirable but not mandatory. For those applicants from accredited 4-year architecture programs, a portfolio is required in addition to the above requirements.

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

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

Degree Requirements

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

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

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

For further information, contact the School of Architecture.

ACADEMIC COMMON MARKET

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

GRADUATE COURSES

403 Introduction to Preservation (3) History, theory, laws 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.


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 studio projects. Historical change in urban form and design.

412 Non-Western & Indigenous Architecture (3) Building responsive to climate, material availability, and economic level, as designed by anonymous builders. Prehistoric times to present throughout the 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 the fall of Rome to beginning of Renaissance.


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


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

421 History of Landscape Architecture (3) Historical, 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. E

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

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

434 Building Energy Analysis (3) Balancing heat flow through internal skin of residential and small and large commercial buildings. Local climate, elevation. Site planning, building size and orientation, window area, wall treatment, infiltration control, and other design features.
Energy uses quantification methods and economic analysis of energy efficient design features. Architectural program analysis of external and internal load-bearing structures.

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

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

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


**466 Marketing Services** (3) Theories of marketing for architectural practice. Case studies. Public relations procedures.

**473 Architectural Photography** (3) Photography as design, research, and presentation medium. Application of photographic techniques and printing and processing. Color and black and white. Prereq: Consent of instructor.

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

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

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

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

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

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

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

**514 Ethical Imperatives** (3) Social, cultural, philosophical and moral issues which impact professional responsibilities. Attitudes, values, and ideas that address formation of profession's ethos. Prereq: Consent of instructor. S/NC only.

**521 Principles of Architectural Form** (3) Historical and contemporary architectural theory through investigation of literature and related examples. Theories of understanding and theorems of application related to generation of architectural form and its application to both cultural and environmental focus. Prereq: Consent of instructor. S/NC only.

**525 Special Topics in Architecture** (1-3) Student-initiated course. May be repeated. Maximum 9 hrs. of credits. Prereq: Consent of instructor. S/NC only.

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

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

**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 research for architectural research and scholarship.

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

**562 Professional Practice** (3) Management and organizational theories and practices for delivering professional design services: assessment of building industry and its influence on practice; analysis of basic management functions within professional firms; legal and ethical standards regulating the practice of architecture. Prereq: Consent of instructor.

**571 Architectural Design Studio/Seminar I: Environmental Forces** (3) Environmental factors influencing regional character of architecture. Examination of associated natural forces and cultural interpretation. Readings and discussions; application in design studio to specific projects. Prereq: Principles in Architectural Design. 1 hr and 5 labs.

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

**573 Architectural Design Studio/Seminar III: Cultural Aesthetics** (4) In-depth investigation of design relationship between form and cultural subject matter. Examination of regional character of architecture. Development of understanding of life safety and health requirements in building and buildings needs of physically challenged user. Prereq: Consent of instructor. 1 hr and 5 labs.

**580 Thesis Preparation** (3) Preparation of document under supervision of candidate's thesis advisory committee and in support of topic of candidate's thesis. Prereq: Consent of instructor. 1 hr and 5 labs.

**591 Foreign Study** (1-9) Prereq: Consent of instructor. 1 hr and 5 labs.

**592 Off-Campus Study** (1-9) Prereq: Consent of instructor. 1 hr and 5 labs.

**593 Independent Study** (1-9) Prereq: Consent of instructor. 1 hr and 5 labs.

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### Art

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

**Major**

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<th>Degree</th>
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**Norman Magden, Head**

**Professors:**

Blain, Sandra J., M.F.A. .......... Wisconsin, University of
Brake, R., M.F.A. (Emeritus), M.S. .......... Wisconsin, University of
Cleaver, Dale G., M.F.A. (Emeritus), Ph.D. .... Chicago, State University of
Daehner, R.H., M.F.A. .......... Wisconsin, University of
Darrow, J., M.F.A. .......... Illinois State University of
Falsetti, Joseph S., M.S. .......... Ohio State University of
Goldenstein, M.B., M.F.A. .......... Wisconsin, University of
Lee, B., M.F.A. .......... Yale University of
Leland, W., M.F.A. .......... Tennessee State University of
Livingston, P.R., M.F.A. .......... Wisconsin, University of
Magden, N., M.F.A. .......... Case Western Reserve University of
Martinson, Fred, Ph.D. .......... Chicago, State University of
Moffett, F., Ph.D. .......... Michigan State University of
Peacock, D., M.F.A. .......... Chicago, State University of
Riesing, T.J., M.F.A. .......... Nebraska, State University of
Stewart, F.C., M.F.A. .......... Claremont, State University of
Yates, S., M.F.A. .......... North Carolina State University of

**Associate Professors:**

Hable, Dorothy, Ph.D. .......... Michigan State University of
LeFevre, Richard, M.F.A. .......... Rochester, Institute of Technology of
Longobardi, Pam, M.F.A. .......... Montana State University of
Lyons, B. (Liaison), M.F.A. .......... Arizona State University of
Neuf, A., Ph.D. .......... Pennsylvania State University of
Staples, Carolyn, M.F.A. .......... Michigan State University of
Wilson, D., M.F.A. .......... California State University of

**Assistant Professor:**

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

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

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

**THE MASTER'S PROGRAM**

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

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

**M.F.A. Requirements**

A minimum of 60 hours is required:

1. Successful completion of 20 hours of studio in a concentration area. An inter-area program must be approved by the graduate faculty only after the second semester in residence. Ten hours of concentration must be in second year courses (512, 514, etc.)
2. A minimum of 9 hours of art history for graduate credit.
3. Eleven hours of electives which may consist of any combination of courses offered by the University for graduate credit.
4. A Project in Lieu of Thesis (20 hours). A third year of semi-independent study. Student must have completed all other coursework prior to registration.
5. A student with the permission of the area faculty can petition to take 3 hours of outside academics as a substitute for 3 hours of art history or 3 hours of concentration area. The petition is to be presented to the graduate faculty committee for final approval and should directly address the need and relevance of this substitution to the student's concentration.

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

The candidate's committee will consist of a minimum of 3 members and a maximum of 6
members and will be appointed prior to registration for Art 599. Three members of the committee shall be as follows: one from the candidate's concentration area who shall be the major professor, one from art history, and one from a studio discipline outside the concentration area.

Exhibition and oral examination: With the completion of all requirements for the M.F.A., the student must produce an exhibition and, in the presence of that work, must satisfactorily complete an oral examination.

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

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

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

Art
GRADUATE COURSES
481 Museology I: Museums, Purpose and Function (3) Development of museums of art, history, natural and applied science. (Same as Anthropology 481.)
482 Museology II: Exhibition Planning and Installation (3) Exhibition concept development and implementation. Exhibition design and installation techniques. Publicity, production, 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. May be repeated. Maximum 12 hrs. (Same as Anthropology 484.)
499 Special Topics (3) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 12 hrs.
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E
591 Foreign Study (1-15) See College of Arts and Sciences.
592 Off-Campus Study (1-15) See College of Arts and Sciences.
593 Independent Study (1-15) See College of Arts and Sciences.
595 Visiting Artist Seminar (2) Contemporary art issues by different visiting artists. May not be used toward art history requirement. May be repeated. Maximum 6 hrs.

Art Ceramics
GRADUATE COURSES
424 Ceramics: Clays and Glazes (3) Clay chemistry, clay bodies, glaze theory and construction, Formulating, mixing and testing of clay bodies and glaze formulas. Prereq: Ceramics: Portfolio Review.
425 Ceramics: History Seminar (3) History of ceramics through lectures and student presentations. May not be used toward art history requirement. Prereq: Ceramics: Portfolio Review.
426 Ceramics: Kiln Design (3) Designing kilns, traditional and modern refractories, construction methods, and kiln operation. Prereq: Ceramics: Portfolio Review.
429 Ceramics: Special Topics (3) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 12 hrs.
521 Graduate Ceramics I (2-4) May be repeated. Maximum 10 hrs.
525 Graduate Ceramics II (2-4) May be repeated. Maximum 10 hrs.
593 Independent Study (1-15) See College of Arts and Sciences.
595 Visiting Artist Seminar (2) Contemporary art issues by different visiting artists. May not be used toward art history requirement. May be repeated. Maximum 8 hrs.
599 Projects in Lieu of Thesis (10) Prereq: All graduate course work and successful second year evaluation by graduate faculty. May be repeated. Maximum 20 hrs. S/NC only. E

Art Drawing
GRADUATE COURSES
411 Drawing IV (6) Individualized pursuit of personal drawing techniques and concepts; supplemented by individual and group critiques; weekly life drawing sessions. Prereq: 410. May be repeated. Maximum 12 hrs.
419 Special Topics in Drawing and Painting (3) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 12 hrs.
511 Graduate Drawing I (2-6) May be repeated. Maximum 10 hrs.
512 Graduate Drawing II (2-6) May be repeated. Maximum 10 hrs.
593 Independent Study (1-15) See College of Arts and Sciences.
599 Projects in Lieu of Thesis (10) Prereq: All graduate course work and successful second year evaluation by graduate faculty. May be repeated. Maximum 20 hrs. S/NC only. E

Art History
GRADUATE COURSES
471 History of North American Art (3) Landmarks in painting, architecture, sculpture, and design from prehistory to 1800.
472 History of 20th-Century American Art (3) Development in architecture, painting, and design from 1900.
473 19th-Century American Painting (3) From West and Copley to emergence of "The Eight."


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

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

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

489 Studies in Art History (3) Concentration in individually selected area. Prereq: 12 hrs of art history and consent of instructor. May be repeated. Maximum 6 hrs.

512 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.

513 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.

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

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

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

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

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

531 Photography I (2-6) May be repeated. Maximum 10 hrs.

532 Photography II (2-6) May be repeated. Maximum 10 hrs.

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

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

535 Studies in Media as Art (3) Selected topics in theory and history of media as art form. Prereq: Modern Art and Film or consent of instructor. May be repeated. Maximum 9 hrs.

572 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.

573 Studies in Baroque Art (3) 17th-century art and architecture: major artists and works from southern or northern Europe. Prereq: M.F.A. candidate or consent of instructor. May be repeated with consent of department. Maximum 6 hrs.

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

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

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

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

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

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

595 Visiting Artist Seminar (2) Contemporary art issues by different visiting artists. May not be used toward art history requirement. May be repeated. Maximum 6 hrs.

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

Art Painting

GRADUATE COURSES

413 Painting IV (6) Individual concepts and personal expression with varied media. Prereq: 315. May be repeated. Maximum 12 hrs.


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

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

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

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

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

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

595 Visiting Artist Seminar (2) Contemporary art issues by different visiting artists. May not be used toward art history requirement. May be repeated. Maximum 6 hrs.

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

Art Printmaking

GRADUATE COURSES

482 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.

483 Lithography II (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.

484 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.

485 Intaglio II (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.

486 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.

487 Lithography II (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.

488 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.

Art Sculpture

GRADUATE COURSES

441 Advanced Sculpture (3-4) Individual development of sculptural problems and techniques. Prereq: 6 hrs of 300 level sculpture. May be repeated. Maximum 12 hrs.

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

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

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

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

595 Visiting Artist Seminar (2) Contemporary art issues by different visiting artists. May not be used toward art history requirement. May be repeated. Maximum 6 hrs.

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

Arrowmont

GRADUATE COURSES

Courses listed below offered periodically only at the PI Bela Phi Arrowmont School of Crafts, Gatlinburg, Tennessee. Courses may be repeated. Upon admission to the M.F.A. program at UT Knoxville, a student may apply certain graduate courses taken at Arrowmont toward the degree, subject to the approval of the student's graduate committee.

400 Special Topics (2-4) Student- or instructor-initiated course offered at convenience of department. May be repeated.
Astronomy
See Physics and Astronomy

Audiology and Speech Pathology

(College of Arts and Sciences)

MAJORS

DEGREES

Audiology
Speech and Hearing Science
Speech Pathology

M.A.
Ph.D.
M.A.

Patrick J. Carney, Head

Professors:
Anp, Carl W., Ph.D. ............. Ohio State
Carney, Patrick J. (Liaison), Ph.D. .... Iowa
Luper, Harold L. (Emeritus), Ph.D. .... Ohio State
Nabelek, Igor V. (Emeritus), Sc.D. ...... Prague
Peterson, H. A., Ph.D. .............. Illinois
Silverstein, B., Ph.D. ............... Purdue
Wallace, Giorfiaen L., Ph.D. ........ Northwestern

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

Assistant Professor:
Ruark, Jack L., Ph.D. ................ Pittsburgh
Swanson, Lori A., Ph.D. ............. Purdue

THE MASTER’S PROGRAM

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

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

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

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

THE DOCTORAL PROGRAM

The Ph.D. program in Speech and Hearing Science seeks to develop individuals for professional careers in a variety of positions including research and college teaching in the concentration areas of speech and language pathology, audiology, speech-language science or hearing science. The degree program is research oriented with primary emphasis on processes involved in normal, deviant, or disordered speech, language and hearing. Students will be expected to demonstrate their knowledge in areas related to the concentrated field of study. These areas include: 1. Basic speech, hearing, or language processes; 2. Basic speech, hearing, or language disorders or differences; 3. Related disciplines providing insight into human communication processes; 4. Technical skills in instrumentation and experimental design which enable the student to investigate problems pertaining to speech and hearing processes.

The program will normally consist of three or more calendar years of graduate study beyond the master’s degree with the first year being devoted primarily to formal coursework and the last year to full-time research culminating in the doctoral dissertation. The total program is a minimum of 60 semester hours, including a minimum of:
1. 24 semester hours in dissertation 600.
2. 6 semester hours in a research tool.
3. 6 semester hours in a cognate area outside the department.
4. 24 semester hours in 600-level coursework within the department of which:
a. a minimum of 6 semester hours in the topic of major interest;
b. a minimum of 6 semester hours in topic(s) of related interests;
c. 2 semester hours in 611; and
5. 3 semester hours in supervised teaching experience.
6. A comprehensive examination to demonstrate knowledge in the concentration area and an examination of research competence.
7. A final oral examination.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The Ph.D. programs in Speech and Hearing Science is available to residents of the states of Alabama, Arkansas, Kentucky, or West Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE COURSES

431 Stuttering (3) Nature, appraisal and treatment. Prereq: 304 or consent of instructor.
432 Observation of Clinical Practice (1) Prereq: Speech and Language Development, Articulation Disorders, or consent of instructor.
434 Clinical Practice in Speech-Language Pathology II (1-4) Prereq: 433 and consent of instructor. Enrollment for fewer than 2 hrs must have prior departmental approval.
455 Problems in Speech Pathology (1-3) Prereq: Consent of instructor.
465 Speech and Language of the Culturally Different Child (3) Speech and language differences of children of various minority groups, of different ethnic and class memberships and from different geographic regions.
473 Audiology II (3) Basic principles of clinical audiology; pure tone, speech, masking, and overview of special auditory tests. Prereq: 371.
494 Aural Habilitation/Rehabilitation of the Hearing Impaired (3) Psycho-acoustic aspects, amplification components, characteristics, assistive devices, speech acoustics, speech perception, speech reading, parent-child, preschool school years of children, communicative impairments/handicaps/remediation of adults, effects of aging/remediation on the elderly, and case studies. Prereq: 433 or consent of instructor.

GRADUATE COURSES

500 Thesis (1-15) P/N/P only. E
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N only. E
504 Appraisal of Speech and Language Disorders (3) Diagnostic procedures for children and adults with speech and language problems including observation and practice with diagnostic tests. Prereq: Communication Disorders, Phonetics and Acoustics of Speech, and 433, or equivalents or consent of instructor.
506 Neural Bases of Speech and Language (3) Structure and function of central and peripheral nervous systems, role of speech and language. Prereq: 306.
507 Anatomy and Physiology of Hearing (3) Structure and function of the peripheral and central auditory systems, and their roles in mediating auditory processes. Prereq: 473 or equivalent or consent of instructor.
511 Introduction to Research in Speech and Hearing (3) Analysis of research techniques, fundamentals of statistical application, and completion of a proposal and hypothetical pilot research project.
512 Clinical Practice in Audiology (1-4) Prereq: 473 and 484. May be repeated. Maximum 9 hrs.
548 Special Study in Audiology (1-3) Specific reading, consultation, and research activities in field of audiology. May be repeated. Maximum 6 hrs. 

549 Hearing Science (3) Study of psychoacoustic phenomena and how they relate to perception and diagnostic audiology. Prereq: 473, 507, and 546 or equivalents or consent of instructor. 

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

552 Seminar in Speech Pathology (2-3) Current significant research in speech pathology. Topics vary. Prereq: 5 hrs in speech pathology. May be repeated with consent of department. Maximum 5 hrs. 

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

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

557 Management and Supervision for Speech-Language Hearing Professionals (3) Management systems, accountability, performance appraisal and clinical supervision for audiologists and speech language pathologists in private practice, supervisory or administrative positions. 

562 Preschool Language Disorders (3) Assessment and remediation strategies for specifically language-impaired children (ages 3-5). Techniques for special populations. Prereq: 461 or consent of instructor. 

565 School-Age Language Disorders (3) Review of current literature on assessment and intervention techniques for school-age language learners. Prereq: 461 or consent of instructor. 

574 Pediatric Audiology (3) Theoretical and practical considerations in evaluation and treatment of hearing loss in infants and children. Audiological intervention in case management of hearing impaired child: amplification, educational alternatives, and state and federal guidelines. 

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

579 Psycholinguistic Concepts in Speech Pathology (3) Psycholinguistic concepts and information theory in studying the normal acquisition of language and certain disorders of language. Prereq: Consent of instructor. 

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

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

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

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

594 Advanced Aural Rehabilitation/Rehabilitation of the Hearing-Impaired (3) Study of gaging process, counseling, group and individual amplification systems, classroom/speech acoustics, central auditory problems, therapy methods for habilitation and rehabilitation, speech reading, school-based programs, programs for adults and the elderly; student research reports. Prereq: Phonetics and Acoustics of Speech, 473 and 494 or equivalents or consent of instructor. 

595 The Verbotonal System: Auditory/Speech Perception (3) Innovative therapy, therapy procedures, and SJVAG amplification filters for diagnosis/evaluation/remediation of speech problem and hearing loss: hearing impaired children/adults: use of rhythms, movements and suppressant; special audiometric tests, acoustic filters, correcting misarticulations through optimal listening; central auditory treatment; second (foreign) language through listening/speech language; relationship to combination of hearing problem and reading. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. 

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

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

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

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


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

610 Seminar in Hearing Science (2) Advanced study of perception of nonspeech acoustic signal, detectability, pitch, loudness, differential threshold, adaptation, and fatigue. Prereq: 602 or consent of instructor. May be repeated. Maximum 6 hrs. 

611 Experimental Design in Speech and Hearing (3) Analysis of experimental design in theses and related journals. Generation of experimental designs. Prereq: Consent of instructor. 

625 Advanced Seminar in Neurologically-based Communication Disorders (3) Topics vary. Prereq: 520, 523, and 524, or consent of instructor. May be repeated. Maximum 6 hrs. 

655 Practicum in College Teaching (1-3) Supervised experience in college teaching. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. S/N only. 

658 Directed Research (1-4) Participation in ongoing or non-dissertational research. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. 

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

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

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

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

(UT Space Institute)

MAJOR DEGREE
Aviation Systems ................................ M.S.
R. D. Kimberlin, Program Chair

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

Associate Professors:
Kimberlin, R. D. (Liaison), Ph.D. ................. RWTH (Germany)
Solies, U. P., Ph.D. ................................ Tennessee

The University of Tennessee Space Institute offers a program leading to the Master of Science degree with a major in Aviation Systems. The Aviation Systems program is designed for those who possess a Bachelor's degree in engineering or science and wish to study under a "system philosophy" toward careers in research and development or administration in areas pertinent to aviation. Current emphases include flight testing, aircraft design, aviation meteorology, air traffic control, and airport management.

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

Both thesis and non-thesis programs are available. The thesis program involves a minimum of 30 semester hours credit while the non-thesis program involves a minimum of 33 semester hours credit.

**THESIS OPTION**

The thesis program involves satisfactory completion of the following requirements:

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

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

**NON-THESIS OPTION**

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

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

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

**ACADEMIC COMMON MARKET**

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

**GRADUATE COURSES**

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

501 Aviation Systems: An Overview (3) \(501 \text{ Aviation Systems: An Overview (3)}\)
502 Registration for Use of Facilities (3-15) Required

503 Air Vehicles (3) Current capabilities and future requirements for civilian and military air vehicles. Prereq: 501. May be repeated with consent.
504 Airports and the Community (3) Structure of airports and their communities. Technology and economics of cargo, baggage, ticket and passenger handling. Airports, management, economics and logistics. Interfaces with community, plans, programs and developments for collecting and distributing passengers and freight from various types of airports. Types of airport developments and their projections. Prereq: 501.

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

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

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


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

555 Measurement Science I (3) (Same as Nuclear Engineering 587) Measurement Science I (3) (Same as Nuclear Engineering 587)

556 Measurement Science II (3) (Same as Nuclear Engineering 589 and Engineering Science and Mechanics 589.)

Biochemistry and Cellular and Molecular Biology

(College of Arts and Sciences)

MAJOR DEGREE

Biochemistry ................................................... M.S., Ph.D.
John W. Koontz, Head

Professors:
Bagby, R. M., Ph.D. ....................................... Illinois
Becker, J. M., Ph.D. ..................................... Cincinnati
Carlson, J. G. (Emeritus) (Distinguished Prof.), Ph.D. .......................... Pennsylvania
Chen, T. T., Ph.D. ........................................ Florida
Churchill, J. R., Ph.D. ................................. Sheffield
Handel, Mary Ann (Distinguished Prof.), Ph.D. ............................ Kansas State
Jeon, K. W., Ph.D. ......................................... London
Joshi, J. G., Ph.D. ........................................ Poona
Joy, D. C. (Distinguished Scientist), Ph.D. .............................. Oxford (UK)
Kennedy, J. P., Ph.D. ........................ .......... Iowa
Liles, J. N. (Emeritus), Ph.D. ................................ Ohio State
MacCabe, J. A., Ph.D. ............................... California (Davis)
Monty, Kenneth J., Ph.D. ............................. Rochester
Roth, L. Evans, Ph.D. ................................. Chicago
Salo, T. P. (Emeritus), Ph.D. ........................... Michigan
4. Participation in 601 and 603 during the entire period of residence. Participation in one other seminar or journal clubs each semester in residence.

5. Comprehensive examination, taken before the end of the third year of study.

6. A dissertation reporting the results of original and significant research carried out during the term of candidacy.

7. A final oral examination which will be concerned primarily with the student's dissertation.

Petitioning for Master's Degree

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

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

2. Publication of at least one full-length paper in a major scientific journal as senior author.

ACADEMIC COMMON MARKET

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

GRADUATE COURSES

403 General Genetics Laboratory (3) Experiments designed to illustrate basic principles of inheritance; primary organism--Drosophila. Prereq: General Genetics 2 lab.

410 Cellular and Comparative Biochemistry (4) Electrolyte behavior, chemistry and structure of proteins; enzyme behavior and biological function; catabolism and energy capture; synthetic metabolism; nucleic acid function; protein synthesis, and biochemical genetics; regulation of biological processes. Prereq: Organic Chemistry and General Biology 3 hrs and 1 discussion. F,Sp


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

430 Immunology (3) (Same as Microbiology 430.)

439 Immunology Laboratory (2) (Same as Microbiology 439.)


440 Laboratory in Physiology (2) Prereq or coreq: 440 or 443.

465 Human Genetics (3) Genetic and molecular principles and problems of human inheritance. Prereq: General Genetics.

471-478 Biochemical Chemistry (3,3) Physiochemical principles with applications to biological systems. 471--
methods, mechanisms of enzyme catalysis, gene expression, membrane structure and function, metabolic regulation, physical biochemistry, molecular genetics, cell ultrastructure and physiology, neurobiology, and related topics. Prereq: 511-12 or consent of instructor. May be repeated. Maximum 6 hrs.

Biomedical Sciences

(Office of the Vice Chancellor for Academic Affairs)

MAJOR

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

Raymond A. Popp, Director

Professor:

Olins, Donald E., Ph.D. .................... Rockefeller Popp, Raymond A., Ph.D. ....................

Research Professor:

Olins, Ada L., Ph.D. ....................... New York

Assistant Research Professor:

Hauser, Loren, Ph.D. ...................... California (Irvine)

Shared faculty are drawn from the Oak Ridge National Laboratory.

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

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

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

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

ADMISSION REQUIREMENTS

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

Requests for application forms, information on admission, financial aid, and specialization should be sent to Director, University of Tennessee-Oak Ridge Graduate School of Biomedical Sciences, Biology Division, ORNL, Box 2009, Oak Ridge, Tennessee 37831-8077.

THE DOCTORAL PROGRAM

1. Satisfactory (B grade or better) completion of the following core courses or their equivalents: Biochemistry (511); Biophysical Biochemistry (514); Genetics (515); Cell Biology (516); Computing for the Life Sciences (525); and Statistics for Biologists (574).

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

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

4. Satisfactory completion of formal advanced courses in the areas of the student's interests. The number and nature of the required advanced courses will vary depending upon the student's background and area of specialization.

5. Passing both written and oral comprehensive examinations.

6. A dissertation reporting the results of original and significant scientific research. A minimum of 24 semester hours of course 600 is required.

7. A final oral examination on the dissertation.

8. A formal seminar presentation of the dissertation research.

SPECIAL MASTER OF SCIENCE DEGREE PROGRAM

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

1. Graduate credit or a proficiency in the following course or their equivalents: Biochemistry (511); Biophysical Biochemistry (514); Cell Biology (516); plus any three of the following courses: Genetics (515); Statistics for Biologists (574); or Computing for the Life Sciences (525). Additional credit may be obtained (6 to 15 hours) with electives.

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

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

(College of Arts and Sciences)

MAJOR DEGREES

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

Edward E. Schilling, Head

4. A master's committee of three approved faculty members upon admission to candidacy.
5. A thesis reporting results of original and significant scientific research.
6. Passing a final oral examination.

GRADUATE COURSES

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

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

507 Physical Chemistry (3) Thermodynamics: phase equilibria; chemical equilibria; electrochemical force; surface chemistry; electrolyte solutions; kinetics; conductance; viscosity; diffusion.


514 Biophysical Biochemistry (3) Chemistry metabolism and biosynthesis of amino acids, pyrimidines and nucleic acids; biosynthesis of RNA, DNA, and proteins. Energy levels and excited states of large molecules; optical instrumentation; manipulations to system perturbation; properties of macromolecules in solutions; molecular solution; molecular conformations; inter- and intramolecular forces; principles of microscopy. Prereq: 511.

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

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

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

543-46-49 Graduate Research Participation (3,6,9) Special advanced research project not related to dissertation research. Topics chosen with consent of instructor. May be repeated.

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

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

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

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

Professors:

Caponetti, J. D., Ph.D. .................... Harvard
Clebsch, E. E. C. (Emeritus), Ph.D. ........ Duke
DeSelms, H. E. (Emeritus), Ph.D. .... Ohio State
Evans, A. M. (Emeritus), Ph.D. ......... Michigan
Hendron, W. R. (Emeritus), Ph.D. ..... Vanderbilt
Hickok, L. G., Ph.D. ....................... Massachusetts
Holton, R. W., Ph.D. .................. Michigan
Hughes, K. W., Ph.D. .................. Utah
Mullin, B. C., Ph.D. ........... North Carolina State
Petersen, R. H. (Distinguished Professor), Ph.D. ...... Columbia
Schilling, E. E. (Liaison), Ph.D. ........ Indiana
Sharro, A. J. (Emeritus, Distinguished Professor), Ph.D. ........ Ohio State
Walne, P. L. (Benwood Distinguished Professor), Ph.D. ........... Texas

Associate Professors:

Amundsen, C. C., Ph.D. .................. Colorado
Heilmann, A. S., Ph.D. .................. Ohio State
Schwarz, O. J., Ph.D. .............. North Carolina State
Smith, D. K., Ph.D. ..................... Tennessee
Wofford, B. E. (Curator), Ph.D. ........ Tennessee

Assistant Professors:

Cruzan, M. B. C., Ph.D. ........ SUNY (Stony Brook)
Pigigliucci, M., Ph.D. ................ Connecticut
von Armin, A. G., Ph.D. ........... East Anglia (UK)

Lecturer:

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

The Department of Botany offers the Master of Science and Doctor of Philosophy degrees with concentrations in anatomy, biophysics, cytology, cytopathology, ecology, genetics, lichenology, morphology, mycology, physiology, phylogeny, pteridology, and taxonomy.

Educational service is required of each graduate degree candidate and such service will include teaching and/or ancillary services performed in the department related to the instruction of courses. For further information, contact the Department Head or the Graduate Coordinator.

ADMISSION REQUIREMENTS

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

1. Bachelor's degree: a B.A. or B.S. from an accredited college or university and a cumulative grade-point average of 2.5 or better (on a 4.0 scale), with evidence of ability to do work of graduate quality.
2. General botany or general biology: 8 semester hours.
3. Advanced botany or closely allied biological sciences: 12 semester hours.
4. Physical sciences: general inorganic chemistry: 8 semester hours; organic chemistry. Physics highly recommended.
5. College mathematics: 6 semester hours including 1 term of calculus. Evidence of a broad undergraduate background, an ability to do work of graduate quality, and an interest in the study of plant science are considered to be more important than the particular courses taken as an undergraduate. Accordingly, students lacking specific prerequisite courses but otherwise qualified may be admitted to graduate studies in botany. In such cases, the deficiencies should be removed as soon as possible, typically during the first year of the student's graduate program. The determination of deficiencies and the manner in which they will be removed will be decided upon by the student's pro-term 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 form 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.
507 Biological Illustration (3) Principles and applications of photography (BW and Color) photomicro- and photomicrography, drawing, graphics and video for recording and presentation for research and publication of data in pictorial and graphic form.

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

521-22 Advanced Plant Physiology I, II (3, 3) 521- Plant biochemistry and metabolism: respiration, photosynthesis, carbon partitioning, and biosynthesis of specialized plant products: terpenoids, alkaloids, pheno- 

eres. 522- Growth and differentiation of plants at molecular and cellular/genomic levels. Hormones, control of development of development. Inter- 

cellular interpretation of differentiation, dormancy, germination, flowering and senescence. Prereq: Introduction to Biochemistry and Cellular and Molecular Biology 410 and 1 semester of Introductory Plant Physiology or Cell Biology.

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

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

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

573 Population Biology (3) (Same as Ecology and Evolutionary Biology 673.)

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

582 Methods and Instrumentation in Laboratory Investigation (1) Project experience and theoretical background in various research methods, scientific writing, research design, final presentation, laboratory methods, chemical analysis, instrumentation. Prereq: Chemistry 350, 360; Physics 121, 122. May be repeated. Maximum 5 hrs. S/N/C 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/N/C only.

600 Doctoral Research and Dissertation (3-15) S/N/C only. E

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

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

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

**Broadcasting (College of Communications)**

**MAJOR**

**DEGREES**

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

Barbara Moore, Head

Professors:

Holt, Darrell W. (Emeritus), Ph.D. ................... Northwestern

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

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

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

Ziegler, Dhyana, Ph.D. .............................. Southern Illinois

**Assistant Professors:**

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

Jackson, Evelyn, Ph.D. ............................... Ohio State

Wilkinson, Jeffrey, Ph.D. ............................. Georgia

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

**GRADUATE COURSES**

410 Electronic News Gathering (3) Writing, reporting, producing, and performing news for television. Experience as reporter/producer for television news program. Electronic news gathering equipment and techniques, video editing. Prereq: Radio-TV News 1 hr and 4 labs. E


430 Electronic Field Production (3) Principles of video production on location. Concepts relating to message design, development, and production in field: concept development, script writing, shooting graphics, sound design, lighting, and adding audio. Prereq: Audio/Video Production or consent of instructor. E

440 Corporate Video (3) Special requirements of business, industrial, educational, and medical uses of video. Management, budgeting, planning, producing, and evaluating projects. Prereq: 330 or consent of instructor.


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

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

480 Radio and Television Programming (3) Programming practices in radio, television, and cable. Nature and types of programs. Radio format, programming, Acquir- 


490 Radio & Television Management (3) Business policies and practices of broadcast organizations, depart- 

mental function, cost and income analysis, leadership styles and techniques, mid-level management. Cap-

stone course to be taken in student's last semester. Prereq: Senior standing. E

550 International Broadcasting (3) Broadcasting systems in other countries. Analysis of international broad- 

casting organizations. Intercultural communication and international broadcasting. Development and interna- 

tional broadcasting. Prereq: consent of instructor.

560 Radio & Television Law and Regulations (3) Legal problems faced by broadcast managers. Philo-

sophy and history of regulatory policy formulation. Efforts at self-regulation, sociopolitical constraints, effects of laws and regulations, and public pressure on stations, networks, cable and satellite technologies. Use and role of broadcasting, among media in terms of regulations. Prereq: Consent of instructor or admission to program. F

570 Radio & Television Research (3) Various tech-

niques used by stations and consultants in broadcast research. Applied audience research. Deciding which method to use, interpreting results, and applying re-
search to management decision making. Prereq: Communications 512 or 612, or consent of instructor. Sp.

580 Seminar in Radio and Television (3) Salient issues in broadcasting. Topics vary. International broadcasting, cable television, new technologies, corporate television, educational and public broadcasting, broadcasting and society. Prereq: Consent of instructor or admission to program. May be repeated. Maximum 6 hrs. F, S.


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

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

**Business Administration**

(Office of Business Administration)

**MAJOR DEGREES**

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

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

To obtain application materials, write or call:

Office of Graduate Business Programs, Suite 527, Stokely Management Center, College of Business Administration, The University of Tennessee, Knoxville, TN 37996-0592, Telephone: (423) 974-5033. For the executive program, telephone (423) 974-1660.

**ACADEMIC COMMON MARKET**

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state basis. The Ph.D. in Business Administration is available to residents of Alabama, Florida, or Kentucky (concentration in logistics and transportation only), or West Virginia; the MBA is available to residents of Louisiana (concentration in forest industries management or logistics and transportation), Alabama, Florida or Texas (concentration in logistics and transportation only), Kentucky (concentration in new venture analysis and entrepreneurship or environmental management), Virginia (concentration in environmental management or logistics and transportation), and West Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records. ACADEMIC STANDARDS

A graduate student in the College of Business Administration whose grade-point average falls below 3.0 will be placed on probation. A student on probation will be dropped from the program unless his/hers 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.

**THE MBA PROGRAM**

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

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

The program consists of two 15-credit-hour MBA core courses in the first year and 24 credit hours of concentration/elective courses in the second. Elective courses carry 3 or 6 semester hours of graduate credit.

**Admission Requirements**

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

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

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

**ACADEMIC STANDARDS**

A 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/hers 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.

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**MBA Core**

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

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

**Concentration and Electives**

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

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

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

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

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

**Concentration Area:** 3 hours (provided at least 6 hours of work at this institution are included in the concentration area).
**Elective Area:** 2 hours
Because of the fully integrated nature of the first-year curriculum, no credit hours are transferred into this core curriculum. The maximum number of hours that may be transferred to elective and concentration areas is 6 semester hours. Transfer credit will be considered upon formal petition to the Director of Graduate Business Programs.

**Other Requirements**
The Application for Admission to Candidacy must be approved by two faculty members and the departmental student's area of concentration and the Associate Dean in the College of Business Administration. It should be submitted to the Graduate Office at least one full semester prior to the date the degree is conferred. (Admission to candidacy in the fall semester permits graduation in the following spring semester.)

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

**BUSINESS ADMINISTRATION CONCENTRATIONS**
For complete listing of MBA program requirements, see above.

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

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

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

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

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

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

Upon admission, students begin MBA coursework in the fourth year and are awarded a BA degree at the end of that year. Upon successful completion of the fifth year (minimum of 50 semester hours of graduate credit), the student receives the MBA degree.

**DUAL J.D.-MBA PROGRAM**
The College of Business Administration and the College of Law offer a coordinated dual program leading to the conferral of both the Doctor of Jurisprudence and the Master of Business Administration. The dual program saves the student approximately one semester over the time that would be required to earn both degrees independently.

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

**Admission Requirements**
Applicants for the J.D.-MBA program must make separate applications, and be competitively and independently accepted by the College of Law for the J.D., The Graduate School and College of Business Administration for the MBA degree, and by the Dual Program Committee.

Students who have been accepted by both colleges may apply for approval to pursue the dual program anytime prior to, or after, matriculation in either or both colleges. Such approval will be granted, provided that dual program studies be started prior to entry into the last 28 semester hours of J.D. coursework and prior to entry into the second year of the MBA program. Students interested in entering the dual degree program should submit a letter of application to the Dual Program Committee.

Upon receipt of the application, the Dual Program Committee will determine eligibility and assign students to advisors who will be responsible for course approval and supervision of the student's progress through the dual program.

**Curriculum**
A dual program candidate must satisfy the graduation requirements of each college. Students withdrawing from the dual program before completion of both degrees will not receive credit toward graduation from either college for courses in the other college, except as such courses qualify for credit without regard to the dual program.

The College of Law will award up to 9 semester hours of credit toward the J.D. for acceptable performance in approved graduate-level courses offered by the College of Business Administration. The College of Business Administration will award up to 9 semester hours of credit toward the MBA for acceptable performance in approved courses offered in the College of Law. The approval of courses is the responsibility of the Dual Program Committee and the student's assigned advisor.

Students may begin their studies in either the J.D. or the MBA program, but may not enroll in MBA coursework while completing the first year of the law curriculum and may not enroll in J.D. coursework while completing the first year of the business curriculum. During the first year in the J.D. program, students register through the College of Law. For any term in which students take MBA courses, even though they are also taking law courses, they must register through the Graduate School. The Graduate School registration form must be approved by the Director of Graduate Business Programs.

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

Approved Dual Credit

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

EXECUTIVE MBA PROGRAM

The executive MBA is designed for professionals holding middle and upper level positions in organizations that wish to support their attainment of an MBA degree. The objective of the program is to provide advanced management skills to individuals who play key roles in leading their organizations.

The executive track of the MBA is a three consecutive terms completed in one year. Each term requires two residence periods on campus alternating with a continuous program of reading, study and on-the-job applications off campus. The off-campus work requires substantial and regular contact with program faculty and other participants and includes scheduled assignments to be carried out.

The program consists of three 12-hour core courses and a 9-hour sequence which is a project of diagnosis and analysis of a significant strategic issue in the sponsoring organization.

Admission Requirements

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

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

Transfer Credits

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

EXECUTIVE MBA in Taiwan

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

The Taiwan executive MBA is a three semesters of 16 credit hours each, including the same core and project courses described for the Knoxville program. Between each semester, there is a term when students are not enrolled. The program begins in the Summer term, includes Spring semester of the following calendar year and is completed in the Fall semester of that same year. All participants begin and complete the program together.

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

Admissions Requirements for the Executive MBA in Taiwan

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

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

THE DOCTORAL PROGRAM

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

Admission Requirements

Students seeking a Ph.D. degree must be recommended for acceptance by the College of Business Administration to The Graduate School. Actual admission is based on the applicant's overall standing compared with other applicants and with the number of vacancies in each department. The Graduate School requires the Graduate School Application, transcripts from all previous college work, and additional information from international students. The college requires the Ph.D. application, scores from the GMAT, and four written recommendations. All materials should be received by the College of Business Administration no later than March 1. Late applications are considered only if space is available.

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

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

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

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

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

1. Accounting
2. Finance
3. Logistics and Transportation Management
4. Operations Management and Strategic Management
5. Marketing
6. Statistics

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

Degree Requirements

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

1. Students must complete at least three years of full-time coursework beyond the baccalaureate degree, with two years of residence on the Knoxville campus.
2. Students are required to have a sound and broad base on which to build their Ph.D. coursework. The departmental doctoral advisor will work with the student to determine what, if any, courses need to be completed. All such work is subject to approval by the temporary doctoral advisory committee and the Director of Graduate Business Programs. Specific concentrations may have prerequisites.
3. Research Tools: A minimum of 9 semester hours of additional research methods courses beyond Statistics 531 are required. The remaining 3 semester hours may be completed in additional statistics courses (not to include Statistics 531) or in other areas such as research methodology, management science, computer science, econometrics, and psychometrics.

4. Concentrations: The concentration is the focal point of the Ph.D. program. Students are expected to master the literature and research techniques in the concentration area and to do quality research as evidenced by the preparation of an acceptable dissertation. A minimum of 12 semester hours of coursework is required, including at least 9 hours of doctoral seminars. Graduate work taken in the concentration at other institutions is considered by the temporary doctoral advisory committee in approving the specific coursework required. Available concentrations are: accounting, finance, logistics/transportation, management (operations management and strategic management), marketing, and statistics. See the appropriate fields of instruction for specific course requirements.
5. A minimum of 9 semester hours of graduate coursework is required in an area outside, but complementary to, the concentration. The student may choose the cognate from one of the following: one of the six concentration business areas listed above, economics, or a related area in another school or college of the University.

Comprehensive Examinations

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

When either the concentration or cognate area examination is passed, the remaining examination must be passed within the next 13 months.

Doctoral Committee

A doctoral student is advised to give serious attention early in the program to the composition of his/her doctoral committee. In accordance with Graduate School policy, the student and the major professor 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 Graduate School.

Dissertation

Minimum of 24 semester hours: The student must complete a dissertation embodying the results of original research demonstrating the ability to do scholarly writing. The dissertation is reviewed by the student's doctoral committee, which must certify its completion and acceptability after oral defense of the candidate's research effort. The dissertation normally must be completed within three years of the student's advancement to candidacy.

GRADUATE COURSES

504 Core I (15) Development of roles and responsibilities of business manager. Functional fundamentals (accounting, finance, marketing, operations, human resource management) through year-long case in which knowledge is applied to solution of simulated real-world enterprise. Continuous improvements in system and delivery of customer value: role of firm in society (with attention to stakeholder value, economics, and the ethical and legal environment of firm). Personal leadership skills: teambuilding, written and oral communication, and assessment of others. Prereq: 503 or consent of Director of Graduate Business Programs.

505 Core II (15) Continuation of 504. Functional fundamentals through year-long case. Case-study work on organizations as a systemic, competitive, managing technology, ethics and social responsibility, and strategic planning. Capstone integrated business simulation. Prereq: 504 or consent of Director of Graduate Business Programs.

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

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


553 Executive Core III (12) Continuation of 552. One 11-day period and one two-week period of residence at
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 the thesis. The minimum requirements are 15 hours in chemical engineering, 3 hours in other engineering, scientific, or business areas (as approved by the departmental faculty); and 3 hours chosen from either of these two categories.
3. Active participation in graduate seminars in the department. Resident students must register for ChE 501 every semester it is offered.
4. A final oral examination covering the thesis, related fields and graduate coursework.

**Non-Thesis Option:** Under certain conditions, a candidate may apply for a non-thesis program. To be eligible, a candidate must show evidence of significant professional experience after the baccalaureate degree; at least five years of industrial experience or research publications would be examples of such evidence. The departmental faculty will consider each application individually. Upon graduation, 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 20 hours in chemical engineering; 6 hours in other engineering, scientific, or business areas (as approved by the departmental faculty); and 12 hours given 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

THE DOCTORAL PROGRAM

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

Department requirements consist of the satisfactory completion of:

1. Graduate courses in chemical engineering, amounting to approximately 24 semester hours, at least 9 of which must be in 600 series courses.
2. Supporting courses in related scientific and engineering fields amounting to approximately 24 semester hours, subject to approval by the student's faculty committee. These related fields will normally include chemistry, mathematics, physics, and engineering.
3. The comprehensive examination, consisting of a written part and an oral part. The written part covers thermodynamics, reactor analysis, and transport phenomena and separations.

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

**GRADUATE COURSES**

- **503 Introduction to Optimization (3)** Principles and applications of optimization techniques to chemical processes; constrained and equality constrained optimization, linear programming, dynamic programming, and geometric programming. Prereq: Mathematics 241.
- **413 Computer Applications in Chemical Engineering (3)** Computer solution of chemical engineering problems. Application of existing personal computer programs. Flow sheet simulators, statistics, spreadsheets, graphics and process modeling.
- **447 Honors: Transport Phenomena (3)** Momentum, heat and mass transfer processes, analogies, differential and macroscopic balances, applications involving molecular diffusion, simultaneous mass, heat and chemical reaction. Prereq: Mass Transfer and Separation Processes and consent of instructor. F
- **485 Hydrocarbon Processing (3)** Chemical and physical properties of selected petroleum and these processes used in conversion of raw materials into useful feedstocks. Prereq: Mass Transfer and Separation Processes. Organic Chemistry. Prereq: 485 or Separation Technology. F
- **500 Thesis (1-15) P/NP only. E**
- **501 Graduate Seminar (1)** Prereq: Admission to graduate program. May be repeated. S/NP only. F-Sp
- **502 Registration for Use of Facilities (3-15)** Required for the student not otherwise registered during any semester in which the student uses University facilities. Faculty consent before the semester before degree is completed. May not be used toward degree requirements. May be repeated. S/NP only. E
- **505 Engineering Analysis (3)** Formulation and solution of problems in chemical engineering and materials 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 Numerical Linear Algebra in Systems and Control Engineering (3)** Fundamental concepts of linear algebra to problems in systems and control areas. Geometric and physical interpretations of relevant concepts: least square problems, LU, QR, and SVD decompositions of matrices, eigenvalue problems and similarity transformations in solving difference and differential equations. Numerical computational aspects of various algorithms. Application of linear algebra concepts in optimization studies. Introduction to linear programming. Prereq: Graduate standing or consent of instructor. (Same as Electrical Engineering 507 and Mechanical Engineering 507.)
- **531 Advanced Chemical Engineering Thermodynamics (3)** Phase equilibrium in ideal and nonideal solution, composition relationship between phases, solution behavior and application to macromolecules; introduction to microscopic approach to thermodynamics.
Chemistry

( College of Arts and Sciences)

MAJOR

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

William Bull, Acting Head

Professors:

Adcock, J. L., Ph.D. ................................... Texas

Alexandratos, S. D., Ph.D. ..................... California

Baker, D. C., Ph. D. .................................. Ohio State

Bartmess, J. E., Ph.D. ............................. Northwestern

Bloor, J. E. (Emeritus), Ph.D. .................. Manchester

Bull, W. E., Ph.D. .................................... Illinois

Chambers, J. Q., Ph.D. .............................. Kansas

Compton, R. N., Ph.D. ............................. Tennessee

Cook, K. D., Ph.D. .................................... Wisconsin

Dean, J. A. (Emeritus), Ph.D. .................. Michigan

Eastham, J. F. (Emeritus), Ph.D. .............. Minnesota

Fleming, F. A., Ph.D. .................................. Cornell

Guichon, G. (Distinguished Scientist), Ph.D. ... Ecole Polytechnique and Paris VI

Kabalka, G. W. (Distinguished Prof.), Ph.D. ... Purdue

Kleinfelter, D. C., Ph.D. ............................ Princeton

Kovac, J. D., Ph.D. .................................... Yale

Liebke, M. H. (Emeritus), Ph.D. ............... Wisconsin

Magli, L. J., Ph.D. ..................................... Tennessee

Magli, R. M., Ph.D. ...................................... Yale

Pagni, R. M., Ph.D. .................................... Wisconsin

Peterson, J. R., Ph.D. ............................... California

Schweitzer, G. K. (Distinguished Prof.), Ph.D. ... Illinois

Sepaniak, M. J., Ph.D. .............................. Iowa State

Smith, W. T. (Emeritus), Ph.D. ................. Ohio State

VanHooke, W. A., Ph.D. ......................... Johns Hopkins

Wehry, E. L. (Emeritus), Ph.D. ................. Purdue

Williams, T. F. (Distinguished Prof.), Ph.D. ... London

Woods, C., Ph.D. ...................................... NG State

Wundrich, B. (Distinguished Scientist), Ph.D. ... Northwestern

Associate Professors:

Barnes, C. E., Ph.D. ............................... Stanford

Feigler, C. S. (Laison), Ph.D. ................. Colorado

Lane, C. A., Ph.D. ....................................... California

Schell, F. M., Ph.D. ................................. Indiana

Assistant Professor:

Dadman, M. D., Ph.D. ............................ Massachusetts

Hinde, Robert J., Ph.D. ............................ Chicago

Xue, Z. B., Ph.D. ..................................... California

Students majoring in Chemistry for the master's or doctoral degree are required to present as a prerequisite two years of chemistry including quantitative analysis.

THE MASTER'S PROGRAM

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

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

1. Research and a thesis to give 6 to 12 hours of graduate credit in Chemistry 501.

2. Participation in seminar (Chemistry 501) during the entire period of graduate study, including the presentation of at least one seminar. (No more than 2 hours may be applied to the course requirements.)

3. Prescribed remedial courses based on performance on entrance examinations.

4. Sufficient graduate coursework in chemistry (at the 400 level or above). and/or a related field to make an overall total of 30 hours, including one of the following sequences: 530-31-32, 540-11-12, 570-72-73, 580-94-95, or three courses from 510-11-12-20. At least 14 hours of this graduate coursework must be at the 500 level or above.

5. A final oral examination.

THE DOCTORAL PROGRAM

The department offers concentrations in eight areas for the Ph.D.: analytical chemistry, chemical physics, inorganic chemistry, organic chemistry, polymer chemistry, physical chemistry, and theoretical chemistry.

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

1. Research and a dissertation to give at least 24 hours of graduate credit in Chemistry 600. Registration must be continuous from the beginning of research.

2. Participation in seminar (Chemistry 501) during the entire period of graduate study, including the presentation of at least one seminar.

3. Prescribed remedial courses based on performance on entrance examinations.

4. Completion of the comprehensive examination series and defense of an original research proposal to give 2 hours of credit in Chemistry 601.

5. Eighteen additional hours in courses at the 500 level or above including at least one course above 601 and one of the following sequences: 510-11-12, 530-31-32, 550-51-52-53-54, 570-71-72-73, and 590-84-85.

6. A final oral examination.

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

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

GRADUATE COURSES

430 Advanced Inorganic Chemistry (3) Atomic and molecular structure, bonding theories, descriptive chemistry of elements, kinetics and mechanism of inorganic reactions, applications of modern techniques for characterization, coordination and organometallic chemistry. Prereq: 230. Prereq or coreq: 380 or 381.
550 Structure and Reactivity in Organic Chemistry (3) Structure and bonding in organic compounds; molecular orbital theory, stereochemistry, conformational analysis, and molecular mechanics; substituent effects on acidity and reactivity; introduction to reaction mechanisms. Prereq: 360. F


552 Organic Reaction Mechanisms (3) Techniques and principles in study of organic reaction mechanisms; applications and interpretations in polar, radical, and pericyclic reactions; reactive intermediates. Prereq: 350. Sp

553 Spectroscopic Characterization of Organic Compounds (3) Organic structure elucidation using spectroscopic methods: nuclear magnetic resonance, infrared, ultraviolet, and mass spectrometry. Prereq: 350 or equivalent. F

554 Organic Spectroscopy Laboratory (1) Use of IR, UV, MS, and multinuclear FT NMR spectrometers. Development of problem-solving ability in area of spectroscopic characterization of organic molecules. Prereq: 350 or equivalent. Coreq: 553. F

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

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

572 Thermodynamics and Statistical Mechanics (3) Macroscopic and microscopic description of equilibrium systems. Basic principles of thermodynamics and statistical mechanics, and application to selected chemical systems. Prereq: 1 year of physical chemistry. F

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

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

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

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

610 Selected Topics in Analytical Chemistry (3) Topical of current significance. Prereq: Consent of Instructor. May be repeated. Maximum 12 hrs.

630 Selected Topics in Inorganic Chemistry (3) Topical of current significance. Prereq: Consent of Instructor. May be repeated. Maximum 12 hrs.

650 Selected Topics in Organic Chemistry (3) Topical of current significance. Prereq: Consent of Instructor. May be repeated. Maximum 12 hrs.

670 Selected Topics in Physical Chemistry (3) Topical of current significance. Prereq: Consent of Instructor. May be repeated. Maximum 12 hrs.

690 Selected Topics in Polymer Chemistry (3) Topical of current significance. Prereq: Consent of Instructor. May be repeated. Maximum 12 hrs.
The M.S. with a concentration in child development offers two tracks. Track 1 is designed to meet the needs of professionals who work in programs encompassing a variety of early childhood settings. Students in Track 1 consist of early childhood education, early childhood special education, early childhood administration, and child development. Track 2 is designed for students seeking initial teacher licensure in early childhood education (pre-K through grade 2). Students in Track 2 are required to take at least 3 hours of 500-level research methods; 3 hours of 500-level statistics; 6 hours of CFS courses in the area of concentration; 6 hours of thesis credit; and an oral comprehensive examination. Requirements include:

1. Minimum 10-13 credits in child and family studies required foundation courses: 510, 550, 570, 571 and 630 (child development area) or 540 (family studies area).

2. Minimum 12 credits in 500- and 600-level courses in child development or family studies, with at least 3 credits in 600-level courses (in addition to the required courses described in #1).

3. Minimum 6 credits in a cognate area.
4. Minimum 9 credits in graduate-level statistics; with at least 3 of these credits in a more specialized area than a sequence of survey courses.

Graduate courses:

500 Thesis (1-15) F/P/NP only. E
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E
505 Development of Interpersonal and Supervision Skills (2) Refinement of interpersonal skills needed to work with families and other professionals. Supervisory training in others' skill development, active listening, self-disclosure, relationship building, and negotiation.
510 Survey of Theory and Research in Child Development (3) Theoretical models and research literature in child development (conception through adolescence); application to research intervention and evaluation. Prereq: 9 hrs of either upper division undergraduate or graduate social science or consent of instructor. F
512 Survey of Research in Early Childhood Education (3) Current literature and issues in early childhood education. Prereq: 510 or equivalent or consent of instructor. F
515 Children in Contemporary Society (3) Theory and research on environmental and developmental issues in contemporary child situations and educational environments for children from infancy through middle childhood. Implications for programs and policy.
521 Organizational Management in Early Childhood Education (3) Designing, implementing, and evaluating physical and human resources in educational environments. Development of skills in environmental organization, interpersonal leadership, and supervision of staff. Prereq: 512 or equivalent or consent of instructor. F
522 Naturalistic Interventions for Parents and Teachers of Young Children (3) Common problems faced by parents and teachers; methods available to modify problem behavior. Prereq: 510 or equivalent or consent of instructor. F
525 Seminar on Play (3) Comparison and contrast of theoretical frameworks in research methodology on play. Developmental perspective on play.
530 Families of Handicapped Children (3) Developmental nature of family experience in caring for handicapped children, especially during infancy and early childhood. Prereq: 510 or consent of instructor.
540 Parent-Child Relations (3) Influence of parents on childhood, influence of children on parents, reciprocal interaction between parents and child, applications of systems models, child abuse, and impact of divorce on children. Prereq: 550 or equivalent or consent of instructor. F
550 Survey of Theory and Research in Family Studies (3) Use of family conceptual frameworks and application of theoretical models in research and family life programs.
552 Family in Contemporary Social Thought (3) Alternative conceptualizations of family in current social thought. Variation of family experiences by race, gender, and social class. Prereq: Consent of instructor. F
556 Children, Divorce and Remarriage (3) Children's and adolescents' adjustment to transitions involved in parental divorce, single-parenthood, and remarriage. Consent of instructor. F
560 Marital Dyad (3) Communication, power, sexuality, marital stability, and marital satisfaction. Prereq: 550 or equivalent or consent of instructor. F
561 Children in Crisis (3) Family processes during times of stress. Vulnerabilities and coping mechanisms of families. Prereq: 550 or equivalent consent of instructor. F
563 Family Life Education Programs (3) Planning, implementing and evaluating programs in marital, parent-child, and family relationships, and parenthood education. Prereq: Consent of instructor. (Same as Human Ecology 563.) F
564 Practicum in Human Development or Family Studies I (3) School and community programs. Education for human development and family living. Prereq: Consent of instructor. S/NC only. E
565 Practicum in Human Development or Family Studies II (3) School and community programs concerned with education for human development and family living. Committee approved and supervised written project. Prereq: 564 and consent of instructor. S/NC only. E
566 Approaches to Family Intervention and Counseling (3) Various theoretical approaches for family intervention and counseling. Structural, strategic, experiential, and social learning schools of practice. Effects of intervention from perspective of their impact on family 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. F
571 Field Experience (1-15) F/P/NP only. E
572 Field Experience II (1-15) F/P/NP only. E
573 Internship (1-15) F/P/NP only. E
574 Internship in Human Development or Family Studies (1-15) F/P/NP only. E
575 Field Experience I (1-15) F/P/NP only. E
576 Field Experience II (1-15) F/P/NP only. E
577 Field Experience III (1-15) F/P/NP only. E
578 Internship in Human Development or Family Studies (3) F/P/NP only. E
579 Internship in Human Development or Family Studies (6) F/P/NP only. E
580 Internship in Human Development or Family Studies (9) F/P/NP only. E
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., Ph.D. ................................ Illinois
Burdette, E. G. (Fred N. Peabody Prof.) , Ph.D. .......... Illinois
Chatterjee, A., Ph.D. .................................. NC State
Davis, W. T., Ph.D. .................................. Tennessee
Deatherage, J. H., Ph.D. .............................. Tennessee
Drumm, E. C., Ph.D. ................................... Arizona
Ghosh, M. (Goodrich Chair of Excellence), Ph.D. . . . Illinois
Goodpasture, D. W., Ph.D. ............................ Illinois
Greco, W. L. (Emeritus), Ph.D. ......................... Michigan State
Heathington, K. W. (Emeritus), Ph.D. ................... Northwestern
Humphreys, J. B. (Emeritus), Ph.D. .................. Texas A&M
Johnson, H. L. (Emeritus), M.S. ....................... Tennessee
Miller, W. A. (Granger Prof.), Ph.D. ................. Georgia Tech
Reed, G. D. (Liaison), Ph.D. .......................... Arkansas
Robinson, R. B. (Fisher Prof.), Ph.D. ................. Iowa State
Smoot, J. L., Ph.D. ..................................... VPI
Tschantz, B. A. (Condra Prof.) .............................. VPI
Trow, D. .............................................. New Mexico State
Walker, C. R. (Emeritus), M.S. ........................ MIT
Wegmann, F. J., Ph.D. ................................. Northwestern

Associate Professors:
Chou, K. G., Ph.D. ..................................... Northwestern
Hansen, J. H. (UTSI), Ph.D. ........................ Missouri
Miller, T. L., Ph.D. .................................. Tennessee
Moore, A. B., M.S. .................................. Tennessee
Richards, S. H., Ph.D. ................................ Tennessee
Robinson, K. G., Ph.D. ............................... VPI
Tiry, R. F. (Emeritus), B.S. .......................... Marquette

Assistant Professors:
Cox, C. D., Ph.D. ...................................... Penn State
Han, L. D., Ph.D. ..................................... California
Mauldon, M., Ph.D. .................................... California

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 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, including a 3-hour special problems required. The special problem will culminate in a written report which must be approved by the student's major professor.

Civil and Environmental Engineering

For a Master of Science with a major in Civil Engineering, normally a Bachelor's degree in a field of engineering is required. For a student who does not have an engineering background, the following minimum prerequisite courses will be required: Basic Engineering or Computer Science 101; Basic Engineering or Computer Science 121, 131; Engineering Science and Mechanics 231; Statistics 251; Civil Engineering 330, 335, 380; Mathematics 141, 142, 231, 241; Chemistry 120, 130. In general, these must be completed with a grade of at least A average before courses for graduate credit can be taken.

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

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

Non-Thesis Option: The student may present a minimum of 33 semester hours of approved graduate courses. The major shall include a minimum of 18 semester hours of approved environmental engineering coursework. A minor may be selected but is not necessarily required.

Either option must be approved by the student's major professor. A student's program must include a minimum of 9 semester hours of advanced engineering design courses selected from a list provided by the student's committee. Normally, the graduate program of study will be adjusted by the head of the department and the student's committee to suit the individual academic objectives.

THE DOCTORAL PROGRAM

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

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

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

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

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

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

After completion of the dissertation, prior to graduation, each student must pass a comprehensive examination administered by a faculty committee.

MINOR IN ENVIRONMENTAL POLICY

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

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S. program in Environmental Engineering (concentration in air quality or waste management) is available to residents of the state of Alabama. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

Civil Engineering

GRADUATE COURSES

406 Legal and Ethical Aspects of Engineering (2) Legal principles underlying engineering work; laws of contracts, torts, real property; problems of professional registration and ethical conduct; appraisal of a project.

421 Portland Cement and Asphalthic Concrete (3) Aggregate properties and tests, tests of portland cement concrete, mix design methods for concrete and asphalt, concrete admixtures, tests of asphalt and asphalt mixes, and nondestructive testing. Prereq: 321. 2 hrs and 1 lab.

451 Highway Engineering (3) Design, construction, operation, and maintenance of highway facilities; application of various engineering principles and techniques to process of planning, locating and design of highway facilities, both geometric and pavement design. Prereq: 210, 251, 325.

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

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

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

472 Steel Design (3) Design of plate girders and composite beams; consideration of members subjected to combined stresses; design of typical framed building connections. Prereq: 210.

474 Reinforced Concrete Design (3) Reinforced concrete beams and floor slabs, columns with combined axial loads and bending, footings and retaining walls. Prereq: 471.

485 Principles of Hydrogeology (3) Same as Geology 385.

490 Water Resources Project Design (3) Coherent development of multipurpose project, including dam project, data acquisition, spillway and outlet works design; earthen and gravity dam stability analyses; drains and filters; maintenance and control principles and safety concepts, dam break analyses. Prereq: 390, 395.

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

495 Water Resources Development and Management (3) Principles of water resources project development and planning and institutional frameworks: water law, evaluation procedures for comparing and selecting among water resources development alternatives, multi-objective planning, principles of engineering economics, cost-benefit analysis, and cost allocation methods; environmental impact assessment procedures; decisions using risk-based methods; case studies. Prereq: 390, Senior standing.

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

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

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

521 Pavement Design (3) Empirical and theoretical based methods of pavement design and analysis, strengthening existing pavements, pavement distress and economical design alternatives. Prereq: 521 and 330.


531 Soil Stabilization (3) Mechanical stabilization of soils by compaction, drainage, and blending; chemical stabilization of soils with admixtures, waterproofing and modifying soils and adding lime, soil cement, reinforced earth and blending with geopolymers. Prereq: Introduction to Soil Behavior.

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


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

538 Finite Element Applications in Geotechnical Engineering (3) Applications of finite element method to typical problems in geotechnical engineering. Conined and unconfined flow through porous media; stresses and strains in elastic halfspace; representation of nonlinear soil behavior with elastic and plastic models; stress flow interaction effects. Prereq: Introduction to Soil Behavior and 561.

539 Geotechnology Seminar (1) Seminar topics in geotechnical and geological engineering. Research contributions and case histories by graduate students and engineers and scientists in the surrounding community. Prereq: Graduate standing and consent of advisor. May not apply toward degree. May be repeated. 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 and organization of heavy and building construction projects. Prereq: Construction Methods and Equipment.

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

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

552 Traffic Engineering-Operations (3) Signs, signals and markings; short-term operations; controllers; signal timing/phasing; one-way reversible flow; system operations; identification and correction of high-accident locations and system deficiencies. Prereq: 551 or 452.

553 Geometric Design and Layout of Roadways and Communities (3) Geometric, design and rural and urban roads of all classes; subdivision layout; configuration of urban roads of all classes; lane widths for access control; freeway interchanges and street intersections; and parking. Prereq: 451 or consent of instructor.

554 Urban Transportation Planning (3) Urban transportation systems, transportation planning for identifying existing and future problems; travel surveys and demand models; transportation demand planning and management. Prereq: 562 or graduate standing.

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

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

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

558 Planning and Transportation (3) Preparation of transportation plans as a comprehensive development plan. Analysis of relationship between various transportation modes and other community features. Use of planning process to establish existing travel patterns, modeling of demand, proposing alternatives and evaluating. Prereq: Graduate standing. (Same as Planning 537.)

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

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

GRADUATE COURSES

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

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

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

510 Environmental Protection (3) Managing of water, wastewaters, air quality, solids, and hazardous materials; encourage efficiency and comfort to safeguard health, safety, and public welfare. Prereq: Consent of instructor.

515 Structural Design I (3) Analysis of trip generation, trip distribution, modal split, and traffic assignment, employing mathematical, statistical, and computer science techniques. May be repeated. Maximum 6 hrs. S/NC only.

525 Soil Erosion and Sediment Yield (3) Theory of soil erosion and sediment yield. Prereq: Civil Engineering 395. (Same as Agricultural Engineering 543.)


535 Ground Water Hydrology (3) Dynamics of flow and contamination of ground water; hydrogeological dispersion, advection, and groundwater contaminant transport phenomena. Prereq: Hydrology or Civil Engineering 485 for geology majors. (Same as Geological Sciences 535.)

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

541 Remote Sensing Data Acquisition and Analysis (3) Active and passive sensors; automated analog and digital analysis and interpretation systems. Image enhancement and classification techniques for color aerial photo and thermal imagery applications to environmental pollution and stress assessment. Prereq: Consent of instructor.

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

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

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

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

554 Environmental Engineering Chemistry (3) Application of chemical principles in analyzing physical, chemical, or biological interactions of chemical contaminants in various environmental compartments: air, water, soil, and biota, earth, and food. Prereq: One year chemistry and consent of instructor.

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

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

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

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

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

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

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

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

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

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

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

596 Special Readings (1-4) Readings related to current developments in field. May be repeated. Maximum 6 hrs. S/NC only.

600 Doctoral Research and Dissertation (1-15) P/NP only. E

651 Analysis Techniques for Transportation Systems I (3) Analysis of trip generation, trip distribution, modal split and traffic assignment, employing mathematical, statistical, and computer science techniques. State of the art and new modeling techniques. Prereq: 555 or 554.

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

665 Reliability of Constructed Systems (3) Development of reliability-based design codes; Monte Carlo methods; constructed system reliability; evaluation of existing infrastructures. Prereq: 555 or 554. (Same as Environmental Engineering 581.)

671 Behavior of Steel Bridges and Buildings (3) Behavior, analysis and design of plate girders, columns, and composite members subjected to static and dynamic loading. Prereq: Civil Engineering 395 or 390.

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

691 Special Topics in Civil Engineering (3) Selected advanced problems of current interest. Prereq: Consent of instructor. May be repeated.
651 Industrial Waste Operations and Processes (3) Theoretical design and laboratory modeling of industrial waste treatment processes and operations. Prereq.: 551, 553. Prereq or coreq: 552. 2 hrs and 1 lab.


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

673 Microbiological Systems Analysis (3) (Same as Chemical Engineering 675.)

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

Classics
(College of Arts and Sciences)

Susan D. Martin, Head

Professors:
Gesell, G. C., Ph.D. .................. North Carolina
Rutledge, H. C., Ph.D. ................ Ohio State

Associate Professors:
Craig, C. P., Ph.D. .................. North Carolina
Martin, S. D., Ph.D. ................ Michigan
Shelton, J. W., Ph.D. ................. Vanderbilt
Tandy, D. W., Ph.D. ................. Yale

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. Prereq: 351-352 or consent of instructor. Prereq: 351-352. Prereq or consent of instructor. May be repeated. Maximum 9 hrs.

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

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

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

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

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

531 Special Topics in Latin Literature (3) Advanced study of classical or medieval Latin literature. Authors vary. Prereq: Consent of students and instructor. Prereq: 531-532. Prereq or consent of instructor. May be repeated. Maximum 9 hrs.

551 Special Topics in Classical Civilization (1-3) Special advanced tutorial work in Greek and Latin authors. May be repeated. Maximum 9 hrs. Letter grade or S/NC.

Communications
(College of Communications)

MAJOR

DEGREES

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

The College of Communications offers the Master of Science and the Doctor of Philosophy degrees with a major in Communications.

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

ADMISSION REQUIREMENTS

Applicants must meet admission requirements of The Graduate School. In addition, they must complete the Graduate Record Examination, rating forms, and application forms as required by the College of Communications. Minimum requirements for admission to full potential candidate status normally include a 3.0 (4.0 system) grade-point average in undergraduate studies and scores at or above the fiftieth percentile in verbal and quantitative aptitude on the Graduate Record Examination. All application materials are screened by an admissions committee authorized by the faculty of the College of Communications. New students normally are admitted to the programs only at the beginning of fall semester. However, under special circumstances, a student may be admitted at the beginning of spring semester in a temporary non-degree status. Applications for fall admission must be received by May 1. Applications for financial aid are due by March 1.

A baccalaureate degree in communications or a related field is recommended. Admission is possible with other baccalaureate degrees. However, all applicants without the appropriate background are required to take up to 18 semester hours of prerequisite and corequisite courses as determined by the department in which the student is enrolled. Students may take a proficiency test on any prerequisite course, subject to review by the master’s or doctoral committee of the College of Communications. Students who have had no courses in their major area of concentration may expect to spend four or more full-time semesters in the program, including a media internship.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of the states of Alabama, Arkansas, Louisiana, Maryland, Virginia, or West Virginia additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

ACADEMIC STANDARDS

A student in the College of Communications whose 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 Communications on the recommendation of the student’s faculty committee.

THE MASTER’S PROGRAM

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

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

Degree Requirements

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

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

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

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

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

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

A student's internship experience requires approval by his/her advisor. Credit will be given through Advertising 598, Broadcasting 599, or Journalism 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. Professional experience will be evaluated by the student's committee.

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

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

THE DOCTORAL PROGRAM

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

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

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

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

1. a 3.0 (4.0 system) grade-point average in undergraduate studies, or 3.5 for graduate work in a master's degree.
2. at or above the fiftieth percentile in verbal and quantitative aptitude on the Graduate Record Examination;
3. endorsement by at least three former teachers or professional colleagues; and
4. a statement of the applicant's goals and reasons for pursuing the doctorate. Personal interviews with members of the Ph.D. Admissions Committee are recommended and may be required. Professional experience in some field of communications is a highly desirable criterion for admission.

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

1. Twenty-eight hours of core courses—Communications 610, 612, 620, 640, 641; 6 hours of statistics; and three of the following courses: Communications 622, 632, 642, and 652.
2. Fifteen hours in a primary concentration (advertising, broadcasting, information sciences, journalism, public relations, or speech communication) supplementing the core. Courses may be taken in one or more of the Departments of Advertising, Broadcasting, Speech Communication, and/or the Schools of Information Sciences and Journalism.

3. Twelve hours in a secondary concentration (outside the College of Communications).
4. Nine hours in a primary concentration.
5. Twenty-four hours of dissertation.
All courses require the approval of the student's advising committee.

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

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

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

Planned course offerings in the College of Communications for a full calendar year are available for the preceding November. This information is available from the Graduate Studies Office, 426 Communications Building, 974-6651. See also courses listed under Advertising, Broadcasting, Information Sciences, Journalism, and Speech Communication.

GRADUATE COURSES

400 Mass Communications Law and Ethics (3) Legal issues directly affecting the mass media: libel, privacy, free press-fair trial, judicial controls, governmental regulations. Ethical standards and practices of mass media in America. Prereq: Writing for Mass Communication or consent of instructor. E

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

502 Registration for Use of Facilities (3-15) Required in the last semester of candidacy. May not be used as a prerequisite.

510 Orientation to Master's Studies (1) Degree and dissertation requirements, development of research and program planning. Overview of research methods and informational sources. Prereq: Consent of instructor or admission to program. S/NC only. F

512 Fundamentals of Media Research (3) Applications of communications research techniques for management. Gathering and analysis of data for assessing media audiences and usage impacts. Prereq: Consent of instructor or admission to program. S/NC only. F

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

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

550 Seminar in Media Economics and New Technology (3) Electronic and print media ownership, finance and organizational structure and function. Prereq: Consent of instructor or admission to program. Sp


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

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


570 Independent Study (1-3) Research, projects on special topics in communication. On individual basis, under faculty direction, with consent. May be repeated. Maximum 6 hrs. E

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

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

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

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

610 Orientation to Doctoral Research (3) Degree and dissertation requirements. Committee formation and program planning. Overview of research methods and informational sources. Prereq: Consent of instructor or admission to program. S/NC only.

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

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

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

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

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

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

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

652 Mass Communications Law and Legal Research (3) Legal restrictions under which mass media operate. Finding, interpreting and analyzing sources of legal information. Prereq: 612 or consent of instructor. Sp

692 Advanced Topics in Communications Theory and Methodology (3) Advanced study of communication issues, theories and methods. May use qualitative, quantitative, historical or legal approaches. May be repeated. Prereq: 622, 632, 642 or 652 or consent of instructor.
Comparative and Experimental Medicine
(Office of the Vice Chancellor for Academic Affairs)

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

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

The Comparative and Experimental Medicine degree program (M.S. and Ph.D.) is a jointly-administered graduate program intended to prepare students for teaching and/or research careers in the health sciences. This program emphasizes the comparative approach to the study of experimental pathobiology, infectious diseases, 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 an undergraduate biological background, the Comparative and Experimental Medicine program provides an unusual opportunity to study disease processes common in humans and animals from a multidisciplinary perspective. The scope of this intercollegiate program, which pools faculty resources from both veterinary and human medicine, is broadened by faculty members representing animal science and numerous areas of the life sciences. The interdisciplinary training environment includes such diverse support as facilities and personnel at the Veterinary Teaching Hospital, UT Medical Center at Knoxville, the Oak Ridge National Laboratory, Knoxville Zoological Park, Hemophilia Clinic, Developmental and Genetic Center, Hematology and Oncology services, and departments of public health sciences.

For additional information, write to the Office of Research and Graduate Programs, P.O. Box 1071, Knoxville, TN 37901-1071.

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

Master of Science Degree Program
Applicants must have a baccalaureate degree with coursework in chemistry through organic, mathematics through calculus, physics, and basic biology. More advanced study in biology such as biochemistry, mammalian anatomy, histology, cell biology, or other appropriate biomedical courses from an accredited university is recommended.

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

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

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

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

THE MASTER'S PROGRAM
All students must take at least 4 credit hours in 500- or 600-level courses in basic mechanisms of disease and at least 7 credit hours of 500-level biochemistry or cell biology. See listings under Biochemistry and Cellular and Molecular Biology program for information on these courses. In addition, students must complete a minimum of 8 hours of coursework in a specified discipline, 5 or more hours of electives, and 6 hours of Thesis 500.

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 all members, including the chair, must be approved by the Graduate Council to direct doctoral research. At least one member must be from the College of Veterinary Medicine and at least one member from the Graduate School of Medicine.

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

Comparative and Experimental Medicine--Graduate School of Medicine

GRADUATE COURSES
Participating departments include: Anesthesiology, Medicine, Medical Biology, Obstetrics and Gynecology, Pathology, Pediatrics, Radiology, and Surgery.

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

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

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

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

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

545 Clinical Genetics (3) Human genetic disorders: new developments in cytogenetics, molecular genetics, clinical diagnoses and prevention. Prereq: Biology, biochemistry, and genetics background or consent of instructor.

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

610 Medical Biology Seminar (1) Invited speakers. Topics posted in advance. May be repeated. S/NC only. E

611 Advanced Topics in Medical Science (1-3) New developments in biological research applicable to clinical medicine. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. (Same as Biochemistry and Cellular and Molecular Biology 611.) E

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

Glossary
- Biochemistry and Cellular and Molecular Biology
- Developmental and Genetic Center
- Veterinary Teaching Hospital
- Graduate Record Examination
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/NP only. E

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

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

503 Predictive Toxicology (3) Principles and techniques of predictive toxicity: structure-activity relationships, expert systems, neural nets and molecular similarity. Sp, Fa

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. Fa

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. F

521 Advanced Mammalian Physiology I (4) Membrane, neuron, central nervous system, muscle, cardiovascular system, and control mechanisms. Prereq: General undergraduate anatomy and physiology and Biology 410 or equivalent or consent of instructor. Recommended prereq: Biochemistry and Molecular Biology 419. (Same as Biology and Molecular Biology 521.) 3 hrs and 1 lab. Fa

530 Wildlife Diseases (2) (Same as Wildlife and Fisheries Science 530.)

536 Toxicology (2) (Same as Veterinary Medicine 536.)

537 Multi-Species Medicine (4) (Same as Veterinary Medicine 537.)

538 Nutritional Aspects of Companion Animal Health (2) (Same as Animal Science 538.)

545 Principles of Medical Science (2) (Same as Veterinary Medicine 545.)

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

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

554 Comparative Hematology (3) (Same as Animal Science 554.)

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

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

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

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

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

605 Pathobiology Seminar (1) Subjects of current interest in biomedical sciences. 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. Laboratory: appraisal of outcome, performance, and design of proposal for clinical research project. Prereq: Consent of instructor. Sp

607 Diagnosis and Pathogenesis of Virus Diseases of Domestic Animals (3) Advanced study of virus diseases important to domestic animals: virus biology, pathogenesis, pathology and disease diagnosis. Prereq: Cell and Molecular Biology 401 or comparable experience. 4 hrs and 1 lab. Fa

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

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

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

615 Advanced Topics in Animal Anatomy (1) (Same as Animal Science 615.)

652 Disorders of the Endocrine System (2) (Same as Animal Science 652.)
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 500 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 550, 560 and 580 are required for the degree. At least six hours of 600-level graded courses must be taken in computer science at UTK. The student's advisor and committee will establish the specific course requirements. The comprehensive examination consists of a departmental written examination and a subsequent oral examination conducted by the student's committee.

GRADUATE COURSES

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

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

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

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

521 Artificial Intelligence (3) Heuristic search, automatic theorem proving, symbolic methods, semantic information processing, representation theory. Prereg: Discrete Structures and Problem Solving.

522 Cybernetics (3) Various functions in living systems and their actual or potential realization in computers. Prereg: Discrete Structures.

523 Machine Learning (3) Algorithms whereby computers exhibit aspects of learning or inference about their environment. Supervised and unsupervised methods; data-driven pattern analysis; explicit and implicit structure. Prereg: 521.

525 Software Engineering (3) Survey of key ideas in software engineering: formal methods, tools, testing, reliability, structured design and development, metrics, management and history of the field.


551 Pattern Analysis (3) Decision-theoretic and structural pattern analysis. Deterministic and statistical decision rules, feature extraction and representation, syntactic and semantic methods, relational models. Prereg: Digital design and probability or statistics.

552 Image Analysis (3) Techniques of computer image processing and understanding. Prereg: 551.

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


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

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

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

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

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

580 Foundations (3) Finite automata and regular sets, push-down automata and context-free languages, Turing Machines, recursively enumerable sets, undecidability, Cook's theorem and NP-completeness. Prereg: Discrete Structures.

581 Design and Analysis of Algorithms (3) Analysis of algorithms and relevance of analysis to design of efficient computer algorithms. Sorting, searching, graph algorithms, pattern matching, dynamic programming, efficient approximation algorithms.


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

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

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

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

630 Advanced Topics in Computer Systems (1-5) Prereg: Consent of instructor. May be repeated with consent of department.

640 Advanced Topics in Databases/Information Retrieval (1-6) Prereg: Consent of instructor. May be repeated with consent of department.

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

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

670 Advanced Topics in Numerical Mathematics (1-6) Prereg: Consent of instructor. May be repeated with consent of department.

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

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

Counselor Education and Counseling Psychology (College of Education)

MAJORS

Counselor Education and Counseling Psychology

DEGREES

Education.................................Ph.D. Educational Psychology .....................M.S., Ed.D. Educational Psychology and Guidance ...... Ed.S. Guidance ....................M.S.

M. A. Hector, Leader

Professors:


Associate Professor:

Hutchens, Teresa A., Ph.D. ............Georgia

The Counselor Education and Counseling Psychology unit offers graduate programs leading to the following: Master of Science with a major in Educational Psychology, concentration in community counseling; Master of Science in elementary guidance, secondary guidance, and school counseling; Educational Specialist with a major in Educational Psychology and Guidance, concentration in school counseling; and Doctor of Education with a major in Educational Psychology, concentration in counselor education. The unit also participates in the college-wide Ph.D. program with a major in Education. The concentration area is theories and practices of educational and personal adjustment with specializations in counselor.
education, counseling psychology, and educational psychology. See Education Under fields of instruction for full description of all degree requirements.

Several programs in the unit are accredited. The Ed.D. counselor education concentration and the Ph.D. specialization in counselor education are accredited by the Council for Accreditation of Counseling and Related Educational Programs; counseling psychology by the American Psychological Association. Also, the school counseling program has the approval of the National Council for Accreditation of Teacher Education. The community counseling and school counseling programs are accredited by the Council for Accreditation of Counseling and Related Educational Programs. The program in Educational Psychology has been recognized as a "Designated Program" by the American Association of State Psychology Boards and the Council for the National Register of Health Service Providers in Psychology for information about the various programs of study, write to the unit admissions secretary.

ADMISSION REQUIREMENTS

Admission requirements include up-to-date scores from the GRE, the unit admissions application form and letters of recommendation. For the doctoral program, a writing sample is also required. The application deadline for admission is February 1 for all programs. Some programs also review applications November 1.

GRADUATE COURSES

410 Sex Role Development: Implications for Education and Counseling (3) Theory and research concerning development of sex role and its relevance in educational and counseling settings. F, Su

431 Personality and Mental Health (3) Various perspectives of mental health with application to education and other social institutions. E

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

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


504 Special Topics (1-3) Instructor-initiated course offered at convenience of academic unit on topics of current interest. May be repeated. Maximum 16 hrs. S/NC or letter grade. E

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

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

521 Statistics and Research Design: Application (3) Data collection and analysis. Descriptive techniques, estimation, logic of hypothesis testing and selected parametric and nonparametric tests. For master's students conducting thesis and beginning doctoral students. Use of computer statistical packages. F, Su

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

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

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

552 Career Development: Vocational Theory, Research and Practice (3) Relationship of vocational theory, career development research and societal factors to life career roles. F, Su

553 Career and Educational Information Systems and Resources (3) Use of print and non-print materials: computer-based systems, for career and educational planning. Prereq: 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. E

555 Practicum in Counseling (3) Supervised practice and application of counseling skills with individual clients. Prereq: Admission to program, 431, 552, 551 and consent of instructor. May be repeated. Maximum 9 hrs. S/NC only. F, Sp

556 Seminar in Community Agency Counseling (1) Orientation to professional organizations, code of ethics, certification requirements, and role identity of community agency counselors. May be repeated. Maximum 2 hrs. S/NC only. F, Sp

558 Internship 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. E

559 Internship in Community Agency Counseling (1-6) Supervised practicum employment at academic unit approved human service agency. Prereq: Admission to community agency program, 555 and consent of instructor. May be repeated. Maximum 12 hrs. S/NC only. E

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

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

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

585 Seminar in Gerontology (1) (Same as Human Development 585, Psychology 585, Psychology 585, Psychology 585, Psychology 585.)

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

600 Doctoral Research and Dissertation (1-15) P/NP only. E

602 Directed Research (1-3) Instructor-initiated course in research and application of research in educational and counseling psychology may be repeated. Maximum 12 hrs. S/NC only. E

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

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

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

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

655 Practicum in Counselor Education (3) Supervised practice and application of counseling skills with clients. Prereq: Admission to counselor education program and consent of instructor. May be repeated. Maximum 6 hrs. Sp

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

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


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

672 Psychological Dysfunction (3) Classification methods, dynamics and treatment of dysfunctional individuals in counseling. Prereq: 625 and course in abnormal psychology, or consent of instructor. A

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

674 Practicum in Counseling Psychology (3) Supervised practice of individual counseling. Minimum 15 clock hrs required each semester. Prereq: Admission to counseling psychology doctoral program, 555, and consent of instructor. May be repeated. Maximum 6 hrs. E

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

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

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

Cultural Studies in Education

(Majors in Education)

MAJOR

DEGREES

Curriculum and Instruction .............. M.S., Ed.D. Education .............. Ph.D.

Human Performance and Sport Studies .............. M.S., Ed.D.

J. Paul, Leader

Professors:


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


Winsberg, C. A., Ph.D. .......... Michigan

Wrisberg, C. A., Ph.D .......... Michigan

Beitel, Patricia A., Ph.D. .......... Oklahoma
533 Psychology of Sport (3) Social psychological factors influencing human behavior in sport context; discussion of contemporary theory, research, and methodology. Prereq: General psychology course or consent of instructor.
534 Motor Behavior and Skill Acquisition (3) Topical explanation and application of principles of human movement behavior to acquisition and performance of skills; discussion of current research and methodology.
540 Foundations of Educational Policy (3) Relationship between policy, theory, and practice; educational policies that arise from philosophical and practical considerations relative to human nature, to educational purpose, to content of curriculum and to methods and techniques for conducting educational enterprise. F, Su
541 Special Topics (1-3) Advanced study in selected disciplinary or professional areas of physical education and/or sport. May be repeated.
542 Sociological Aspects of Sport (3) Social and cultural factors influencing sport and physical education. Pertinent issues and research applications. Prereq: Consent of instructor. (Same as Sociology 542.)
543 Human Motor Development (3) Changes in selected motor performance and related attributes that affect empirical development during critical developmental periods within context of perceptual-motor development theories and explanations of factors affecting motor behavior.
545 Educational Sociology (3) Sociological analysis of American educational system; controversy social issues that affect educational system and potential solutions offered by various programs. Open to juniors, seniors, and graduate students. F, Su
546 Topics in History of Education (3) May be repeated. E
547 Topics in Philosophy of Education (3) May be repeated. F, Su
549 Topics in International Education (3) Historical, philosophical, and sociological foundations; selected nations and their cultures. May be repeated. E
560 Introduction to Qualitative Research in Education (3) Fundamentals of qualitative research methods and development of skills needed for qualitative research proposals. Overview of qualitative research methods: ethnography, case study, hermeneutics, biography, and life history. Critical reading and evaluation of qualitative research studies. F, Su
593 Independent Study (1-3) May be repeated. S/N or letter grade. E
594 Supervised Readings (1-3) May be repeated. S/N or letter grade. E
595 Special Topics (1-3) Advanced study in selected aspects of cultural studies. May be repeated. Maximum 9 hrs. S/N or letter grade. E
600 Doctoral Research and Dissertation (3-15) P/NP only. E
601 Practicum (1-3) Intern experience in areas of major interest. May be repeated. E
603 Problems in Lieu of Thesis (2-3) May be repeated. Sp
500 Thesis (1-15) P/NP only. E
501 Special Project (3) Culminating experience for non-thesis major. Research study suitable for publication, or practicum requiring special written work. Prereq: SUC.
502 Registration for Use of Facilities (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. SUC only. E
503 Problems in Lieu of Thesis (2-3) May be repeated. Maximum 9 hrs. SUC only. E
505 History of Olympics: Ancient and Modern (3) Examination of various aspects of ancient and modern Games. Ancient Olympic Games, 776 BC to 393 AD. Parthenon, modern Olympics, 1896 to date: political, social, class, gender, and economic issues that influence Games. Fall
514 Advanced Philosophy of Sport (3) Major philosophical theories of sport. Various conceptual, moral, aesthetic, and social-political issues. Spring
515 Social Theories of Sport (3) Liberal, democratic and Marxist social theories of sport. (Same as Sociology 594.)
526 Philosophy of Education (3) Truth, knowledge, and valuation in relation to work of schools. F, Su
559 Development of Education Thought (3) Historical and philosophical approaches to lives and writings of influential educators: Plato, Quinlin, Comenius, Rousseau, Pestalozzi, Froebel, Dewey, Prereq: Graduate status and consent of instructor. Sp, Su
530 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.
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541 Special Topics (1-3) Advanced study in selected disciplinary or professional areas of physical education and/or sport. May be repeated.
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545 Educational Sociology (3) Sociological analysis of American educational system; controversy social issues that affect educational system and potential solutions offered by various programs. Open to juniors, seniors, and graduate students. F, Su
546 Topics in History of Education (3) May be repeated. E
547 Topics in Philosophy of Education (3) May be repeated. F, Su
549 Topics in International Education (3) Historical, philosophical, and sociological foundations; selected nations and their cultures. May be repeated. E
560 Introduction to Qualitative Research in Education (3) Fundamentals of qualitative research methods and development of skills needed for qualitative research proposals. Overview of qualitative research methods: ethnography, case study, hermeneutics, biography, and life history. Critical reading and evaluation of qualitative research studies. F, Su
593 Independent Study (1-3) May be repeated. S/N or letter grade. E
594 Supervised Readings (1-3) May be repeated. S/N or letter grade. E
595 Special Topics (1-3) Advanced study in selected aspects of cultural studies. May be repeated. Maximum 9 hrs. S/N or letter grade. E
600 Doctoral Research and Dissertation (3-15) P/NP only. E
601 Practicum (1-3) Intern experience in areas of major interest. May be repeated. E
603 Problems in Lieu of Thesis (2-3) May be repeated. Sp
500 Thesis (1-15) P/NP only. E
501 Special Project (3) Culminating experience for non-thesis major. Research study suitable for publication, or practicum requiring special written work. Prereq: SUC.
502 Registration for Use of Facilities (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. SUC only. E
503 Problems in Lieu of Thesis (2-3) May be repeated. Maximum 9 hrs. SUC only. E
505 History of Olympics: Ancient and Modern (3) Examination of various aspects of ancient and modern Games. Ancient Olympic Games, 776 BC to 393 AD. Parthenon, modern Olympics, 1896 to date: political, social, class, gender, and economic issues that influence Games. Fall
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515 Social Theories of Sport (3) Liberal, democratic and Marxist social theories of sport. (Same as Sociology 594.)
526 Philosophy of Education (3) Truth, knowledge, and valuation in relation to work of schools. F, Su
559 Development of Education Thought (3) Historical and philosophical approaches to lives and writings of influential educators: Plato, Quinlin, Comenius, Rousseau, Pestalozzi, Froebel, Dewey, Prereq: Graduate status and consent of instructor. Sp, Su
ACADEMIC COMMON MARKET

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

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

GRADUATE COURSES

411-412 Minicourse in Ecology and Evolutionary Biology (2) Selected advanced topics in ecology, behavior, and evolutionary biology, concentrated in time and subject matter. Consult departmental listing for topics offered. Prereq: consent of instructor. May be repeated. Maximum 4 hrs may apply toward departmental major.

431 Plant Ecology (3) Interactions between individuals, species, communities, and their environments. Circulation of energy and matter in ecosystems. Weekly field trips to local ecosystems, and at least two weekend field trips. Prereq: Field Botany or equivalent. Su

540 Comparative Animal Behavior (3) Principles and methods of ethology: ecological, developmental, physiological, and evolutionary aspects. (Same as Psychology 450.)

549 Comparative Animal Behavior Laboratory (3) Introduction to observational and experimental research in ethology. Coreq: 450. (Same as Psychology 459.)


570 Aquatic Ecology (3) Introduction to the physicochemical nature of inland waters with description of biotic communities and their interrelationships. Prereq: General Chemistry and General Ecology. 2 hrs and 1 lab.

571 Field Limnology (3) Lab and field investigations of the physicochemical nature of inland waters, focusing on interrelationships within biotic communities. Prereq: One year of introductory chemistry; General Ecology. 470 consent of instructor. Lab, field, and independent project.

572 Arachnology (3) Biology of spiders, mites, scorpions and relatives. Prereq: Comparative Invertebrate Biology or General Entomology. 2 hrs and 1 lab.


575 Ornithology (3) Behavior, ecology, populations, evolution and field identification of birds. Prereq: General Ecology. 2 hrs and 1 lab.

577 Mammalogy (3) Evolution, classification, biogeography, ecology, behavior and functional anatomy of mammals. Prereq: General Ecology or equivalent. 2 hrs and 1 lab.

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

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

591 Graduate Research Participation (3) Advanced research techniques studied under supervision of staff research director. Open to all graduate students in good standing. Prereq: Consent of department and research director. S/N only.

592 Registration for Use of Facilities (2-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N only. E

596 Research Methods (1-3) Instruction in methods and techniques of research. Consult departmental listing for offerings. May be repeated with consent of instructor. Maximum 9 hrs.

598 Special Topics (1-2) Selected directed readings or special course in topics of current interest. Consult departmental listing for offerings. May be repeated with consent of instructor. Maximum 9 hrs.

599 Problems in Ecology (1-3) Individual investigations in ecology. May be repeated with consent of instructor. Maximum 6 hrs.

650 Colloquium in Ecology (1) (Same as Psychology 516.)

520 Ecology for Planners and Engineers (3) Ecological principals and effects that human-caused changes have on living organisms. Lectures and fieldtrips. Appropriate for students in Planning and Environmental Engineering.

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: Basic Graduate Courses in minors in physiology and ecology, Biochemistry and Cellular and Molecular Biology 440 and General Ecology or equivalent.

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 of insect tissue and cellular level of insects. Prereq: Consent of instructor.

543 Aquatic Insects (3) Taxonomy and biology of aquatic insects; immature forms. Prereq: Consent of instructor. 2 hrs and 1 lab.

544 Fresh Water Invertebrate Zoology (3) Ecology and taxonomy of fresh water invertebrates exclusive of insects. Prereq: Comparative Invertebrate Biology. 3 hrs lab and field study.

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

547 Conceptual Foundations of Evolution and Behavior (3) (Same as Psychology 547.)

552 Development Planning in the Third World (3) (Same as Planning 552.)

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

560 Biometry (3) Statistical methods in analysis of quantitative biological data. Prereq: Statistics course or consent of instructor.

561 Environmental Toxicology (3) (Same as Biochemistry and Cellular and Molecular Biology 561.)

573 Population Biology (3) Genetics and ecology of natural populations of plants and animals and aspects of behavior in determining population structure. Prereq: Introductory courses in ecology and genetics. (Same as Botany 573.)

574 Communities and Ecosystems (3) Patterns underlying principles behind short and long term community and ecosystem organization, dynamics, energetics and nutrient cycling.

575 Ecological Genetics (3) Genetics of natural populations, using both single-locus and quantitative genetic approaches. Prereq: 573 and statistics course.
Economics
(Consider Business Administration)

MAJORS

Economics................................................. M.A., Ph.D.
Business Administration.................................M.B.A.

William F. Fox, Head

Professors:

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

Schottman, Alan M., Ph.D....................... Washington (St. Louis)
Spiva, George A. (Emeritus), Ph.D........ Texas

Associate Professors:

Gauger, Jean A., Ph.D....................... Iowa State
Glusloff, Errol, Ph.D......................... Stanford
Kahn, James R., Ph.D............................ Maryland
Mayo, John W., Ph.D..............................Washington
Murray, M. N., Ph.D............................. Syracuse
Phillips, Keith E., Ph.D....................... Washington

Assistant Professors:

Besse, Peter M., Ph.D............................ Virginia
Farmer, Amy L., Ph.D......................... Duke
Rubin, Jonathan D., Ph.D............ California (Davis)

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

ACADEMIC STANDARDS

A graduate student whose grade-point average falls below 3.0 will be placed on probation. A student on probation will be dropped from the program unless his/her cumulative graduate grade-point average is 3.0 or higher at the end of the probationary period. The probationary period is defined as the next semester's coursework established by the degree program for full-time students and the next two semesters' coursework 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 remaining 18 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, 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 no later than the beginning of the fourth semester of study.
   b. History of Economics: Completion of 515 or 615 with a grade of B or better, or by qualifying examination.
   c. Quantitative Methods: Completion of 581, 582 and one additional course in quantitative methods approved by the department with grades of B or better, or by qualifying examination.

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

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

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

MINOR IN ENVIRONMENTAL POLICY

The program is designed to give master's 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: Agricultural Economics and Rural Sociology; Civil and Environmental Engineering; Ecology and Evolutionary Biology; Economics; Forestry, Wildlife and Fisheries; Geography; Management; Political Science; and Sociology. Students may request admission to the minor following admission to the master's program in one of the participating departments. Students in good standing in one of these programs may apply for admission to the minor in environmental policy. The coordinating committee will consider the admission of interested students. Applicants should have a background in both natural and social sciences.
evidenced by prior coursework or experience. One course in environmental studies from the student’s major’s discipline and one course in quantitative methods are required. These requirements may be fulfilled before or after admission to the minor. All students admitted to the minor will be required to register for at least three hours of Economics 570, Environmental Policy Research Workshop, and to complete successfully the following:

1. Ecology and Evolutionary Biology 520 or Plant and Soil Sciences 414 or Geography 433 or an equivalent course approved by the coordinating committee.
2. Six hours of coursework outside the major’s discipline approved by the coordinating committee.

BUSINESS ADMINISTRATION CONCENTRATION

For complete listing of MBA program requirements, see Business Administration.

MBA Concentration: Economics.

Minimum course requirements are as approved by the area MBA faculty advisor.

GRADUATE COURSES

400 Special Topics (3) Topics vary. Prereq: Determined by department. May be repeated.

413 Macroeconomic Fluctuations (3) Analysis of historical data, methods of analyzing macro-econometric fluctuations, theoretical explanations of cycles, and role of monetary and fiscal policies in aggregate economy. Major writing requirement. Prereq: Intermediate Macroeconomics or consent of instructor.

415 History of Economics (3) Same as History 415. Prereq: History 201.


441 Political Economy of World Development (3) Topics vary: Latin America, Asia, Soviet Union and Eastern Europe. Analysis of major economic strategies, policies, and problems. Prereq: 201. This course includes a major writing requirement. May be repeated when topic varies. Maximum 9 hrs.


450 Advanced Macroeconomic Theory (3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.


475 Research and Dissertation (3-15) P/NP only. May be repeated. Maximum 60 hrs.

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

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

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

513-14 Macroeconomic Theory (3,3) Determination of national income, prices, and employment. Results using Keynesian, non-Keynesian, monetary, and nonmonetary theories. Prereq: 1, 2, 3, 4, 5, and 6.

515 History of Economics (3) Purpose and methods of history of economics. Background for and origins, concerns, methods, development, and conclusions of classical, neoclassical, and Marxist economics. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

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

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


552 Labor Relations and Collective Bargaining (3) (Same as Management 522.)

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


571 Public Finance: Optimal Government Size and Expenditure Analysis (3) Theory of public goods and externalities; public choice. Expenditure incidence and determinants; benefit cost analysis.

572 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.

573 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.

574 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.

581 Econometric Methods (3) Theory and techniques of statistical testing of economic hypotheses and construction and estimation of econometric models. Review of classical least squares regression model, and approaches to simultaneous equation models with applications to current econometric research. Prereq: 582 or equivalent.

582 Economic Methods (3) Theory and techniques of statistical testing of economic hypotheses and construction and estimation of econometric models. Review of classical least squares regression model, and approaches to simultaneous equation models with applications to current econometric research. Prereq: 582 or equivalent.


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

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

595 Doctoral Dissertation (3-15) P/NP only. E

596 Doctoral Dissertation (3-15) P/NP only. E

600 Public Finance: Optimal Government Size and Expenditure Analysis (3) Theory of public goods and externalities; public choice. Expenditure incidence and determinants; benefit cost analysis.

601 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.

602 Economic Methods (3) Theory and techniques of statistical testing of economic hypotheses and construction and estimation of econometric models. Review of classical least squares regression model, and approaches to simultaneous equation models with applications to current econometric research. Prereq: 582 or equivalent.

605 Workshop (3) Advanced topics in economics. Student participation. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

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


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

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


642 Labor History and Legislation (3) Development of organized labor as important economic and political force in modern times. Results of legal status of labor unions and of individual workers vis-a-vis their employers.

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

652 Topics in Monetary Theory (3) Advanced monetary issues, theories in monetary policy, open economy monetary theory and policy. Student participation. Prereq: 513.


656 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 input-output models. Theory and problem solution.


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

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

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.

681-82 Econometric Methods (3,3) Theory and techniques of statistical testing of economic hypotheses and construction and estimation of econometric models. Review of classical least squares regression model, and approaches to simultaneous equation models with applications to current econometric research. Prereq: 582 or equivalent.

690 Workshop (3) Advanced topics in economics. Student participation. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.
and non-thesis options are available for both Track 1 is for students who are already certified. Majors in Curriculum and Instruction are offered. Courses.

A minimum of 12 hours in Higher Education experience is required in either option, with a total of 36 semester hours. The thesis option requires the completion of 33 hours of coursework. The thesis option requires the completion of 30 hours including 6 hours of Thesis 500. Both options require a minimum of 12 hours in the major discipline. For art education, the non-thesis requirements are an Education 510, 520, 530, and 540; Education 517, 574, 575, 591; and 3 hours selected from Social Foundations of Education 511, 526, 542, 543, 544, Education in the Sciences, Mathematics, Research, and Technology 535, 558, 569 or 588 for a total of 36 semester hours.

Track 2 - Concentrations are available in elementary teaching and in secondary teaching under Education in the Sciences, Mathematics, Research, and Technology, and under Holistic Teaching/Learning; elementary teaching under Cultural Studies in Education, and under Inclusive Early Childhood Education; and art education and secondary teaching under Language, Communication, and Humanities Education.

The requirements are the same as those for Teacher Licensure plus 12 hours in the academic discipline as approved by the student committee, for a total of 38 hours. The thesis option requires 6 additional hours of Thesis 500 for a total of 42 hours.

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

**Educational Psychology**

Admission requirements include up-to-date scores from the GRE, application form and letters of recommendation. All programs include thesis and non-thesis options. Under Counselor Education and Counseling Psychology, a major in Educational Psychology, concentration in community counseling, requires 60 hours plus supervised practicum and internship experiences working with clients. Under Psychocultural Studies, the major in Educational Psychology, concentrations in adult education, educational psychology, and individual and collaborative learning, requires 36 hours. The concentration in adult education requires a minimum of 12 hours in Adult Education concentration.

A final examination is required of all master's degree students.

**Guidance**

Admission requirements include up-to-date scores from the GRE, the unit admissions application form and letters of recommendation. The program includes thesis and non-thesis options. Under Counselor Education and Counseling Psychology, a major in Guidance, concentrations in elementary guidance, school counseling, and secondary guidance, requires 38 hours and supervised practicum and internship experiences working with clients. A final examination is required.

**Human Performance and Sport Studies**

Concentrations are available in motor behavior and sociocultural foundations under Cultural Studies in Education; exercise science (exercise physiology/fitness, kinesiology/sports medicine) under Exercise Science; and sport administration/management under Sport and Physical Activity. Both thesis and non-thesis options are available. The non-thesis option requires 32 hours, including a project, and a course in research design or an approved specialized research class. The thesis option requires the completion of 30 hours, including 6 hours of Thesis 500. Both options require a minimum of 12 hours of Sport Studies, Exercise Science, or Sport Management courses.

**Leadership Studies in Education**

The master's degree program under Leadership Studies in Education offers a concentration in educational administration and supervision, requiring a minimum of 33 credit hours including 8 hours of Thesis 500 for the thesis option and 36 hours for the non-thesis option. The concentration in educational administration and supervision consists of a minimum of 18 hours of coursework in Educational Administration and Supervision. A final oral examination is required for the thesis option, with an oral exam at the option of the committee. A final written comprehensive examination is required for the non-thesis option, with an oral exam at the option of the committee. Students entering either of these options must complete the introductory core consisting of Educational Administration and Supervision 513, 515, 516, and 535 or a demonstrated computer proficiency. The courses are prerequisites to other courses in the unit.

**Rehabilitation Counseling**

The program under Rehabilitation and Deafness prepares professional counselors for successful practice in public and private rehabilitation programs. Rehabilitation counselors assist individuals with disabilities to achieve their optimal level of functioning in living, learning, and working environments. Rehabilitation counselors work primarily with youth and adults who have congenital or acquired physical, intellectual, or emotional disabilities. Clinical practice offers students an opportunity to emphasize skill development for specific or general disability caseloads. The program is fully accredited by the Council on Rehabilitation Education, Inc. and requires 54 semester hours, including internship. A minimum of 12 hours of Rehabilitation and Deafness courses is required. Thesis and non-thesis options are available. Graduates are employed by federal and state governments, hospitals, private industry, and a variety of community agencies.

**Special Education**

Two tracks are offered for the master's degree with a major in Special Education. Track 1 is for students who are already licensed to teach in special education or a related field or those who are seeking a master's degree without teacher licensure. Track 2 is for students seeking initial licensure. Thesis and non-thesis options are available for both tracks.
Concentrations for both tracks are offered in general special education under Holistic Teaching/Learning, early childhood special education under Inclusive Early Childhood Education; and hearing impaired under Rehabilitation and Deafness.

Track 1 - Coursework may apply toward State of Tennessee endorsements (add-on certification in specific licensure areas). The non-thesis option requires 36 hours, including a minimum of 15 in the specific discipline, and a final written and oral comprehensive examination. The thesis option requires 30 hours, including 6 hours of Thesis 500, and a minimum of 12 hours in the discipline.

Track 2 - The requirements are the same as those for Teacher Licensure plus 12 hours in the academic discipline as approved by the student's committee, for a total of 36 hours. The thesis option requires 6 additional hours of Thesis 500 for a total of 42 hours.

Students completing a program in the general special education concentration area are qualified and/or consultants in a variety of special education programs providing services to people certified as mentally retarded, learning disabled, emotionally disturbed, gifted, physical-health disabled, multiply disabled, and/or emotionally disturbed.

General special education majors, in conjunction with their committees, select one or more specializations for their program of study. Six to nine hours of coursework in the designated area should be taken. Approved specializations include affective/motivational approaches, assessment/diagnosis, cognitive education, early childhood, gifted education, rehabilitation, and/or technology. Students also may select a cognate of three to six hours of coursework taken outside the unit.

Students completing a program in the education of the hearing impaired concentration area are qualified to teach in public or residential schools for the hearing impaired. Graduates are eligible for both Council on Education of the Deaf (CED) certification and Tennessee state certification. Internships (student teaching) may be completed at the Tennessee School for the Deaf, in mainstream programs in the state or in programs for the hearing impaired in North Carolina, Kentucky, Georgia, Virginia and the District of Columbia.

THE SPECIALIST IN EDUCATION PROGRAMS

Curriculum and Instruction
The Educational Specialist degree program with a major in Curriculum and Instruction encompasses concentrations in curriculum, elementary education, instructional media and technology, mathematics education, and science education under Education in the Sciences, Mathematics, Research, and Technology; in elementary education, reading education, and science education; and in reading education and language, science education, and technology.

Educational Psychology and Guidance
Under Counselor Education and Counseling Psychology, the minimum number of hours required for the concentration in counselor education is 79. Under Psychoeducational Studies, the required number of hours is 90. Research is a two-semester concentration. A concentration in education and psychology and in collaborative learning is available with a major in Educational Psychology under the Psychoeducational Studies unit.

The Doctor of Education with a major in Holistic Teaching/Learning, early childhood special education under Inclusive Early Childhood Education; and hearing impaired under Rehabilitation and Deafness.

THE DOCTOR OF EDUCATION PROGRAMS

Curriculum and Instruction
The Ed.D. program with a major in Curriculum and Instruction is available under Cultural Studies in Education with a concentration in social foundations; under Education in the Sciences, Mathematics, Research, and Technology with concentrations in curriculum, educational research, elementary education, instructional media and technology, mathematics education, and science education; under Holistic Teaching/Learning, with a concentration in early childhood, reading education, and social science education; and under Inclusive Early Childhood Education, with a concentration in early childhood education; under Language, Communication, and Humanities Education, with specializations in foreign language education, reading education, and language education.

Educational Psychology
Under Counselor Education and Counseling Psychology, the minimum number of hours required for the concentration in counselor education is 79. Under Psychoeducational Studies, the required number of hours is 90. Research is a two-semester concentration. A concentration in education and psychology and in collaborative learning is available with a major in Educational Psychology under the Psychoeducational Studies unit.

THE DOCTOR OF PHILOSOPHY PROGRAM

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

Program requirements are:

Requirements
Research Area 15
Foreign or Computer Language (demonstrate proficiency) 6
General Core Requirements Option A
—History and philosophy of education, (both areas must be represented) 4
—Learning theory and curriculum (both areas must be represented) 4
—Administrative/Leadership theory 2

and research design is a requirement for all concentrations/programs. All doctoral students take written comprehensive examinations in the program concentration, supporting specialization and cognate areas. The guidelines for each program concentration may be consulted for further requirements.
education and the equivalent of a year’s full-time work as an intern in an appropriate counseling setting. The concentration in educational psychology also requires a supervised practicum experience in classroom teaching. Under Psychoeducational Studies, the following minimum number of hours is required in each program: educational psychology, 92: school psychology, 97. The guidelines for each program may be consulted for further requirements.

MINOR IN GERONTOLOGY

Graduate students in the units of Counselor Education and Counseling Psychology, Exercise Science, or Psychoeducational Studies may pursue a specialized minor in gerontology. This interunit/interdisciplinary minor gives the student an opportunity for combining the knowledge about aging in American society with his/her major concentration. Please refer to Human Ecology for specific requirements.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S. program in Curriculum and Instruction (concentration in foreign language education—Track 1 only) is available to residents of the state of Louisiana. The Ph.D. program in Education is available to residents of the state of Arkansas (concentration in administrative theory and practice or in theory and practice of educational and personal adjustment only). The M.S. program in Human Performance and Sport Studies is available to residents of Dakotas, Idaho, Iowa, Kansas, Missouri, Montana, Nebraska, North Dakota, South Dakota, Wisconsin, Wyoming, and Washington. The M.S. program in Human Performance and Sport Studies is available to residents of Arkansas, Georgia (concentration in motor behavior only). The M.S. in Rehabilitation Counseling is available to residents of Alabama. The M.S. program in Special Education is available to residents of the states of Kentucky (concentration in special education), South Carolina or Virginia (concentration in special education), or West Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE COURSES

510 Advanced Educational and Clinical Procedures (3-4) Integration of advanced educational and clinical procedures; skills and knowledge for implementing instruction and for consulting with other persons in treatment of exceptional individuals. May be repeated. Maximum 6 hrs.

517 Seminar (1-3) Curriculum, instructional technology, elementary education, secondary education, or social foundations as related to students’ programs. May be repeated. Maximum 8 hrs. S/NC or letter grade. F

532 Instructional Research: Analysis and Application (3) Analysis of research on instruction. Translation and application of research findings into instructional performance. Prereq: Consent of Instructor. Ph.D., F, Su

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

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

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

574 Analysis of Teaching for Professional Development (2) Strategies to document and analyze effectiveness of teaching and professional development. Study and application of various approaches. Coreq: 575. F

575 Professional Internship in Teaching (1-6) Professional experiences in 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. E, F, Su

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. E

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

601 Trans-College Seminar (1) Introduction to Ph.D. program in Education: research requirements, meaning of scholarship in academic and issues/problems in education. Minimum of two consecutive semesters preceded or followed by summer term required of all Ph.D. students. Prereq: Admission to Ph.D. program or consent of Ph.D. program coordinator. May be repeated. Maximum 12 hrs. May not be used to meet 600 requirement. S/NC only.

618 Interpretation and Application Curriculum and Instruction (15) Analysis and evaluation 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. Sp

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

Education in the Sciences, Mathematics, Research, and Technology

(College of Education)

MAJOR

M. Everett Myer, Leader

Profs:

Butefish, William L. (Emeritus), Ed.D. ........................................ Texas Tech
Dessart, Donald J., Ph.D. ........................................ Maryland
Dook, E. Dale, Ed.D. ........................................ Colorado
McIntyre, Lonnie D., Ed.D. ........................................ Indiana
Myer, M. E., Ph.D. ........................................ Florida

DEGREES

Curriculum and Instruction: M.S., Ed.S., Ed.D.
Education: Ph.D.

Education in the Sciences, Mathematics, Research, and Technology
Course in teaching elementary school science or consent of instructor.

535 Curriculum Evaluation and Program Improvement (3) Historical background and importance of educational evaluation in relation to curriculum development. Understanding systematic curriculum evaluation approach and applying it to improve program development and implementation. Prereq: Consent of instructor.

541 The High School Curriculum (3) Identification of problems associated with curriculum study, Tennessee curriculum framework, assessment of trends in programs of local, regional, and national significance. Prereq: Consent of instructor.

543 Teaching Mathematics in Middle Schools (3-6) Unit planning, daily planning, grouping and other strategies of teaching mathematics. For those with little preparation in teaching middle school mathematics.

557 The Junior High and Middle School Curriculum (3) Curriculum and instructional design for junior high and middle school. Characteristics of students, curriculum designs, instructional patterns, and organization and structure of junior high and middle school. Prereq: Consent of instructor.

560 Student Assessment (3) Processes for assessing and reporting student progress. Use of available assessment data. Methods of assessment other than tests and measurements: portfolios, performance tasks, exhibitions.

561 Educational Statistics (3) Applications of descriptive and inferential statistics to educational and instructional problems. Use of electronic calculators in educational research. Prereq: One year of college mathematics, an elementary course in statistics, or consent of instructor.

565 Instructional Trends and Issues in Science Education (3) Analysis of current trends in science instruction, instructional issues facing elementary, secondary, and college science teachers, and application of learning theory to teaching biological, physical, and environmental sciences. Prereq: 496, 422, or equivalent.

566 Administering Instructional Media Programs (3) Leadership roles and responsibilities of professional media administrator in a variety of organizational settings.

569 Advanced Production of Audiovisual Software (3) Hand and mechanical lettering, flat picture mounting, laminating, cover preparation, audio production, TV studio orientation, sync-taping, multi-screen presentations, and printing techniques. (Same as Information Sciences 569.)

577 Introduction To Data Processing in Curriculum and Instruction (3) Analysis of computer applications in educational and instructional problems. Use of microcomputers to super computers. Prereq: Consent of instructor.

580 Techniques for Research in Curriculum and Instruction (3) Fundamentals of research methodology applicable to curriculum, instruction, an other areas of educational inquiry. Critical reading of research and development of skills needed for proposal development.

581 Seminar in Mathematics Education (3) Current issues influencing instruction in mathematics, elementary through college. Related teaching methodologies. Opportunities for work on special problems. Prereq: Undergraduate course in teaching of mathematics.

582 Teaching Enrichment Mathematics in Middle and Junior High Schools (3) Topics to enrich middle and junior high mathematics. Geometrical, statistical, intuitive, and problem solving activities. Special attention to metric system. Opportunities for individual projects. Prereq: 561. Su

583 Teaching Mathematics in Senior High Schools and College Communities (3) Topics appropriate for high school and community/junior college mathematics curriculum. Special problems related to enrichment, probability, and use of microcomputers. Opportunities for special projects. Prereq: 581. F

586 Teaching Probability & Statistics (3) Teaching of probability and statistics in schools, elementary through college. Prereq: 561. F

589 Instructional Theory and Design (3) Relationship of current research to instruction; examination of instructional and related learning theories, instructional models and teaching styles.

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) May be repeated. S/NC or letter grade.

596 Curricular Trends and Issues in Science Education (3) Analysis of curricular and instructional problems. Use of microcomputers in educational research.

600 Doctoral Research and Dissertation (3-15) Prereq: Consent of instructor. F, Sp

604 Seminar in Curriculum and Instruction (1) Required 2 consecutive semesters. Prereq: 561. F

623 Using Research for Curriculum Improvement (3) Research methodology; application to descriptive/curricular materials. Critical reading of research, methodological development and survey areas.


669 Instructional Media Research (3) Identification, location, and collection of developmental and experimental research on instructional media. Application of research.

671 Advanced Educational Statistics (3) Applications of parametric and non-parametric statistical inference to educational and instructional problems. Use of microcomputers in educational research.

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.

675 Curriculum Evaluation: Theory and Application (3) Evaluation trends and issues. Theoretical frameworks to design evaluation studies for various educational programs.

676 Curriculum Theory (3) Influential curriculum theories and approaches, implications for structure and design of educational programs. Nature and function of theory, theory building activities. Prereq: Consent of instructor.

683 Advanced Studies in Elementary School Mathematics (2) Research in elementary school mathematics.

684 Graduate course in mathematics education or consent of instructor.

690 Internship (1-3) Experiences in applied principles and practices of curriculum and instructional improvement. Program prerequisites and consent of instructor. May be repeated. Maximum 9 hrs. S/NC only.

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) May be repeated. S/NC or letter grade.

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.
The Electrical Engineering Department has a graduate committee to administer, promote, and advance the general well-being of the graduate program. The Department of Electrical Engineering and the Department of Nuclear Engineering jointly offer a master's degree program in the field of fusion energy. Students may have the opportunity to do their master's thesis at the Fusion Energy Division of the Oak Ridge National Laboratory or at the Plasma Science laboratory, affiliated with the Electrical Engineering Department. A limited number of Graduate Assistantships are available at each location. Further information about this program is available from the department.

THE MASTER'S PROGRAM

Graduate work leading to the Master of Science with a major in Electrical Engineering may be completed during one academic year of full-time study, or the degree may be obtained in two or three years of study in the evening.

Admission Requirements

Students applying for admission to the Master of Science program and who hold a B.S. in Electrical Engineering are considered for admission on an individual basis. The minimum expectation is an undergraduate cumulative grade-point average of 3.0 out of 4.0 and a GPA of 3.0 for the senior year. All applicants whose native language is not English, including those who have earned degrees at U.S. institutions, must score at least 550 on the TOEFL exam to be considered for admission to the program. Students who hold the B.S. or B.A. in a field other than electrical engineering are also expected to have a minimum cumulative grade-point average of 3.0 and a minimum senior year average of 3.0 in that field. These students should also have a strong background in the field that they wish to pursue at Auburn. Students from fields other than electrical engineering who have met the admission standards except for this background will be admitted as only non-degree students until they have completed coursework to provide this background.

Master's Degree Requirements

Specific degree requirements which must be met include:

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

THE DOCTORAL PROGRAM

The Ph.D. with a major in Electrical Engineering may be pursued in the concentration areas of circuit theory, computer, electromagnetic theory, solid-state electronics, and control systems. Applicants must submit scores on the General Graduate Record Exam. A TOEFL score of 550 is required for non-native speakers of English. Including those who have earned degrees at U.S. institutions. Specific departmental requirements for the Ph.D. include the following:

1. A Master of Science or Master of Engineering degree.
2. A minimum of 48 semester hours of coursework beyond the B.S. excluding thesis, research, and dissertation work.
   a. A minimum of 24 semester hours of work in electrical engineering courses at the 500 and 600 levels.
   b. A minimum of 9 semester hours of 600-level coursework. At least 3 semester hours of this work must be in an area other than the student's major area.
   c. A minimum of 12 hours of mathematics courses approved by the Electrical Engineering Graduate Committee. All 12 hours must be 400-level or above, and at least 6 hours must be at 500-level or above.
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 both a qualifying and comprehensive examination. The qualifying examination is prepared by the Electrical Engineering faculty and consists of a 3-hour written examination in each of four areas. Areas (1) mathematics and transform methods, and (2) basic electrical network analysis, are required of all Ph.D. students. Areas (3) and (4) are usually chosen from two of the graduate course divisions in the department and are dependent on the student's area of interest. Students must be considered for admission to the program.
5. A comprehensive examination is required by The Graduate School. In this department the comprehensive exam is administered by the student's committee; the exam results are reported to the graduate committee for approval, and the exam is filed in the department. The comprehensive exam is given when the student is ready to apply for admission to candidacy. The exam consists of both written and oral parts. 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 student must demonstrate a mastery of the dissertation area, ability to think analytically and creatively, skill in using academic resources, and ability to complete the dissertation successfully. 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.

Many of the electrical engineering courses are offered in the evening. Engineers working in industry are encouraged to participate in the department's graduate program. Departmental graduate programs are also available at the Space Institute, Tullahoma.
441 Digital Communication (3) Discrete Fourier transforms, Binary and M-ary signaling, digital communication in presence of noise, matched filtering and equalization, introduction to information theory. Prereq: Analog Communication Amplitude and Frequency Modulation.

442 Communication System Design (4) Application of communication theory to system design. Development of communication system specifications. System simulation utilizing graphic language Hardware and software design and simulation. Construction and performance evaluation of a complete analog or digital transmitter and receiver and/or significant subsystems. Prereq: 441.


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


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

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


504 Random Process Theory for Engineers (3) Probability and random variables as approached by set theory. Statistical averages and correlation functions 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 (3) Discrete-time signals and systems, sampling, fast Fourier transform and fast convolution, design of FIR filters and IIR filters.

506 Digital Signal Processing Il (3) Filter properties in the Z and Fourier transform domains, structures for digital filters, design and implementation of digital filters.

507 Application of Numerical Linear Algebra in Systems and Control Engineering (3) Same as Chemical Engineering 507 and Mechanical Engineering 507.

511 Linear Systems Theory (3) State space models of linear dynamical systems, state transition matrix, matrix exponential, controllability, observability, realization theory, and stability theory. Coreq: 503.

512 Multivariable Linear Control System Design (3) Design of controllers, for multivariable systems, which satisfy constraints on robustness to plant uncertainties, disturbance rejection, command following. Prereq: 511.

515 Adaptive Control and System Identification (3) Adaptive control of linear deterministic and stochastic systems, adaptive filtering and prediction, parameter estimation, and design of deterministic and stochastic systems. Prereq: 511-2 or 518-9.

518 Control Systems Design I (3) Analysis and design of continuous and discrete time control systems, feedback theory, stability, steady-state performance, compensator design aspects of linear 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 instrumentation. Prereq: 518.

521 Power Systems Analysis I (3) Matrix-vector representations of power networks, sequence modelling of power system components, unbalanced short 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 and dynamic stability. Formulating and solving problems in matrix-vector form with application to large scale power systems. Prereq: 521.

523 Power Electronics and Drives (3) Forced commutated inverter, cycloconverters and circuits, current inverters, drive system modeling, vector and scalar control of induction machines, parameter variations, control principles of synchronous machine.


529 Advanced Electrical Machines I (3) Fundamental processes of electromechanical energy conversion; application in conventional devices. Digital equations for rotating machinery. Prereq: 422 or equivalent.

531 Analog Design I (3) Operation of modern electronic devices: semiconductor devices; diodes, bipolar transistors, J-FETs, and MOS-FETs. Small-signal equivalent circuits and noise models of active devices. Project laboratory. Prereq: 431, 432, 433, or consent of instructor.


541 Electromagnetic Fields (3) Maxwell’s equations, special relativity, wave reflection and transmission, generalized media, guided waves, radiation from current elements, waves in dielectric and vacuum. Prereq: Mathematics 404.


545 Introductory Microwave Networks and Components (3) Scattering and transfer representation for multipole scattering parameters, microwave and millimeter wave devices. Component and system parameter measurement by modern network analyzers. Electronic oscillators and amplifiers, frequency sweep oscillators, transistors, variable capacitors, monolithic and hybrid devices. Mixers, mixers, mixers. Prereq: 551.


552 Digital System Design II (3) State identification and structure realization of sequential machines. Digital system architecture design, microprogramming and interrupt control. Prereq: 551.

561 Plasma Diagnostics I (3) Principles of active, passive, perturbing and nonperturbing diagnostic methods used in low temperature plasmas, and high temperature plasmas of interest in fusion research. Laboratory safety, data reduction and presentation, microprocessor based data handling and analysis, and reduction of time series data. Prereq: 461, 485, or consent of instructor. (Same as Nuclear Engineering 561.)

562 Plasma Diagnostics II (3) Laboratory instruction in operation of plasma diagnostic instruments in plasma science laboratory, experience with high voltage, vacuum, RF, and digital data handling techniques. Prereq: 561.

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

566 Industrial Plasma Engineering II (3) Continuation of 565 to industrial applications: ion implantation, plasma deposition and etching, space propulsion systems, plasma chemistry, plasma lighting devices, insulating dielectrics and breakdown, materials processing with plasma arcs, and related topics. Prereq: 565 or consent of instructor.

571 Pattern Recognition (3) Decision-theoretic and structural approaches to pattern recognition. Deterministic and statistical decision rules; feature extraction and representation, systematic and semantic methods. Prereq: 471 or consent of instructor.


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

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


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

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

600 Doctoral Research and Dissertation (1-15) P/NP hrs.

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


614 Optimal Control (3) Deterministic and stochastic dynamic programming in continuous and discrete time, minimum principle and matrix minimum principle, computational methods in optimal control. Prereq: 511.

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

618 Special Topics in Systems Theory II (3) Topics of current interest to students and faculty: large scale systems, model order reduction, algebraic and geometric system theories, and advanced design methods. Prereq: 517.

623 Advanced Power Electronics and Drives (3) Phase-controlled cycloconverters, cycloconverter-fed drives, resonant converters, vector and scalar control of diode- and thyristor-switched machines, thyristor-fed machines, static Scherbius drives, VSCF generation, modern control theory in ac drives.

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

631 Advanced Topics in Electronic Instrumentation I (3) Based on particular interests of students. Fundamental physical processes in instrumentation transducers: thermoelectric, magnetoelectric, electromechanical and optical devices. Prereq: 531-32 and consent of instructor.


643 Detection and Estimation Theory (3) Detection and 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 nonanalytic codes, error-correcting codes, decoding methods, identification schemes: deterministic, stochastic, and hierarchical methods. Prereq: 643.

651 Computer-Aided Design of VLSI Systems I (3) Fundamentals of microelectronics 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: 551.

663 Advanced Plasma Physics I (3) Basic concepts of high-temperature plasma physics. Magneto-hydrodynamics and kinetic theory and geometric description of plasma, plasma transport, plasma waves, equilibrium, and stability. Prereq: Physics 541-2, 546-2 or 663-4, or consent of instructor. (Same as Physics 663.)

664 Advanced Plasma Physics II (3) Plasma heating and radiation phenomena. Advanced topics of current interest. Must be taken in sequence. Prereq: 663.

671 Image Processing and Robotics I (3) Three-dimensional scene modeling and recognition, multi-sensor systems. Prereq: 572 or 573 or consent of instructor.

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

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

681-82 Quantum Electronics (3,3) Prereq: Consent of instructor.

691 Advanced Graduate Seminar (1) Research in department. May be repeated. S'NC or letter grade.

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

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**Engineering Science**

*See Mechanical and Aerospace Engineering and Engineering Science*

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**English**

*(College of Arts and Sciences)*

**MAJOR DEGREES**

English .......................... M.A., Ph.D.

D. Allen Carroll, Head
**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 Knoxville with a grade of B or better.
3. Passing of the regular Ph.D. foreign language examination as currently administered at UT Knoxville.

**Dissertation:** Twenty-four semester hours of dissertation. These represent the research for a creative project such as a collection of poems or short stories, a short novel, a play, or a work of fiction. 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. 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.

**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 work of fiction.

**The Doctoral Program**

**Requirements**

A student must successfully complete a program of study, normally 8 full semesters as outlined below, approved by the candidate's committee or the Director of Graduate Studies in English.

**Coursework:** At least 51 semester hours beyond the B.A. to include at least 21 semester hours at the 600 level; at least 15 semester hours at the 500 level or above (only 3 hours of 593 Independent Study may be applied toward the M.A.); and 3 after the M.A.); a special three-hour course in teaching composition; and 12 additional hours at any level, including the 400 level. At least 6 of these additional hours may be taken in some cognate field or fields such as history, philosophy, French. These coursework must be drawn from those approved for graduate credit. All other coursework must be in the English department. In this coursework, students must normally maintain a 3.5 GPA.

**Dissertation:** Twenty-four semester hours of dissertation. These represent the research and 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 is 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 of 300 level or above in the foreign language at the 400 level or above in the foreign language or literature with at least a grade of B in each course; (c) passing of the regular Ph.D. foreign language examination as currently administered at UT Knoxville.

**Writing Concentration**

The master's program with writing concentration is intended for those students who plan to do free-lance writing, specialize in teaching writing courses at the college level, or work as professional writers in business or industry.

**Requirements**

The requirements for the writing concentration are the same as those for the thesis option above, with the following exceptions:

**Coursework:** Writing students may substitute two 400-level writing courses for two 500-level courses. Students must take at least 6 hours in writing and 6 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 hours are strongly recommended.
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, plus intensive study of the English language. This requirement must be fulfilled by completion of (a), (b), or (c) in option 1 for one foreign language; and completion of 6 semester hours in English language courses with grades of B or better, at least three of which must be from English 508 or 509 History of the English Language (offered in alternate years only). For the other 3 hours, the student may either complete the history of the language sequence or choose one other course in language taught in the Department of English at the 500 or 600 level and approved by the Director of Graduate Studies in English. These courses will not count toward the minimum number of courses for the Ph.D., and anyone electing this language option may not take the comprehensive examination in linguistics.

Examinations: (1) A 4-hour qualifying examination taken before the end of the first year of Ph.D. coursework; this examination is given three times a year, with the M.A. written examination. (2) A comprehensive written examination which may be divided as the department directs; see the English Department graduate brochure. The comprehensive examination is given twice a year, normally in March and September. Before a student may take it, he/she must have completed all coursework required. A student must also have met all requirements for foreign languages before beginning the first part of the examination.

Dissertation Defense: A one-hour examination on the dissertation and other related areas.

Residence Requirement: Two consecutive semesters as a full-time student. For students not on teaching assistantships, full-time consists of 9 or more hours of coursework and/or dissertation hours each semester. For students on assistantships, full-time consists of at least 6 hours of courses and/or dissertation hours and 3 hours of teaching each semester.

GRADUATE COURSES

Note: Students enrolling in English graduate courses must first register in the office of the Director of Graduate Studies in 306 McClung Tower.

401 Medieval Literature (3) Reading and analysis of selected medieval literary masterpieces in modern English.

402 Chaucer (3) Reading and analysis of Canterbury Tales and Troilus and Criseyde in Middle English.

404 Shakespeare I: Early Plays (3) Shakespeare's dramatic achievement before 1601. Reading and discussion of selected plays from romantic comedies, including Twelfth Night; English histories, including Henry IV, and early tragedy, including Hamlet.

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

406 Renaissance Drama (3) English theatre between 1590 and 1640 through reading of representative plays by Shakespeare's contemporaries: Marlowe, Webster, Jonson.

409 Spenser and his Contemporaries (3) Principal achievements in prose and poetry of sixteenth century authors: Spenser, Wyatt, Marlowe, More, Sidney, and Bacon.

410 Milton, Donne and their Contemporaries (3) Principal achievements in prose and poetry of first two-thirds of seventeenth century: poetry of Milton, Donne, Marvell, and prose of Browne, Bacon, Walton.

411 Literature of Restoration and Early Eighteenth Century: Dryden to Pope (3) Survey of English literature and culture from 1660 to 1745.

412 Literature of Late Eighteenth Century: Johnson to Burns (3) Survey of English literature and culture from 1745 to 1800.

413 Restoration and Eighteenth-Century Genres and Modes (3) A major genre or literary mode: drama, novel, poetry, non-fiction prose, satire, romance, or epic, written between 1660 and 1820. May be repeated.

414 Romantic Poetry and Prose I (3) Wordsworth, Coleridge, and Blake; readings from Lamb, De Quincey, and other prose writers.

415 Romantic Poetry and Prose II (3) Keats, Shelley, and Byron; readings from Hazlitt, Peacock, and other prose writers.

416 Victorian Poetry and Prose (3) Tennyson, Pre-Raphaelites, Carlyle, Newman, and Wilde.

419 Victorian Poetry and Prose II (3) Browning, Arnold, Hopkins, Hardy, Ruskin, Darwin, and Wilde.

420 The Nineteenth-Century British Novel (3) Scott to Hardy.

421 Modern British Novel (3) Lawrence, Joyce, and Woolf.

422 Women Writers in Britain (3) Literary consciousness and works of women writers in Britain. Topics vary: Wollstonecraft, Mary Shelley, George Eliot, Virginia Woolf, and Doris Lessing. May be repeated. Maximum 6 hrs. (Same as Women's Studies 422.)

431 Colonial, Federal, and Early National American Literature (3) From Columbus to Washington Irving.

432 American Romanticism and Transcendentalism (3)

433 American Realism and Naturalism (3)

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: frontier humorists, local color writers, and Southern literary renaissance.

442 American Humor (3) Early nineteenth century into twentieth century: Mark Twain.

443 Topics in Black Literature (3) Contents vary: particular genres, authors, or theories from 1640 to present: Langston Hughes and Harlem Renaissance, F. Scott Fitzgerald and Hemingway, Dubois and Du Bois, and major figures to 1900: Hawthorne, Melville, Stowe, Clemens, and James.

451 Modern British and American Poetry (3) From Yeats and Frost to Auden, Stevens, and more recent poets.

452 Modern British and American Drama (3) O'Neill's works as precursors to modern dramatists: Williams, Miller, Albee, and representatives of Black theater, Bullins, and Skaske.

453 Continental Drama (3) Selection of plays in English translation by major European writers from late Renaissance to present; twentieth-century achievement.

454 Twentieth-Century International Novel (3) Joyce, Camus, Camilo, and others.

455 Persuasive Writing (3) Persuasive strategies in both student and professional writing. Practice in mastering effective logical and emotional appeals.

460 Technical Editing (3) Editing technical material for publication. Principles of style, format, graphics, layout, and production management. Prereq: 360 or 400, or consent of instructor.

461 Advanced Technical and Professional Writing (3) For students planning careers in industry, education, and government who need technical writing skills. Writing of proposals, process descriptions, sets of instructions, descriptions of mechanisms, recommendation reports, abstracts, proposals, and major reports. Prereq: Junior standing in student's major or consent of instructor.

462 Writing for Publication (3) Principles and practices of writing for publication. Dissertation, theses, articles, and reports in science and technology. Prereq: 450 or consent of instructor.

463 Advanced Poetry Writing (3) Further development of skills acquired in basic writing poetry course. Prereq: 360 or consent of instructor.

464 Advanced Fiction Writing (3) Further development of skills acquired in basic writing fiction course. Prereq: 360 or consent of instructor.

471 Sociolinguistics (3) Study of language in relation to society. Empirical and theoretical focus. Large-scale units: tribes, nations, social groups. Prereq: 371 or 372 or Linguistics 200 or consent of instructor. (Same as Linguistics 471 and Sociology 471.)

472 American English (3) Phonological, morphological, and syntactic characteristics of major social and regional varieties of American English: origins, functions, and implications for cultural pluralism. Prereq: 371 or 372 or Linguistics 200 or consent of instructor. (Same as Linguistics 472.)

474 Teaching English as a Second or Foreign Language (3) Grammatical structures of English; particular grammatical difficulties of non-native learners of English. Teaching grammatical and phonological structures of English. Teaching grammar and phonology to non-native speakers: contrastive analysis of English with other languages. Prereq: Sec. I or II of a foreign language. (Same as Linguistics 474.)

475 Teaching English as a Second or Foreign Language II (3) Second language acquisition theory. Issues in teaching four language skills to learners of English. Materials and methods of language teaching and testing; preparation of materials. Observations and teaching with experienced staff members. Prereq: English 474. (Same as Linguistics 475.)

476 Second Language Acquisition (3) Theoretical models; research; differences between first and second language acquisition; effect of age, cognitive factors in second language acquisition; learner variables and cross-cultural implications. Prereq: 371 or 372 or Linguistics 200. (Same as Linguistics 476.)

479 Literary Criticism (3) Historical survey of major works of literary criticism.

480 British and American Ballad and Folk Tale (3) Popular ballads and folktales of English, Scottish, and North American tradition.

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 most influential writers in British or American literary history; e.g., Donne, Tennyson, James, Austen, Whitman, Faulkner, Baldwin or Lawrence.

483 Special Topics in Literature (3) Topics vary. May be repeated. Maximum 6 hrs.

484 Special Topics in Writing (3) Original writing integrated with reading, usually taught by professional author. Topics vary. May be repeated. Maximum 6 hrs.

485 Special Topics in Language (3) May be repeated. Maximum 6 hrs with consent of department. (Same as Linguistics 465.)

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. Particularly directors, film genres, national cinema movements, or
other topics. May be repeated with consent of department. Maximum 6 hrs. (Same as Cinema Studies 489.)

495 Introduction to Rhetoric and Composition (3) Historical, theoretical, and empirical modes of inquiry in rhetoric and composition and implications for teaching of composition.

496 Rhetoric of Legal Discourse (3) Application of basic principles of persuasive writing to legal materials: issue identification and argument through written position papers, briefs, and memoranda. Critical reading and discussion. Introduction to research techniques. No prior legal knowledge necessary.

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

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

505 Teaching Freshman Composition (3) Introduction to teaching Freshman English through study of various techniques and philosophies of composition. 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: collecting of information, evaluation of material, 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.

508 History of the English Language I (3) Phonological, morphological, and syntactic development of Old and Middle English. A

509 History of the English Language II (3) Phonological, morphological, and syntactic development of English language with concentration on developments after 1500, especially in American English. A

513-14 Readings in Medieval Literature (3,3) Reading and analysis of selected masterpieces of Old and Middle English literature and their Continental sources in Modern English.

520-21 Readings and Analysis in Selected Areas of Sixteenth- and Seventeenth-Century Prose, Poetry, and Drama (3,3) Content varies: genre, theme, literary movement, or other coherent emphasis.

530-31 Readings in English Literature of the Restoration and Eighteenth Century (3,3) Topics vary: genre, poetry, prose, drama, period, or Restoration, eighteenth century, eighteenth century.

540-41 Readings in English Literature of the Nineteenth Century I and II (3,3) Content varies: genre, theme, literary movement, or other coherent emphasis.

550-51 Readings in American Literature from the Colonial Period to the Present (3,3) Content varies: genre, theme, literary movement, or other coherent emphasis.

552 Readings in Black American Literature (3) Content varies: genre, theme, literary movement, or other coherent emphasis.

559-61 Readings in Twentieth-Century Literature (3,3) Content varies: genre, theme, literary movement, or other coherent emphasis.

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

580 Fiction Writing (3) Advanced fiction projects; undergraduate seminar in creative writing. Prereq: Extensive background in reading and writing fiction.

581 Colloquium in Poetry Writing (3) Major poet project or continuation of project begun in 463. Individual consultation with instructor supplemented class analysis; readings in contemporary poetry and theory. Prereq: 463 or consent of instructor.

582 Special Topics in Writing (1-3) Topics vary. May be repeated. Maximum 6 hrs. Enrollment by consent of director of graduate studies only.

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

586 History of Rhetoric I (3) Survey of rhetoric from Sophocles to Ramus.

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

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

590 Topics in Critical Theory (3) Topics vary.

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

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

593 Independent Study (1-18) See College of Arts and Sciences.

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

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

602 See College of Arts and Sciences.

611 Studies in Old English Language and Literature (3) Old English grammar with prose and poetry. F,A

612 Studies in Beowulf (3) Translation and critical study of Beowulf. Prereq: English 610 or consent of instructor. Sp,A

613 Studies in Anglo-Saxon and Old Norse Literature (3) Seminars: Anglo-Saxon language, literature, and culture; Old Norse language, literature, and culture; Anglo-Saxon and Old Norse literature. A

616 Studies in Medieval Literature (3) Seminars: Medieval literature and culture; literature of the Middle Ages; medieval literature and culture; medieval literature and culture. A

620 Studies in Medieval English Literature (3) Seminar in medieval literature and literary genres of Medieval English literature, read in Old and Middle English. Subject matter varies from year to year.

621 Studies in Chaucer (3) Seminar in text, interpretation, and criticism of Chaucer's writings. Prereq: Previous course in Chaucer.

630-31 Studies in Renaissance Literature (3,3) Seminars: Shakespearean, sixteenth-century prose and poetry, non-Shakespearean drama.

640-41 Studies in Restoration and Eighteenth-Century Literature (3,3) Topics vary: Swift, satire, restoration literature, Johnson and Boswell, Addison and Steele, restoration drama, Dryden.

650 Studies in English Romanticism (3) Seminar content varies: particular literary figure or figures, genres, theme, or other coherent focus.

651-52 Studies in Victorian Literature (3,3) Seminar content varies: particular literary figure or figures, genres, theme, or other coherent focus.

660-61-62 Studies in American Literature (3,3,3) Southern literature before 1860, frontier, regionalism, women's literature, women's literature, Irving, Cooper, Poe, Emerson, Thoreau, Hawthorne, Melville, Whitman, Dickinson, James, and Twain.

670-71-72 Studies in Twentieth-Century Literature (3,3,3) Seminar content varies: particular literary figure or figures, genres, theme, or other coherent focus.

680 Topics in English Language (3) May be repeated with consent of director of graduate studies. Maximum 9 hrs.

682 Studies in Rhetoric and Composition (3) Content varies: Advanced work in theory and/or history of rhetoric and composition. Issues in invention, textuality, literacy, historiography, style and ethics.


686 Studies in Creative Writing (3) Content varies: Advanced work in theory and practice of creative writing.

688 Studies in Literary Criticism (3) Content varies: Advanced work in literary theory and history of literary criticism.

690 Special Topics (3) Content varies: History of Ideas, humor, biography, autobiography, extra-literary disciplines.
Environmental Engineering
See Civil Engineering

Exercise Science
(1 College of Education)

MAJORS DEGREES
Education ........................................ Ph.D.
Human Performance and Sport Studies ................. M.S., Ed.D.
E. Howley, Leader

Professors:
CapeI, Edward K. (Emeritus), Ph.D. ............... Iowa
Howley, Edward T., Ph.D. .................... Wisconsin
Kozar, Andrew J. (University Prof.), Ph.D.
Michigan
Liemohn, W. P., Ph.D. ......................... Iowa
Rackett, Ian R., Ph.D. ....................... Brown
Welch, Hugh (Emeritus), Ph.D. ................ Florida

Associate Professor:
Bassett, David R., Jr., Ph.D. ............... Wisconsin

Assistant Professors:
Thompson, Dixie, Ph.D. .................. Virginia
Zhang, Sengping, Ph.D. .............. Oregon

The Exercise Science unit offers graduate programs leading to the Master of Science with a minor in Human Performance and Sport Studies, concentration in exercise science (exercise physiology/fitness, kinesiology/sports medicine); Doctor of Education with a major in Human Performance and Sport Studies; and the Doctor of Philosophy with a major in Education. See Education under Fields of instruction for full description of all degree requirements.

Specific questions about these programs should be directed to the leader of the unit.

ADMISSION REQUIREMENTS
Applicants are required to complete the unit application which will be sent to all persons upon their initial inquiry about the program. This is in addition to The Graduate School application.

The following retention policy applies to all graduate students seeking a degree in the Exercise Science unit:
1. Graduate students are required to maintain an overall GPA.
2. Any student who fails below this standard will be asked in writing by the unit leader of the need to discuss the matter with the advisor.
3. If a student's overall GPA remains below 3.0 for a second semester, the student will have his/hers degree status revoked.

GRADUATE ASSISTANTSHIPS
A limited number of graduate assistantships are available for qualified women and men who are graduates of accredited colleges or universities. These assistantships are open to students in the master's and doctoral programs. Students interested in these opportunities should file their applications before February.

Letters should be addressed to Graduate Assistantships Coordinator, Exercise Science Unit, The University of Tennessee, Knoxville, TN 37996-2700.

GRADUATE COURSES

480 Physiology of Exercise (3) Functions of body in relation to physiological aspects of fatigue, training, and adaptation to environment. Prereq: Human Physiology or general physiology. 2 hrs and 1 lab. (Same as Biochemistry and Cellular and Molecular Biology 480.)

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

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

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


509 Graduate Seminar in Public Health (1) (Same as Public Health 509, Nutrition 509, Nursing 509, and Social Work 509.)


511 Biomechanics of Orthopaedic Rehabilitation (3) Effect of physical activity on bone and soft tissue development, anatomical and mechanical implications of exercise, theoretical bases for rehabilitative programs.

512 Therapeutic Exercise (3) Therapeutic exercise programs designed for specific pathologies: McKenzie, nar sal spine, based on specific biomechanical considerations: eccentric, closed kinetic chain; and more general in nature: Feldenkrais, myofascial release.

513 Biomechanics of Human Performance (3) Human movement: teaching, coaching and sports medicine. Prereq: 422 or equivalent.

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

515 Laboratory Techniques in Exercise Physiology Laboratory course in experimental methodology and instrumentation: respiratory and metabolic measurements, blood chemistry, and gas analysis. Prereq: 480.

516 Advanced Physiology of Exercise (3) Quantitative approach to current and classical questions in exercise physiology. Prereq: 480 and 533.


518 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 and 414 or equivalents. (Same as Public Health 568.)

569 Fitness Testing, Programming, and Leadership for Diverse Populations (2) Clinical experience in selecting, administering, and evaluating exercise tolerance tests on cycle ergometer and treadmill. Individual fitness programs for diverse populations.
variety of activities aimed at improved fitness. Prereq: 480 and 414. (Same as Public Health 569.)

570 Cardiac Rehabilitation Practicum (1-3) Supervised experience in hospital-based exercise programs for participants with cardiac and/or pulmonary disorders. Use of telemetry monitoring, leading safe exercise regimens, counseling participants on safe exercise guidelines. Presenting educational class on topic applicable to participants. Prereq: 460 and 567. Coreq: 569.

585 Seminar in Gerontology (1) (Same as Human Ecology 585, Counseling Education and Counseling Psychology 585, Nursing 586, Public Health 586, Psychological Studies 585, Social Work 585, and Sociology 585.)

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

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

601 Research Seminar in Exercise Science (1) Research topics in different aspects of exercise science. May be repeated. S/NC only.

622 Directed Independent Research (3-6) Prereq: Doctoral student or consent of instructor. May be repeated. S/NC or letter grade.

661 Seminar in Exercise and Applied Physiology (1) Selected topics in exercise and environmental physiology. Prereq: 563 and 565. May be repeated with consent of instructor.

664 Research Participation in Applied Physiology (1-6) Participation in research with faculty member whose interests coincide with those of student. S/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. E

BUSINESS ADMINISTRATION CONCENTRATIONS

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

MBA Concentration: Finance.

The curriculum offers courses for those interested in careers in corporate financial management, security analysis and investments, banking and financial institutions, and real estate.

Minimum course requirements are three courses: Finance 510 (3 hours), plus two from the following: 512, 522, 532, 551, and 561.

Ph.D. Concentration: Finance.

Minimum course requirements are finance seminars 641, 642, 651, 652.

GRADUATE COURSES

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

510 Contemporary Concepts and Methods in Finance (3) Strategic issues and broad-based valuation concepts in finance; integrative approach in investments, corporate finance and institutions and areas. Prereq: Business Administration 504 and 505 or consent of instructor.

512 Problems in Financial Management (3) Readings and cases that apply finance theory to real-world investment, financing, and asset management problems. Prereq: Business Administration 504 and 505 or consent of instructor.

522 Portfolio Analysis and Management (3) Portfolio theory and evidence of behavior of security returns with view to determining rational investment policy. Statistical analysis of risk and return of portfolios, portfolio evaluation and revision, capital market theory, and extensions of portfolio analysis. Prereq: Business Administration 504 and 505 or consent of instructor.

532 Financial Institutions (3) Analysis of management policies of financial institutions, asset, liability, and capital management. Legal, economic, and regulatory environment and implications for management. Financial institution structure and competitive positioning. Prereq: Business Administration 504 and 505 or consent of instructor.

551 Financial Management of a New Enterprise (3) Financial issues associated with formation, control, and long-term planning of a new enterprise. Acquisition of venture capital. Prereq: Business Administration 504 and 505 or consent of instructor.

561 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 both mortgage rates and availability of funds for real estate lending. Effects of government intervention (taxation, subsidization, and regulation) in both real estate and mortgage markets. Prereq: Business Administration 504 and 505 or consent of instructor.

599 Special Topics in Finance (1-3) Topics vary. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

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


642 Seminar in Finance II: Theory of the Firm (3) Theoretical and financial decision making under conditions of uncertainty, equilibrium models of firm. Option pricing, agency theory, capital structure, economics of information, and dividend policy.

651 Advanced Seminar in Finance I (3) Recent theoretical and empirical developments in micro-finance literature. Topics vary. May be repeated. Maximum 6 hrs.

652 Advanced Seminar in Finance II (3) Recent theoretical and empirical developments in macro-finance literature. Topics vary. May be repeated. Maximum 6 hrs.

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:

Breckke, C. J., Ph.D. ............... Wisconsin
Collins, J. L., Ph.D. ............... Maryland
Draughon, F. A., Ph.D. ............. Georgia
Jaynes, H. O. (Emeritus), Ph.D. .... Illinois
Malton, S. L., Ph.D. ............... Tennessee
Miles, J. T. (Emeritus), Ph.D. ...... Wisconsin
Overcash, W. W. (Emeritus), Ph.D. Iowa State
Penfield, M. P. (Liaison), Ph.D. .... Tennessee

Associate Professors:

Christen, G. E., Ph.D. ........... Missouri
Loveday, H. D., Ph.D. ............ Kansas State
Mount, J. R., Ph.D. ............... Ohio State

Assistant Professor:

Golden, D. A., Ph.D. ............. Georgia
Hulbert, G., Ph.D. ............... Illinois
van Laack, R. L., Ph.D. ......... Utrecht

The Department of Food Science and Technology offers the Master of Science and Doctor of Philosophy degrees. Students in the doctoral program may choose research in the concentration area of food products, food chemistry, food microbiology, or sensory evaluation of foods. Commodity interests (meats, dairy, fruits, vegetables, bakery products) can be emphasized in any of the fields by careful selection of courses and the research topic. Minors are available in cognate fields. For detailed information, contact the department head.

Graduate School rating forms or letters of recommendation from at least three people are required. Respondents should be familiar with the applicant's scholastic ability and professional potential.

THE MASTER'S PROGRAM

Applicants must have a B.S. in food technology, food science or a related scientific field.

Thesis Option

1. Prior to research for the thesis, the student must develop a detailed written research plan. Registration for 6 hours of 500 Thesis is required.
2. In addition to the thesis requirement, a minimum of 24 semester hours of graduate coursework is required. This work must be approved by the student's committee and a minimum of 14 hours must be courses numbered above 500. The committee may require additional coursework if the student's progress or background indicates such need.

3. All students are required to take 2 hours of 501 Seminar in their program and are expected to attend this course and participate in discussions during their master's program. Completion of 510 or equivalent is also required.

4. An oral, final examination covering the thesis and coursework is required.

**Non-Thesis Option**

1. In lieu of a thesis, students are required to complete a problem in cooperation with their employer (company or governmental agency) and their faculty committee. Students working on a problem must register for 6 hours of 503.

2. In addition to the requirement for 6 hours of 503, a minimum of 24 semester hours of graduate coursework is required. This work must be approved by the student's committee and a minimum of 14 hours must be courses numbered above 500. The committee may require additional coursework if the student's progress or background indicates such need.

3. All students are required to take 2 hours of 501 Seminar in their program and are expected to attend this course and participate in discussions during their master's program. Completion of 510 or equivalent is also required.

4. Students will be registered to take a written comprehensive examination covering their coursework. In addition, an oral, final examination covering the problem and coursework is required. The oral examination will be held on the Knoxville campus.

**THE DOCTORAL PROGRAM**

1. Completion of a master's degree in the field or a closely related field, or passing a special qualifying examination is required for admission. Scores on the GRE aptitude test are also required.


3. A minimum of 72 hours beyond the Bachelor's degree, excluding credit for the master's thesis, is required. Of this, 24 semester hours must be 500 Doctoral Research and Dissertation.

4. At least 24 hours of coursework numbered above 500 are required exclusive of doctoral research and dissertation. At least 6 of the 24 hours must be courses numbered above 500.

5. A minimum of 6 hours of courses for graduate credit must be taken outside the Department of Food Science and Technology. All candidates must complete 601 (2 hrs.) and are expected to attend 601 during their Ph.D. program.

6. 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.

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**GRADUATE COURSES**

430 Sensory Evaluation of Food (3) Principles and methods of sensory evaluation of foods. Prereq: Basic statistics. 2 hrs and 1 lab. F

452 Science of Dairy Foods (3) Science and technology of processing of milk and its products. Prereq: Food Laws and Regulations, Food Chemistry, Food Microbiology, and Lab, and Food Preservation or consent of instructor. 2 hrs and 1 lab. Sp

460 Meat Science (3) Carcass characteristics of meat animals, muscle structure and composition, cut identification, curing, freezing and cookery. Prereq: Food Industry or consent of instructor. Sp

469 Meat Science Lab (1) Slaughter and processing methods for beef, pork, lamb and poultry. Coreq: 460. Sp

470 Food Crop Products (3) Food products from plants; types, manufacturing systems, quality attributes and utility. Prereq: Food Preservation and 3 hrs biological science or consent of instructor.

480 Cereal Science and Bakery Products (3) Chemistry and technology of processing cereal grains, interactions of ingredients during production and storage of bakery products. Prereq: Food Laws and Regulations, Food Chemistry, and Food Preservation or consent of instructor. 2 hrs and 1 lab. Sp, A

495 Food Processing System Analysis and Evaluation (3) Design and evaluation of food processing operation to produce safe and acceptable quality food product. Prereq: Food Chemistry, Food Microbiology, Food Preservation or consent of instructor. Sp

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

501 Seminar (1) Individual reports and discussion on topics from current literature. May be repeated. Maximum 3 hrs. F, Sp

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

503 Problems in Lieu of Thesis (2-3) May be repeated. S/N only. E

510 Instrumental Analysis of Food (3) Modern instrumental methods for control of food manufacturing processes. Prereq: Food Chemistry, 2 hrs and 1 lab. F

511 Color and Flavor of Foods (3) Chemical basis, measurements, and reactions involved in color and flavor characteristics of foods. Manufacture and application of materials used to modify color and flavor. Prereq: Food Chemistry, 2 hrs and 1 lab. F

520 Food and Industrial Fermentations (3) Microbiology, biochemistry and technology of food-related fermentations involving dairy products, meat, cereals, fruits and vegetables. Production of food ingredients and by-product utilization. Prereq: Food Microbiology and Lab, Food Preservation, Biochemistry and Cellular and Molecular Biology 410 or equivalent. 2 hrs and 1 lab. Sp, A

521 Advanced Food Microbiology (3) Microorganisms in foods, their identification, characterization and relationship to food processing. Isolation of microorganisms from foods and plant equipment. Prereq: Food Microbiology and Lab, 1 hr. 2 lab. F

540 Food Product Development (3) Art, science and technology of developing and marketing new food products. Prereq: Food Preservation, 2 hrs and 1 lab. Sp, A

560 Advanced Meat Science (3) Physical and chemical changes that occur in conversion of muscle to meat; effect of postmortem treatments on meat quality, composition and palatability; packaging, preservation and quality control. Prereq: 480. 2 hrs and 1 lab. Sp, A

580 Oilseed Products (3) Chemistry and technology of foods and food ingredients produced from oilseeds. Prereq: Food Chemistry or equivalent. 2 hrs and 1 lab. Sp, A

580 Special Topics in Food Technology and Science (1-3) Critical reviews of current research and production concerns of food industry. May be repeated. Maximum 9 hrs. F, Sp

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**Forestry, Wildlife and Fisheries**

**DEGREES**

Forestry ...................................................... M.S.

Wildlife and Fisheries Science ...................... M.S.

George M. Hopper, Head

Professors:

Barrett, J. W. (Emeritus), Ph.D. ................. Syracuse

Buckner, E. R. (Distinguished Prof.), Ph.D. ................. NC State

Core, H. A. (Emeritus), Ph.D. ....................................... Syracuse

Deardon, B. L., Ph.D. ................................... Colorado State

Dimick, R. W., Ph.D. .................................... Wyoming

Hill, T. K., Ph.D. ...................................... Auburn

Hopper, G. M., Ph.D. ................................ VPI

McGee, C. E. (Adjunct), D.F. ............................ Duke

Ostermeier, D. M., Ph.D. ......................... Oregon State

Petrou, M. R., Ph.D. ................................... Georgia

Rennie, J. C., Ph.D. .................................. NC State

Schneider, G. P., Ph.D. .......................... Michigan State

Sharp, J. B. (Emeritus), D.P.A. ............. Harvard

Smalley, G. (Adjunct), Ph.D. .................. Tennessee

Strange, R. J., Ph.D. ................................ Oregon State

Stumbo, D. A. (Emeritus), Ph.D. ........... Minnesota

Thor, E. (Emeritus), Ph.D. .............................. NC State

Wilson, J. L., Ph.D. ...................................... Tennessee

Associate Professors:

Hay, R. L., Ph.D. ...................................... Duke

King, M. M., Ph.D. ................................ Utah State

Nelson, C., Ph.D. (Adjunct), Ph.D. .............. Cornell

Schlababum, S. E., Ph.D. ..................... Colorado State

Smith, K. G. (Adjunct), Ph.D. ................ Utah State

Wells, G. R. (Liaison), D.F. ...................... Duke

Winston, P. M., Ph.D. ............................... Iowa State

Assistant Professors:

Buehler, D. A., Ph.D. ................................... VPI

Clark, J. D. (Adjunct), Ph.D. ................ Phoenix

Fly, J. M., Ph.D. ..................................... Arkansas

Smith, E. R. (Adjunct), Ph.D. ...................... Tennessee

VanMiegroet, H., Adjunct, Ph.D. ........ Washington

Waldrop, T. A. (Adjunct), Ph.D. ............... Tennessee

Graduate study leading to the Master of Science with majors in Forestry and in Wildlife
and Fisheries Science is offered by the Department of Forestry, Wildlife and Fisheries. The Master of Business Administration, with a concentration in forest industries management is available for qualified students. This degree program is offered by the College of Business Administration with participation by the Department of Forestry, Wildlife and Fisheries. The Doctor of Philosophy with specialization in forest biology, wildlife science, or fisheries science can be achieved through the University's Department of Ecology and Evolutionary Biology. A joint program between the department and Knoxville College leading to a specialized B.S. in Biological Assessment allows Knoxville College graduates for graduate programs in natural resources.

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 resources area. Applicants must also have taken the general Graduate Record Examination (GRE). Graduate School rating forms or letters of recommendation from three individuals familiar with the applicant's academic ability are required. The department also has an application that must be submitted at the time of application to The Graduate School.

Thesis Option

1. Prior to research for the thesis, the student is required to develop a detailed written research proposal. Registration for 6 hours of Thesis (Forestry 500 or Wildlife and Fisheries Science 500) is required.
2. A graduate committee of no fewer than 3 faculty members must be selected by the student. 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.

A concentration in managing natural resource organizations is available under the non-thesis option with a major in Forestry. The minimum core requirements include: Forestry 511, 570, and six additional hours of Forestry courses to be selected in consultation with the student's committee; Political Science 564, Management 504, and Planning 560. Fourteen hours of elective coursework are selected with the faculty advisor.

MINOR IN ENVIRONMENTAL POLICY

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

ACADEMIC COMMON MARKET

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

Forestry

GRADUATE COURSES

422 Forest and Wildland Resource Policy (3) Policy formulation; criteria for policy determination; forest and wildland law and regulations; theory of conflict resolution; formal and informal resolution. Prereq: Senior standing. F

423 Wildland Recreation Planning and Management (3) Planning processes, master and site planning, site design projects; management strategies, methods of visitor and recreation site management; case studies. Weekend field trips. Prereq: Wildland Recreation or consent of instructor. 2 hrs and 1 lab. Sp

433 Wood Adhesives and Glued Wood Products (2) Theory and practice of adhesive bonding; wood substrate-adhesive interface for bonding; principles of adhesion; gluing of solid wood and composite wood materials; gluing practices; laboratory manufacture and testing of adhesives, adhesive bond strength and glued-wood product performance; day field trip. Prereq: Wood Properties and Uses and Wood Identification, or consent of instructor. 1 hr and 2 labs. F

434 Wood Processing and Machining (2) Primary log breakdown and secondary processing into major products. Fundamentals of machining technology for major types of cutting operations: sawing, boring, planing, veneer cutting, and laser machining; day field trip. Prereq: Wood Properties and Uses and Wood Identification, or consent of instructor. 1 hr and 2 labs. F

435 Wood Drying and Preserving (2) Discussion of wood moisture relationships. Introduction to commercial wood drying equipment and practices. Proper use, specification, and disposal of preservative treated wood. Day field trips. Prereq: Wood Properties and Uses and Wood Identification, or consent of instructor. F

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

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

511 Problem Analysis in Forest Resources (3) Problem identification, analysis and solution in forest resource management. Identify, analyze and prepare written report. Topics and report must have approval of graduate committee. Available only to students in non-thesis option for M.S. in Forestry. E

512 Seminar (1) Current developments in forestry. Required of all graduate students in residence. May be repeated. Maximum 2 hrs. S/NC only. F

520 Advanced Forest Tree Biology (3) Growth, reproduction, and physiology of trees; forest ecology; variability and taxonomy of forest trees. Prereq: Graduate standing in forestry or biological science, or consent of instructor. F

530 Advanced Forest Resource Management (3) Analysis of forest management plans as exemplified in public agencies and private firms. Forest organization and computerized regulation systems; financial and operational planning tools, as applied to forest resource management. Prereq: Senior-level forest management or consent of instructor. Sp

540 Genetics in Forestry (3) Genetic improvement of forest trees; selection of superior phenotypes; field testing for genetic variability; tree breeding; development of seed orchards; hybridization; tree cytology and tissue culture; use of biochemical variation; planning and conducting forest genetics research. Prereq: Silvicultural methods and Biology 220 or consent of instructor. Sp

550 Recreation Planning for Forests and Associated Lands (3) Planning process for recreation development on forests and associated lands; analysis and critique of specific alternatives. Overnight field trips. Prereq: Senior-level forest recreation or consent of instructor. F

570 Management & Policy of Forest Resource Organizations (3) Theory and application of management as applied to natural resource organizations; institutional direction and culture, and strategic management. Development and policy as planning tools and as results from conflict resolution. Linkage between policy development and execution, and structure and means of organizational operations. Prereq: Forest administration or policy or consent of instructor. F

580 Advanced Silviculture (3) Silvicultural characteristics, silvicultural systems and practices applied to commercial, important hardwoods and softwoods, depth analyses of silvicultural principles involved and tools used, prescribed fire, management computer modeling of stand dynamics, structure, growth, yield. Prereq: Undergraduate silviculture course or consent of instructor. 2 hrs and 1 lab. Sp

585 Advanced Forest Biometry (3) Application of sampling techniques to forest inventory; fixed and variable plot sampling; list sampling; Poisson sampling; regression estimators; multistage and multiphase sampling. Growth and yield predictors for even-aged and uneven-aged forests. Prereq: Land Measurement Techniques and Forest Resource Inventory or consent of instructor. F

590 Advanced Topics in Forestry (1-3) Recent advances and concepts, research techniques and analysis of current issues in forestry. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

593 Independent Study in Forestry (1-4) May be repeated. Maximum 6 hrs. E

Forestry, Wildlife & Fisheries

GRADUATE COURSES

410 Wildlife Habitat Evaluation and Management (3) Ecological relationships between wildlife and habitat. Evaluation and analysis, and management of wildlife habitat. Effects of land-use practices on wildlife habitat. Weekend field trips. Prereqs: Principles of Wildlife and Fisheries Management or consent of instructor. Applicable to majors in Forestry and Wildlife and Fisheries Science. 2 hrs and 1 lab. F

416 Planning and Management of Forest, Wildlife and Fisheries Resources (3) Integrated forest and wildlife management planning and development land management plans and analyzing case studies including conflict resolution. Applicable to majors in Forestry and Wildlife and Fisheries Science. Prereq: Senior standing 1 hr and 2 labs. Sp

525 Management of Forestry, Wildlife and Fisheries Resources (2) Current technologies and management
strategies concerning wise use of forestry, wildlife, and fisheries resources; decision making and implementation. Prereq: 5 hrs of biological sciences or consent of instructor. Not available to students in forestry or wildlife and fisheries science. 4 hrs and 1 lab for six weeks. Sp.

535 Environmental Impacts to Natural Ecosystems (3) Current environmental problems impacting natural ecosystems: climatic change, acid deposition, air pollution, species impacts, 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. Sp.


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. Weekend field trips. Prereq: Principles of Wildlife and Fisheries Management or consent of instructor. 1 hr and 1 lab or field. F.

442 Fisheries Techniques (2) Active and passive sampling techniques for fish and aquatic organisms; population estimation methods; fish handling and transport; food habits analysis; marking and tagging techniques; age determination and incremental growth analysis; stream assessment; equipment and instrumentation usage and maintenance; safety in sampling methods. Weekend field trip. Prereq: Principles of Wildlife and Fisheries Management or consent of instructor. 1 hr or 1 lab or field. F.

443 Fisheries Science (3) Quantification and management of freshwater fisheries: population estimation, age and growth, biological assessment, and stocking. Prereq: Principles of Wildlife and Fisheries Management or consent of instructor. 2 hrs and 1 lab. Sp.

444 Ecology and Management of Wild Mammals (3) Biological and ecological characteristics of game mammals and endangered mammals. Current principles and practices of wild mammal management. Prereq: Principles of Wildlife and Fisheries Management or consent of instructor. 2 hrs and 1 lab. One weekend field trip required. Sp.

445 Ecology and Management of Wild Birds (3) Biological and ecological characteristics of game birds, endangered birds, and birds pests. Current principles and practices of wild bird management. Prereq: Principles of Wildlife and Fisheries Management or consent of instructor. 2 hrs and 1 lab. Sp.

450 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. Sp.

500 Thesis (1-5) P/F or P/N only. E

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time. Degree is completed. May be repeated toward degree requirements. May be repeated. Maximum 2 hrs. SANC only. F.


520 Planning and Administration of Fisheries and Wildlife Programs (2) Factors influencing policy and program planning activities of fisheries and wildlife agencies. Decision-making policies, case histories. Sp, A.

525 Endangered Species Management and Conservation of Biodiversity (2) Status, ecology and management of endangered wildlife and plant species. Historic aspects, policy implications and philosophical issues surrounding recovery efforts. Approaches to monitor and manage for biodiversity. Prereq: Graduate standing or consent of instructor. Sp.

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). F, A.

540 Predator Ecology (2) Dynamics of terrestrial vertebrate predator populations in human-altered and relatively unaltered environments. Prereq: 444 or 445 or consent of instructor. F.

549 Population and Habitat Analysis (2) Characteristics, assumptions, and current technologies for fish and wildlife population analysis. Technologies, methodology and goals for wildlife habitat analysis. Use of computers. Prereq: Animal Science 571 or Statistics 536 or consent of instructor. A.

555 Fish Culture (3) Principles, concepts and techniques of culturing economically important fish and shellfish species. Prereq: 443 or consent of instructor. 2 hrs. and 1 lab. Sp, A.

560 Advanced Topics in Wildlife and Fisheries Science (1-3) Recent advances and concepts, research techniques and analysis of current problems. Prereq: 443, 444, 445, or consent of instructor. May be repeated. Maximum 6 hrs. E.

565 Independent Study in Wildlife and Fisheries Science (1-4) May be repeated. Maximum 6 hrs. E.

French

See Romance Languages

Geography

(Course of Arts and Sciences)

MAJOR

DEGREES

Geography .................................................. M.S., Ph.D.

Carol Harden, Head

Professors:

Aiken, Charles S., Ph.D. ....... Georgia Bell, Thomas L., Ph.D. ....... Georgia

Associate Professors:

Brinkman, Leonard W., Jr., Ph.D. ....... Wisconsin Harden, Carol P., Ph.D. ....... Colorado Horn, Sally P., Ph.D. ....... California Rehder, John B., Ph.D. ....... Louisiana State

Assistant Professors:

Orvis, Kenneth H., Ph.D. .......

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 field. An emphasis in geographic information systems is available for students who have appropriate background 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. 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 least one 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; those 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, 558, 9 hours of 800-level seminars, and (at each offering during residency) 501. A minimum of 12 hours must be earned in related fields outside the department. Competence in cartography and quantitative techniques is required. Additional tools, including languages, will be required as appropriate to the student's areas of research specialization. Examinations required for admission to candidacy include a written comprehensive; written examinations on two special fields; and an oral examination on the dissertation and on the dissertation proposal. Also required is a final oral examination on the dissertation and on other aspects of the program as determined by the student's doctoral committee.

MINOR IN ENVIRONMENTAL POLICY

The department participates in a program designed to give master's level graduate students an opportunity to develop an interdisciplinary specialization in environmental policy. See Economics for program description.
### Graduate Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
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<tbody>
<tr>
<td>410</td>
<td>Biogeography</td>
<td>Examination of the distribution of living organisms and their relationships with the environment. Prereq: Consent of instructor. Maximum 3 hrs. May be repeated with consent of instructor.</td>
</tr>
<tr>
<td>411</td>
<td>Biogeochemistry</td>
<td>Stable isotope measurements; environmental consequences of climate change. Prereq: Consent of instructor. Maximum 3 hrs. May be repeated with consent of instructor.</td>
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<tr>
<td>412</td>
<td>Geophysical Fluid Dynamics</td>
<td>Mathematical modeling of geophysical fluid systems; applications to climate, oceanography, and geodynamics. Prereq: Consent of instructor. Maximum 3 hrs. May be repeated with consent of instructor.</td>
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<tr>
<td>413</td>
<td>Remote Sensing</td>
<td>Principles and methods of remote sensing; applications to geographic information systems and environmental monitoring. Prereq: Consent of instructor. Maximum 3 hrs. May be repeated with consent of instructor.</td>
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<tr>
<td>414</td>
<td>Geographic Information Systems</td>
<td>Fundamentals of GIS; data models, database management, and spatial analysis. Prereq: Consent of instructor. Maximum 3 hrs. May be repeated with consent of instructor.</td>
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<tr>
<td>415</td>
<td>Quantitative Methods in Geography</td>
<td>Statistical analysis of spatial data; application of geographic information systems. Prereq: Consent of instructor. Maximum 3 hrs. May be repeated with consent of instructor.</td>
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<tr>
<td>416</td>
<td>Survey of Historical Geography</td>
<td>Development of geography as a discipline; major schools of thought, key figures, and influential publications. Prereq: Consent of instructor. Maximum 3 hrs. May be repeated with consent of instructor.</td>
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<td>417</td>
<td>Historical Geography of the United States</td>
<td>Development of geography of the United States from the colonial period to the present; impact of social, economic, and political factors. Prereq: Consent of instructor. Maximum 3 hrs. May be repeated with consent of instructor.</td>
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<td>418</td>
<td>Historical Geography of Latin America</td>
<td>Development of geography of Latin America from pre-Columbian to modern times; impact of social, economic, and political factors. Prereq: Consent of instructor. Maximum 3 hrs. May be repeated with consent of instructor.</td>
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<td>Historical Geography of Africa</td>
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<td>Historical Geography of Asia</td>
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<td>421</td>
<td>Historical Geography of the Pacific</td>
<td>Development of geography of the Pacific region from pre-Columbian to modern times; impact of social, economic, and political factors. Prereq: Consent of instructor. Maximum 3 hrs. May be repeated with consent of instructor.</td>
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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 a major research project, 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 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.

GRADUATE COURSES

401 Quantitative Methods in Geology (3) Applications of calculus and differential equations to problems in earth sciences. Examples of differentiation and integration in geology, wave equations in geophysical modeling and boundary conditions in structural geology and tectonics. Prereq: The Dynamic Earth or Earth, Life, and Time, 2 semesters of Calculus.

410 Advanced Mineralogy (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. Prereq: 310. 2 hrs and 1 lab.

420 Paleocology (4) Principles of ecological analysis as applied to fossils and fossil assemblages: data collection and interpretation, laboratory designed areas, preparation of scientific reports on field and laboratory analysis, writing emphasis course. 3 hrs and 1 lab.

421 Invertebrate Paleontology (4) Survey of invertebrate animal phyla: skeletal structure and preservation, functional morphology, ecology, and stratigraphic distribution. Prereq: Paleobiology or consent of instructor. 2 hrs and 2-2.5 hrs.

440 Field Geology (6) Summer field course for advanced undergraduate geology majors and first-year graduate students in geology. Taught off-campus and requires full time of student. Synthesis of major aspects of geological sciences in societal context. Field techniques demonstrated, practiced, and applied to solution of geologic problems. Prereq: Completion of major core courses and consent of instructor.

450 Process Geomorphology (3) Integrative approach to development of surface of earth based upon case histories, maps, remote sensing imagery. Prereq: 101-02. (Same as Geography 450). 2 hrs and 1-2 hr lab.

455 Basic Environmental Geology (3) Applications of geological sciences toward comprehension of effects of processes of erosion and effects of human activities on earth's environments. Prereq: 12 hrs of geology courses. 2 hrs and 1-3 hr lab or field period.


470 Applied Geophysics (3) Basic principles of geophysical exploration: applications to environmental problems, geodynamic and economic methods. Prereq: 6 hours of geology courses numbered above 300. Elements of Physics.

471 Fieldwork in Geophysics (2) Geophysical investigations applied to solution of problems in tectonics, hydrogeology, or environment. Summer field course off-campus. Requires full time for 2 or more weeks. Prereq: 470 or consent of instructor.

475 Physical and Chemical Systems of the Earth (3) Development of physical earth from solar nebula to present. Formation, composition and evolution of hydrosphere, crust, mantle, and core. Interdependence of earthquake, volcanic, plate tectonics, geomagnetism, chemical and isotopic processes of interior, and earth's temperature. Historical perspective on major controversies of past, and problems unresolved today. Prereq: 16 hrs of geology courses numbered 300 and above. 2 hrs and 1 discussion.

480 Principles of Economic Geology (3) Ore-forming processes, classification of mineral deposits, survey of different types of mineral deposits with examples, and metallogenic. Prereq: 310 and 330 or equivalent. Recommended prereq: 460. 1 hr and 1-2 hr lab.

485 Principles of Hydrogeology (3) Physical principles of flow, flow equations, geologic controls, aquifer analysis, water well design, engineering introduction to transport processes in the earth. Prereq: The Dynamic Earth, Calculus, Fundamentals of Physics or equivalent, or consent of instructor. (Same as Civil Engineering 485).

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

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

505 Structure of the Southern and Central Appalachian (2) Structural development of Southern and Central Appalachians from extensive Late Proterozoic–early Paleozoic rift–rift platform margin through processes related to compressional events producing accretory elements that formed Appalachian through-out the Paleozoic. Comparisons to similar orogens. Prereq: Structural Geology.

510 Clay Mineralogy (3) Origin, chemistry, structures, and properties of clay minerals; application of mineralogical techniques in clay mineral studies. Prereq: 310 and 566 or equivalent. 2 hrs and 1 lab.

521 Data Analysis in Geology and Environmental Science (3) Application of statistical and other quantitative techniques using computers to analyze geological data: environmental problems.

525 Biostratigraphy (3) Examination of principles of stratigraphy and biostratigraphy through selected case histories. 1 hr and 1-2 hr seminar.

530 Petrogenesis of Crystalline Rocks (4) Origin and properties of igneous and metamorphic rocks, magmatic and subvolcanic processes and physical conditions. Laboratory involves petrographic study of crystalline rocks in thin section. Prereq: 410. 3 hrs and 1 lab.

535 Ground Water Hydrology (3) (Same as Environmental Engineering 535.)

540 Seminar in Local Geology (1) Introduction of geology of Southern Appalachians. 1 hr plus fieldtrips.

545 Sandstone Petrology/Physical Sedimentology (4) Field and microscopic analysis of tenuous elastic rock types; physical processes of sedimentation, transport, and deposition of sediment, and formation of sedimentary structures. Prereq: 340 or equivalent. 3 hrs and 1 lab.

546 Carbonate Sedimentology (4) Environments of deposition of modern and ancient carbonate sediments and diagenesis of resultant rocks; field and laboratory analysis of sample material and preparation of scientific reports. 3 hrs and 1 lab.

550 Regional Geomorphology (3) Integrative approach to study of natural geomorphological regions stressing links and similarities across boundaries, unique characteristics of major divisions, provinces, oases, and districts. May be repeated with consent of instructor. Maximum 6 hrs. (Same as Geography 550).

THE DOCTORAL PROGRAM

The prerequisite for the Ph.D. program, in addition to that for the M.S. program, is either a master's degree in Geology, or a Bachelor's degree plus completion of 9 hours of coursework from the list in #3, above, including one course from each group. These courses may be taken while completing other course requirements.
556 Quaternary Geology of North America (3) Interpretation of geomorphologic, stratigraphic, and sedimentologic evidence in order to reconstruct Quaternary landscapes in glaciated, periglacial, and nonglacial regions of North America; correlation of major episodes of North American glacial and paleo-geomorphic changes in Atlantic and Pacific Oceans. Prereq: 101 or consent of instructor.

557 Quaternary Paleoclimatology (3) Perturbation, processes, and pattern within Quaternary ecosystems: past change and vegetation responses during last 2.5 million years. Prereq: Consent of instructor.

561 Aquatic Geochemistry (4) Introduction to and applications of equilibrium thermodynamics to earth surface environments; geochemistry of natural water, weathering reactions, and environmental diagenesis. Prereq: Chemistry 120-30, 3 hrs and 1 lab or seminar.

563 Stable Isotope Geochemistry (3) Theoretical aspects of isotope fractionation and applications to geologic systems, isotopes exchange, variations in natural waters, diagenetic, hydrothermal and metamorphic systems. Prereq: General Chemistry or equivalent.

565 Chemical Petrology (3) Application of thermodynamics to geologic materials. Thermodynamics of condensed phases, solutions, thermonomic stability, heterogeneous reactions, and crystalline equilibria, and condensation of heat through earth. Prereq: Chemistry 120-30, Mathematics 141-42. Recommended prereq: General Chemistry or equivalent.

568 Geochemical Analysis (3) Collection and treatment of geothermal data using electron microprobe, x-ray fluorescence, and atomic absorption spectrophotometry techniques. Prereq: 310 or consent of instructor, 2 hrs and 1 lab.

570 Advanced Structural Geology (4) Current topics in structural geology and tectonics of mountain belts: recent literature. Prereq: 370 or equivalent, or consent of instructor. 3 hrs and 1 seminar.

572 Fracture Analysis (3) Field and subsurface characterization, and mechanical development of natural fractures: role in groundwater flow. Prereq: Structural Geology or equivalent, or consent of instructor.

575 Tectonics (4) Evolution of Earth’s lithosphere in context of plate tectonics theory: formation of continents through collisional and extensional tectonics and assembly of paleocontinents, including Appalachian, Alps, Ural, Caledonian, Cordilleran, Andes, and Himalayas. Prereq: Structural Geology or consent of instructor. 5 hrs and 1 seminar.

576 Reflection Seismology (3) Imaging subsurface features using reflected seismic waves. Energy sources, modes of wave propagation, field procedures, computer processing, and pitfalls. Applications to tectonic and environmental problems. Prereq: 470 or consent of instructor.

585 Contaminant Hydrogeology (3) Physical transport processes, isotopes and groundwater age dating, processes influencing inorganic, organic and microbial contaminants, sampling and monitoring methods, remediation of contaminated groundwater, aquifer protection. Prereq: 485 or 535, 460 or 561; or Environmental Engineering 555 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. Prereq or coreq: 485 or Environmental Engineering 535, and consent of instructor.

590 Special Problems in Geology (1-3) Directed study or special topics. Prereq: Consent of instructor. May be repeated. Maximum 10 hrs.

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

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

594 Field Problems in Geology (1-15) Literature study and seminars on specific regional geologic interest, supplemented by extended field trips. Prereq: Consent of instructor. May be repeated. Maximum 8 hrs.

595 Selected Topics in Geology (1-15) 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 content, preparation, presentation, and instructor critiques in departmental seminar. Taken only once during residence for each graduate student.

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

620 Seminar in Paleontology (3) Prereq with consent of department. Maximum 9 hrs.

630 Seminar in Petrology (3) Prereq with consent of department. Maximum 9 hrs.

640 Seminar in Sedimentary Geology (3) Prereq with consent of department. Maximum 9 hrs.

650 Seminar in Geomorphology and Quaternary Geology (3) Prereq with consent of department. Maximum 9 hrs.

660 Seminar in Geochemistry (3) Prereq with consent of department. Maximum 9 hrs.

670 Seminar in Structural Geology (3) Prereq with consent of department. Maximum 9 hrs.

675 Seminar in Geophysics (3) Advanced treatment of selected topics in geophysics. Prereq: 470 or consent of Instructor.

680 Seminar in Economic Geology (3) Prereq with consent of department. Maximum 9 hrs.

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**Germanic and Slavic Languages**

(Graduate School of Arts and Sciences)

**MAJORS**

German ........................................... M.A.
Modern Foreign Languages ................. Ph.D.

David E. Lee, Head

Professors:

Falen, James E. (Emeritus), Ph.D. Pennsylvania
Fiene, Donald M. (Emeritus), Ph.D. Indiana
Hodges, Carolyn R., Ph.D. Chicago
Kratz, Henry (Emeritus), Ph.D. Ohio State
Osborne, J. C. (Emeritus), Ph.D. Northwestern
Rittinghoff, Ursula C. (Emerita), Ph.D.

Associate Professors:

Lauckner, Nancy A. (Liaison), Ph.D. Wisconsin
Lee, David E., Ph.D. Stanford
Mellor, C. J., Ph.D. Chicago

Assistant Professors:

Blackwell, Stephen H., Ph.D. Indiana
Hoening, Peter, Ph.D. Wisconsin
Livers, Keith A., Ph.D. Michigan
Moser, Beverly, Ph.D. Georgetown
Ohsneis, Stefanie, Ph.D. McGill
Pervukhin, Natalia K., Ph.D. Bryn Mawr

The Department of Germanic and Slavic Languages offers two advanced degrees: the Master of Arts in German and the Doctor of Philosophy in Modern Foreign Languages. Inquiries should be addressed to the head of the department.

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**THE MASTER'S PROGRAM**

The department requires a minimum of 30 semester hours including 15 hours of coursework numbered 500 and above and 6 hours of Thesis 500.

**THE DOCTORAL PROGRAM**

The Ph.D. in Modern Foreign Languages is offered jointly by the Department of Germanic and Slavic Languages and the Department of Romance and Asian Languages and requires advanced training in one major language and either a second language or applied linguistics. Students whose language of first concentration is French or Spanish should consult the section on Romance and Asian Languages.

**Admission Requirements**

Applicants must have completed a B.A. in either French, German or Spanish to be accepted into this program. Both graduates of institutions in the United States and those with undergraduate degrees from institutions outside the United States must have a grade point average of at least 3.0. Consideration will also be given to applicants who do not have an undergraduate degree in one of the three foreign languages but do have the equivalent of an undergraduate major in one of them.

**Degree Requirements**

Candidates with German as a first concentration must complete a minimum of 63 semester hours of coursework beyond the bachelor's degree in addition to 24 hours of doctoral research and dissertation.

The coursework must be distributed as follows:
1. First Concentration: German. A minimum of 39 hours of German courses beyond the bachelor's degree, distributed as follows:
   - 400 level: A maximum of 6 hours of 400-level classes taken for the M.A. may be applied.
   - 500 level: A minimum of 21 hours must be taken. The maximum number of 512, 513, 520, and 560. Theses hours are excluded. If 512 is used as part of a second concentration in applied linguistics, another course must be substituted in the first concentration.
   - 600 level: A minimum of 12 hours must be taken, exclusive of dissertation hours.
2. Second Concentration. A minimum of 18 hours beyond the bachelor's degree, taken in the field of applied linguistics or in a second language, either French, Italian, Russian or Spanish. Twelve of these hours must be at the 500 level or above.

Students choosing applied linguistics must take German 425, 435, 510, or 512, 3 hours of German linguistics, such as 426, 436, 631, or 632, and 6 hours of linguistics electives in German or English. The student's graduate advisor must approve the electives chosen.

3. Cognate Field. Six hours in graduate courses numbered 400 and above in a field outside the department of the first concentration but related to the student's principal area of research. Students choosing applied linguistics as a second concentration are strongly urged to take their cognate work in a second language.

4. Additional requirements: For any languages taken as a first or second concentration, a student must demonstrate competence by taking a test. The test will include reading, writing, listening, and speaking, and should be completed by the time the student reaches 40...
hours of study beyond the bachelor's degree. Standardized examinations that may be used for this purpose include applicable portions of either the National Teachers Examination, the MLA Examination for Teachers and Advanced Students, or the proficiency standards of the United States Foreign Service Institute (FSI).

If a student has not chosen a third language as his or her cognate area, basic competence (determined by a reading examination with translation into English administered by the department concerned) in a third language is required. If the student's first and second languages are Romance languages, the third language should be chosen from another language family.

For students choosing applied linguistics as an area of second concentration, reading competence in a second language is required. Competence will be determined by translation of a text from the foreign language into English, the test to be administered by the department offering the language.

A comprehensive examination on the 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, McIlure, Rotary fellowships).

For additional courses, see Romance and Asian Languages.

ACADEMIC COMMON MARKET

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

German

GRADUATE COURSES

331-32 Elements of German for Upper-Division and Graduate Students (3,3) Elements of language, elementary and advanced readings, and a final 1,000 word translation project. Open to graduate students preparing for language examinations, and upon division students desiring reading knowledge of the language. No credit for students having completed 101-02 or 107. 332 may be repeated. Maximum 6 hrs. Undergraduate credit only.

411-12 Advanced Conversation and Composition (3,3) Prereq: 311-12 or equivalent or consent of department.

415 Special Topics (3) Topics vary. May be repeated. Maximum 6 hrs.

420 Selected Topics in German Literature from 1750 to the Present (3) Prereq: 6 hrs of 300-level courses (excluding 331-32 and courses in English translation) or equivalent.

421 German Lyric Poetry (3) Prereq: 6 hrs of 300-level courses (excluding 331-32 and courses in English translation) or equivalent.

422 German Drama (3) Prereq: 6 hrs of 300-level courses (excluding 331-32 and courses in English translation) or equivalent.

423 German Narrative Prose (3) Prereq: 6 hrs of 300-level courses (excluding 331-32 and courses in English translation) or equivalent.

424 German Literary Movements (3) Survey of major periods in development of German literature since 1750: problems and details of periodization.

425 Introduction to Descriptive Linguistics (3) Same as French 425, Spanish 425, Linguistics 426, and Russian 426.

426 Methods of Historical Linguistics (3) Phonetics, distinctive feature analysis, sound change types, nature of sound change, principles of reconstruction, and fundamental assumptions about language change through time. Survey of non-phonological linguistic change, language families, Proto-Indo-European, and other proto languages. Prereq: 6 hrs of upper-division foreign language courses (excluding courses in translation or graduate reading courses). (Same as Russian 426, French 425, Spanish 425, and Linguistics 426.)

435 Structure of the German Language (3) Contrastive English-German segmental and suprasegmental phonemes, contrastive English-German linguistic structures, selected topics in advanced German grammar and phonology, analytic and synthetic analyses. Prereq: 6 hrs of upper-division German language courses (excluding courses in translation and graduate reading courses). (Same as Linguistics 435.)

436 History of the German Language (3) Development of German language from Indo-European through Proto-Germanic, Old High German, Middle High German to New High German. Internal and external linguistic history of German speech. Prereq: 6 hrs of upper-division German language courses (excluding courses in translation and graduate reading courses). (Same as Linguistics 436.)

485 Business German (3) Survey of German used in fields of business, government, administration, and economics. Prereq: 6 hrs of upper-division German excluding courses in translation and graduate reading courses.

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

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

510 German Phonetics and Advanced Grammar (3) Advanced work in phonetics, pronunciation, and selected topics in German grammar. For teachers and prospective teachers. Prereq: Consent of instructor.

512 Teaching a Foreign Language (3) Practical application of methods for teaching and evaluating basic language skills and foreign language skills, and cultural knowledge through seminars, demonstrations, peer teaching, and observation of foreign language classes. Required of all M.A. and Ph.D. students holding GTA's, except those whose previous training or experience warrants excise by department.

519 Bibliographical Methods (1) Bibliographical methods, major reference works and bibliographical problems in language and literature.

520 Prosseminar (2) Advanced training in use of bibliographical and reference tools; illustrative problems; paper preparation.

541-42 German German Language and Literature (3,3) 541--Introduction to Middle High German; 542--Readings in Medieval German Literature.

550 Studies in German Literature (3) Content varies. May be repeated. Maximum 6 hrs.

551 German Humanism, Reformation and Baroque (3) Content varies. May be repeated. Maximum 6 hrs.

552 German Enlightenment, Rococo, and Sturm und Drang (3) Content varies. May be repeated. Maximum 6 hrs.

553 German Classicism and Romanticism (3) Content varies. May be repeated. Maximum 6 hrs.

554 German Realism and Naturalism (3) Content varies. May be repeated. Maximum 6 hrs.

555 Modern German Literature 1890-1945 (3) Content varies. May be repeated. Maximum 6 hrs.

556 Modern German Literature 1945-Present (3) Content varies. May be repeated. Maximum 6 hrs.

560 German Literary Theory and Criticism (3)

561-62 Directed Readings in German Language and Literature (3,3)

571 Old Norse Language and Literature (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. E

610 Gothic (3) Phonology, morphology, and syntax of Gothic language. Relationship to Indo-European languages and other Germanic languages. Readings from Codex Bible.

611 Old High German (3) Phonology, morphology, and syntax of Old High German. Representative readings.

621-22 Seminar in German Literature (3,3) May be repeated. Maximum 6 hrs.

631-32 Seminar in German and Germanic Philology (3,3)

Russian

GRADUATE COURSES

401-02 Advanced Grammar, Conversation, and Composition (3,3) Prereq: Russian Composition and Conversation or equivalent. (Same as Russian and East European Studies 401-02.)

425 Introduction to Descriptive Linguistics (3) Same as French 425, German 425, Spanish 425, and Linguistics 425.

426 Methods of Historical Linguistics (3) Same as French 426, German 426, Spanish 426, and Linguistics 426.

451-52 Senior Seminar (3,3) For majors in Russian literature; minors admitted at discretion of instructor. Intensive study of language, literary style, and literary criticism based on selected major novels. (Same as Russian and East European Studies 451.)

510 Russian Phonetics and Advanced Grammar (3) Phonetics, pronunciation, stylistics, and selected topics in Russian grammar. For teachers and prospective teachers. Prereq: Consent of instructor.

550 Studies in Russian Literature (3) Content varies. May be repeated. Maximum 9 hrs.

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

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

593 Independent Study (1-15) See College of Arts and Sciences.
Health, Leisure, and Safety Sciences
(College of Human Ecology)

MAJORS

Human Ecology ........................................ Ph.D.
Health Education ...................................... Ed.D.
Health Promotion and Health Education .......... M.S.
Public Health .......................................... M.P.H.
Recreation and Leisure Studies ..................... M.S.
Safety Education and Service ........................ M.S.

Charles B. Hamilton, Head

Professors:
Gorski, June, Dr.P.H. .......................... UCLA
Hamiton, Charles B. (Liaison),
Dr.P.H. .................................................. Oklahoma
Hayes, Gene A. (Liaison),
Ph.D. .................................................. North Texas State
Kirk, Robert H., H.S.D. .......................... Indiana
Wallace, Bill C. (Liaison),
Ed.D. .................................................. Northern Colorado

Associate Professors:
Blanton, Mary Dale, Re.D. ....................... Indiana
Krick, Ken L., Re.D. ............................ Indiana
Pursley, R. Jack, Ph.D. .......................... Iowa

Assistant Professors:
Ellison, Jack S. (Liaison), Ed.D. ............ Tennessee
Fitzhugh, Eugene C., Ph.D. ...................... Alabama
Hendrick, Francis T. (Liaison), Ph.D. ........ Oregon
Smith, Susan M., Ed.D. ......................... Tennessee

The Health, Leisure, and Safety Sciences Department offers graduate programs leading to the Master of Science with majors in Health Promotion and Health Education, Recreation and Leisure Studies, and Safety Education and Service, and to the Master of Public Health degree in Public Health. The department provides doctoral preparation in Health Education (Ed.D., and Ph.D. through a concentration in Human Ecology), Inquiries should be directed to the department head. Application packets are available by request to department.

The department fosters a natural uniting of disciplines that contribute to a holistic approach to healthy living and the enjoyment of life for all citizens. The academic disciplines focus on assisting students, clients, and faculty to (1) develop a healthful and safe lifestyle that considers the dimensions of disease and injury prevention, and the role of leisure as it contributes to mental, social, and physical health; and (2) prepare persons for competent practice of their respective disciplines, including scholarly, creative and management endeavors. The department is committed to the educational value of community-based experiential learning.

The Health, Leisure, and Safety Sciences Department offers graduate programs leading to the Master of Science with majors in Health Promotion and Health Education, Recreation and Leisure Studies, and Safety Education and Service, and to the Master of Public Health degree in Public Health. The department provides doctoral preparation in Health Education (Ed.D., and Ph.D. through a concentration in Human Ecology), Inquiries should be directed to the department head. Application packets are available by request to department.

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Health

Graduate programs are available leading to the Master of Science with a major in Health Promotion and Health Education (thesis and non-thesis options) and to the Doctor of Education with a major in Health Education. The Master of Science, with thesis and non-thesis options, requires completion of 30 semester hours.

The Doctor of Philosophy with a major in Human Ecology offers a concentration in community health.

THE PH.D. CONCENTRATION

The community health concentration integrates the behavioral and natural sciences with public health, community health education, health promotion and the safety sciences to prepare scholars with an interest in improving the health of the nation.

Requirements include:
1. Minimum 24 hours of foundation courses:
   - 610, 620, 6 hours of statistics, 3 hours of specialized research methods, 6 hours of natural or behavioral sciences, and Human Ecology 610.
   - 3. Minimum 12 hours in supporting specialization in a focused area: public health, safety, gerontology or a program approved by doctoral committee.
   - 4. Minimum 6 hours in a cognate area.

ACADEMIC COMMON MARKET

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

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 products/services. (Same as Public Health 400.) Sp

405 Alcoholism and Alcohol Education (3) Problems of alcoholism. Factors which make alcoholism serious health and safety problem. Various types of instructional/educational and intervention programs. F

406 Death, Dying and Bereavement (3) Aspects of dying, death and handling trauma of loss. Medical, financial, physical, legal and social implications of death. F, Sp

420 Sex Education As It Relates to Human Sexuality (3) Exploration of science of human sexuality. Trends, issues, and content of sex education. E

425 Women's Health (3) Factors influencing women's health and women consumers in nation's health service delivery systems. Health problems/concerns of women and techniques for prevention, maintenance and/or correction. (Same as Women's Studies 425) E

430 Suicide and Crisis Intervention (3) Factors which make suicide serious health problem. Assessment, intervention, and prevention techniques. Sp

435 Substance Use and Abuse (3) Drug and alcohol abuse problems and suspected causes; pharmacology of drugs and effects on society; strategies for intervention and education. Sp

455 Aging and Health (3) Aging process in health perspective as related to health promotion and wellness of aged. F, Sp

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

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

520 Sex Education and Human Sexuality (3) Advanced in-depth discussion of educational and health counseling theory, techniques, materials used in school, community, or health care facility. Sp

530 Health Promotion and Health Education Program Development (3) Theories and principles of health promotion program development; methodology, marketing, public relations. Health education as vehicle for health promotion. Sp

540 Evaluation in Health Promotion and Health Education (3) Evaluation principles and methodologies as related to health promotion products, processes, and construction of instruments for use in assessing health education outcomes. Sp

570 Special Topics (1-3) For graduate students, inservice teachers and other health professionals. Health/wellness or health promotion issues. May be repeated. Maximum 12 hrs.

590 Research Methods in Health (3) Basic research techniques in variety of health settings. Development of research skills and problem identification for research topic. (Same as Public Health 590) F

593 Directed Independent Studies (1-3) Individual identification and study of health/wellness or health promotion problems/issue. Specific proposal to instructor before registration. May be repeated. Maximum 12 hrs. E

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

601 Internship/Research in Safety and Health (3-6) (Same as Safety 601.)

610 Critical Analysis of Writing and Research (3) Analysis of writing and research in health related areas. F

620 Advanced Research Techniques in Health (3) Advanced theory and techniques of research design and methodologies in health discipline. Prereq: 590, 610. Sp

650 Health Aspects of Gerontology (3) Knowledge and understanding of biological, psychological and sociological aspects of aging as related to health and wellness of individual. (Same as Public Health 650.) F

655 Seminar in Nation's Health (3) Comprehensive study of definition, determinants, resources and health status of nation. (Same as Public Health 655) F

660 International Health (3) Study of quality of health, health promotion and health services in countries throughout world. (Same as Public Health 660) Sp

680 Seminar in Health (1) Ramifications of health and health education innovations in relation to evolving field and discipline. Prereq: Advanced standing as doctoral candidates. May be repeated. Maximum 3 hrs. F, Sp

Public Health

Graduate study with a major in Public Health leads to the Master of Public Health (M.P.H.). Two professional preparation concentrations are available: community health education and health planning/administration. The M.P.H. program is accredited by the Council on Education for Public Health. A minor in statistics is available to interested M.P.H. students due to public health affiliation with the Intercollegiate Graduates of Public Health.

ADMISSION REQUIREMENTS

A statement of the applicant's educational and career goals and three rating forms are required. Request application packet from the department. Preferential consideration for
admission to degree status shall be given to those with a minimum undergraduate grade-point average of 2.0 and with at least one year of professional experience in a health-related occupation. As a restricted program, non-degree admission requires department recommendation. Deadlines for completed applications are 1 February for Summer term and 1 April for Fall semester.

THE MASTER'S PROGRAM

The M.P.H. is a non-thesis program requiring completion of 38 semester hours of coursework including 30 weeks of field practice. Field practice 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 to receive credit for the essay 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.

MINOR IN GERONTOLOGY

Graduate students in Public Health may pursue a specialized minor in gerontology. This interdisciplinary minor gives the student an opportunity for combining the knowledge about aging in American society with her or his major concentration. Please refer to Human Ecology for specific requirements.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.P.H. program in Public Health is available to residents of the states of Arkansas, Kentucky, or Louisiana. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

COURSE REGISTRATION

Non-degree students must obtain permission from the department head to register for 500-level public health courses. Prerequisite coursework assigned as a condition of admission to the M.P.H. program must be completed prior to registration, with grade of B or better, typically within the first semester or two of enrollment in graduate studies.

GRADUATE COURSES

400 Consumer Health (3) (Same as Health 400.)
410 Health in the Workplace (3) (Fundamental activities in field of industrial health aimed at reducing health problems for employees. Workplace health hazards and problems of concern to nurses, medical staff, management, engineers and others in industrial health and safety fields. Prereq: Consent of instructor. May not be taken for credit by occupational health concentration majors. F
493 Directly Independent Study (1-3) Individual in-depth study of selected issues. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E
502 Registration for Use of Facilities (3-19) Required for the student not otherwise registered during any semester when student uses University facilities and/or before term date begins. May or may not be used toward degree requirements. May be repeated. S/NC only. E
509 Graduate Seminar in Public Health (1) In-depth discussion of timely topics reflecting scope of public health discipline and its interrelation with many other academic and professional disciplines. Regulations apply 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. F, Sp
511 Fundamentals of Industrial Hygiene (3) Occupational health practice, theory and regulations; recognition, evaluation and control of workplace hazards. Pertinent health hazards. Prereq: 2 yrs of chemistry and biology and consent of department. F
520 Public Health Policy and Administration (3) Administrative considerations of community-based health care programs and public health practice. Health policy formulation, political climate, involvement in health, legal responsibilities, and management concepts/techniques/process. S, Su
521 Organization Theory and Health Care Delivery (3) Administrative and Organization theory related to health facilities; operation and management of community hospital. Case discussions and problem-solving exercises; managerial functions and skills. F
523 Management in Extended Care Settings (3) Managerial concepts and theoretical foundations essential to superintend and supervise ancillary 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. Programs for home health services, comprehensive medical rehabilitation, nursing homes, congregative living centers and similar type health programs. Prereq: 521 or consent of instructor. Sp
525 Financial Management of Health Programs (3) Financial management concepts and practices applied to health services programs. Fundamentals of budgeting, costing, financing, rate setting, financial planning, and control. Opportunities to apply techniques. Prereq: 520 or consent of instructor. Sp
529 Biostatistics (3) Application of descriptive and inferential statistical methods to health-related problems and programs. Computer applications, use and interpretation of vital statistics and introductory research methodology preparatory for first course in epidemiology. Prereq: Introductory statistics or consent of instructor. F
540 Principles of Epidemiology (3) Distribution and determinants of health-related outcomes in specified populations, with application to control of health problems. Historical and present-day hypothesis formulation, research design, data and error sources, measures of frequency and association, etiologic reasoning, disease screening, and influence control. Prereq: or coreq: 530. F, Sp
542 Advanced Epidemiologic Methods (3) Nature, collection, analysis and interpretation of data pertaining to cohort and case-control studies. Surveillance and surveys. Analytic methods: multiple logistic regression and survival analysis. Experience in critiquing professional literature. Prereq.: or consent of instructor. S
550 Principles and Practices of Community Health Education (3) Theoretical foundations for community health education; opportunities for skill development in a variety of educational processes; and introduction to community health analysis. F
552 Community Health Problem Solving (4) Dynamics of community organization, community needs assessment, educational interventions, and application of program planning and evaluation techniques. Opportunity to practice skills in realistic setting. Prereq.: 550 or consent of instructor. Sp
560 Theories and Techniques in Health Planning (4) Overview of health planning concepts and methodologies: systems-oriented planning process. Major elements of planning: formulation and conceptualization of problem, planning, evaluation and implementation. Health problems of institutions, communities and selected population groups, appropriate diagnoses, and programs for addressing needs. Sp
568 Physical Activity and Positive Health (3) (Same as Exercise Science 568.)
569 Fitness Testing, Programming, and Leadership for Diverse Populations (2) (Same as Exercise Science 569.)
570 Special Topics (3) Prereq: Consent of instructor. May be repeated under different topic. Maximum 8 hrs.
585 Seminar in Gerontology (1) (Same as Human Ecology 585, Counselor Education and Counseling Psychology 585, Exercise Science 585, Nursing 585, Psychological Studies 585, Social Work 585, and Sociology 585.)
587-98-99 Internship (3,3,3) Internship (community health education or health planning/administration) in either approved organization or research setting under supervision of designated preceptor. Prereq: MPH major, one semester advance notice and consent of major advisor. S, available only for approved extended placements. S/NC only. E
590 Seminar in Intern's Health (3) (Same as Health 590.)
593 Directed Independent Study (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E
650 Health Aspects of Gerontology (3) (Same as Health 650.)
655 Seminar in Nation's Health (3) (Same as Health 655.)
660 International Health (3) (Same as Health 660.)
administration concentration, the student may emphasize professional preparation for such areas as public parks and recreation, private and commercial recreation, sports management, and entrepreneurial recreation.

The M.S. with thesis option requires a minimum of 33 hours. The M.S. with non-thesis option requires a minimum of 36 hours.

GRADUATE COURSES

410 Maintenance and Management of Recreation and Sports Related Facilities (3) Principles for operation and management of modern recreation and sports facilities. Safety; cost tracking; inventory systems; specialized maintenance techniques; safety guidelines, management systems and procedures. Prereq: Consent of instructor. F

415 Managing Leisure/Sport and Related Facilities (3) Principles of planning, designing, outfitting and operating leisure/sport related facilities such as aquatic centers, tennis complexes, activity centers. Prereq: Consent of instructor. F

430 Organization and Administration of Leisure Services (3) Principles of administration applied to provision of leisure services offered by public, private and commercial enterprises. Organizational structures and processes, management considerations, research in commercial recreation and tourism. Prereq: 110, junior standing, or consent of instructor. F

440 Dimensions of Private and Commercial Recreation Businesses (3) Nature and function of recreation in private, commercial, and industrial settings. Survey of development and management of commercial goods and services offered in leisure market. Factors influencing participation, management considerations, and research in commercial recreation and tourism. Prereq: 110, junior standing, or consent of instructor. F

450 Specialized Study in Leisure Education (1-6) Special interest leisure activities: developing positive attitudes toward leisure. Demonstrates how leisure contributes to one's mental and physical health. May be repeated. Maximum 6 hrs. E

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

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

510 Perspectives and Trends in Leisure Services (3) Basic role of leisure delivery systems in today's society, scope of leisure services, determinants of leisure behavior, developmental features of leisure and recreation. Current trends and issues, and issues affected by and/or affecting delivery of leisure services. Sp

515 Philosophical and Conceptual Foundations of Leisure (3) Philosophy of leisure and recreation; nature of philosophy; concepts of leisure, play, work, and other factors; history of leisure, and relationship of ideas to contemporary society and professional practice. Sp

520 Program Design and Evaluation in Therapeutic Recreation (3) History, philosophy, purpose, special populations served, programmatic process, professional aspects of therapeutic recreation. Basic overview of areas of leisure delivery systems. Prereq: Consent of instructor. F

521 Facilitation Techniques in Therapeutic Recreation (3) Role of therapeutic recreation in clinical and non-clinical settings; application of life-style planning, self-awareness, values clarification and assertiveness training in leisure situations, relationship of leisure education to therapeutic recreation. Prereq: 520 or consent of instructor. Su

522 Clinical Aspects in Therapeutic Recreation (3) Concepts and techniques utilized by experienced and advanced therapeutic recreationists and physical therapists; clinical issues, comprehensive program concerns, administrative funding and trends in practice of therapeutic recreation services. Prereq: 520. Sp

540 Fiscal Policies for Recreation and Sports Related Organizations and Facilities (3) Application of fiscal policies and procedures to operation of recreation and sports related organizations and facilities. Finance, revenue generating strategies, cash and inventory control, commercial, non-profit, for-profit ventures and micro-computer applications. Prereq: 450 or consent of instructor. Sp

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 management of recreation and sport related facilities. Prereq: Consent of instructor. (Same as Sport Management 541.) Sp

550 Internship in Recreation and Leisure Studies (3-6) Required of all graduate students. Minimum 50 clock hrs. each fall and summer term. Prereq: Consent of instructor. F

551 Directed Study in Leisure & Recreation (1-6) Detailed study of theme, issue, or concern. Designed to meet needs of individual students. May be repeated. Maximum 6 hrs. E

592 Special Topics in Recreation & Leisure Studies (1-6) May be repeated. Maximum 6 hrs. E

593 Problems and Research in Accident Prevention (3) Safety problems found in wide variety of accidents that occur in community; findings of current research in behavioral sciences as related to variation in incidence of accidents. F

594 Organization, Administration and Supervision of Recreation Programs (3) National, state and local level programs; administrative, instructional, and supervisory aspects. Implementation of relevant programs. Sp

595 Emergency Management (3) Civil and defense preparation for emergencies: planning, implementation of safety programs. For advanced graduate students, teachers, supervisors, and administrators. May be repeated. Maximum 12 hrs.

596 Special Topics (1-3) Advanced study in selected disciplinary or professional area of safety education. May be repeated. Maximum 12 hrs.

598 Directed Independent Study (1-3) Individual identification and study of problems in safety education. May be repeated. Maximum 12 hrs. E

601 Internship/Research in Safety and Health (3-6) Field experience. Significant problem identified, researched, and reported in acceptable form. May be repeated. Maximum 6 hrs. (Same as Health 601.) E

History

(Graduate of Arts and Sciences)

DEGREES

MAJOR

History

Graduate study with a major in Safety Education and Service (thesis and non-thesis options) leads to the Master of Science degree. The M.S. requires completion of 30 semester hours. Curricular experiences will assist students in preparing for certified safety professional examination.

ACADEMIC COMMON MARKET

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

GRADUATE COURSES

441 Driver and Traffic Safety Education (4) Preparation of traffic safety instructors for school, colleges, industry, and commercial activities: development of safe driving curricula to teach at least two non-drivers to drive. Valid driver's license required. 3 hrs. and 2 labs. Sp

442 Advanced Driver & Traffic Safety Education (3) Development of computer in teaching of driver education through use of simulation, multimedia, and multiple-car driving range. Teaching skills and supervision. 2 hrs. and 2 labs.

443 Sports & Recreational Safety (3) Accident prevention and injury control in sports activities: philosophy of safety in sports; human environmental factors and interaction in sports; injury control; risk-taking and decision solution strategies, and contributions of sports medicine to safety. 3 hrs. and 2 labs. Sp

510 General Safety (3) Principles, practices, and procedures in general safety. Safety problems in industry, traffic, recreation, industry, home and other public areas. F, Su

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

531 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities. May be repeated. S/N only. E

532 Behavioral Problems in Safety Education & Accident Prevention (3) Problems of behavior, causes of accidents, and application of principles of psychology in development of safe behavior in all segments of environment. F

533 Problems and Research in Accident Prevention (3) Safety problems found in wide variety of accidents that occur in community; findings of current research in behavioral sciences as related to variation in incidence of accidents. F

534 Organization, Administration and Supervision of Recreation Programs (3) National, state and local level programs; administrative, instructional, and supervisory aspects. Implementation of relevant programs. Sp

535 Emergency Management (3) Civil and defense preparation for emergencies: planning, implementation of safety programs. For advanced graduate students, teachers, supervisors, and administrators. May be repeated. Maximum 12 hrs.

536 Special Topics (1-3) Advanced study in selected disciplinary or professional area of safety education. May be repeated. Maximum 12 hrs.

539 Directed Independent Study (1-3) Individual identification and study of problems in safety education. May be repeated. Maximum 12 hrs. E

601 Internship/Research in Safety and Health (3-6) Field experience. Significant problem identified, researched, and reported in acceptable form. May be repeated. Maximum 6 hrs. (Same as Health 601.) E
A student who fails the M.A. examination must remain in good standing. M.A. students must be at an accredited institution, preferably with a major in history.

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 and subject).

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 examination taken no later than the semester following the term in which the student has completed the residence, coursework, and language requirements. A student stands examination in one field selected from Group I and one field selected from Group II below. Both parts are 4-hours, written, and taken during the same semester. A general oral exam will be taken following the successful completion of the two written portions. The two written and one oral exams are separate examinations, and Group I must be passed before taking Group II, and the latter passed prior to taking the oral portion. A student who fails any one of the three parts (Group I or Group II or the Oral) which constitute the Comprehensive Exam must repeat the failed exam within two semesters, excluding summer. A second failure on any one of the three parts (regardless of which one) will cause the student to be dropped from the History graduate program. Likewise, a student who does not repeat a failed exam within the allotted time (two semesters) will be dropped from the program.

Comprehensive Examination

The comprehensive examination is to be taken no later than the semester following the term in which the student has completed the residence, coursework, and language requirements. A student who fails the M.A. examination must repeat the examination no later than the following semester. A student who fails the examination a second time or does not take the examination when required will be dropped from the graduate program.

THE DOCTORAL PROGRAM

Admission Requirements

1. Successful completion of the M.A. degree from an accredited institution.
2. Acceptable scores on the Graduate Record Examination (general and subject).

Residence and Coursework

Before being admitted to doctoral candidacy, a student must:
1. Complete History 510 at UT Knoxville.
2. Complete a minimum 6 related hours outside the department.
3. Spend two consecutive semesters in residence.
4. Complete 6 hours in each of two Group I doctoral fields. (The courses in the non-examined field must be graded A-F. There is no minimum hours requirement for a Group II field. Courses taken to fulfill M.A. requirements may be counted toward this requirement.)
5. Fulfill the foreign language requirement.
6. Complete two 800-level research seminars. (One must be completed at UT Knoxville.) Students who have completed a master's thesis need complete only one research seminar (must be taken at UT Knoxville), and History 621.
7. Maintain a 3.0 overall grade-point average in graduate work attempted.
8. Complete 521 hours of graduate coursework graded A-F at UT Knoxville beyond that required for the M.A.
9. Except by prior approval of the Director of Graduate Studies, a student's coursework must be at the 500 level or above.

Language Requirements

Students must demonstrate competence in one foreign language through coursework or examination. The student's doctoral committee may specify any other languages or research tools, such as statistics, essential for the student's preparation. The foreign language requirement must be fulfilled before taking the comprehensive examination.

Comprehensive Examination

The comprehensive examination is to be taken no later than the semester following the term in which the student has completed the residence, coursework, and language requirements. A student who fails the M.A. examination must repeat the failed exam within two semesters, excluding summer. A second failure on any one of the three parts (Group I or Group II or the Oral) which constitute the Comprehensive Exam must repeat the failed exam within two semesters, excluding summer. A second failure on any one of the three parts (regardless of which one) will cause the student to be dropped from the History graduate program. Likewise, a student who does not repeat a failed exam within the allotted time (two semesters) will be dropped from the program.

Upon successful completion of the residence, coursework, and language requirements and passing the comprehensive examination, a doctoral student may be admitted to candidacy.

Doctoral Fields

Group I:

Premodern Europe

Modern Europe

United States (colonial to present)

East Asia

World History

Group II:

To be defined by the student's doctoral committee from within one of the following fields:

United States

Colonial and Early Republic

19th century

20th century

Regional

Military and Foreign Relations

Social and Cultural

American Political

European

Medieval

Early Modern

Modern

Political and Diplomatic

Intellectual and Cultural

Social and Economic

National Fields

Dissertation and Defense

Original research forms the basis for the dissertation. Doctoral candidates must register for a minimum of 3 hours of 600 Dissertation Research each semester and must complete 24 hours of dissertation credit. A final oral defense is given on the dissertation's historical context. The program must be completed within eight years from admission as a potential candidate.

GRADUATE COURSES

415 Western Economic Thought Since the 18th Century (3) Methods of study of doctrinal history. Origins and evolution of major doctrines: classical and neoclassical economics, economics of Keynes and his followers, principal developments of second half of 20th century. Major writing requirement. May not be used toward graduate degree in History. Prereq: Introductory Economics or consent of instructor. (Same as Economics 415.)

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

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

510 Foundations of Graduate Study in History (3) Assumptions and methods of historians. Required of all candidates for advanced degrees. F

521 M.A. Readings (3) Directed readings in preparation for M.A. examinations. Open only to master's candidates in history. May be repeated. Maximum 6 hrs. S/NC only. E

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
Holistic Teaching/Learning

(College of Education)

MAJORS

CURRICULUM AND INSTRUCTION

DEGREES

Curriculum and Instruction ... M.S., Ed.S., Ed.D.
Education

Special Education

L. Knight, Leader

Professors:

Alexender, J. Estill. (Emeritus), Ed.D.
Kentucky

Davis, A. R., Ph.D.
Ohio State

Hargis, Charles H. (Liaison), Ed.D.
Colorado State

Hipple, Theodore W., Ph.D.
Illinois

Huff, P., Ph.D.
Ohio State

Jost, Karl J., Ed.D.
Oklahoma

Knight, James W., Ph.D.
Texas

Rowell, C. Glennon, Ed.D.
Georgia Peabody

Schnider, W. Jean, Ph.D.
Kent State

Turner, T. N., Ed.D.
Penn State

Associate Professors:

Chance, Charles A., Ph.D.
Ohio State

Hannum, Michael C.

Ed.D.

Northern Colorado

Assistant Professors:

Gillane, Colleen P., Ph.D.
Illinois

Hendricks, D. A., Ph.D.
Alabama

Instructor:

Butterworth, Jennifer R., Ph.D.
Vanderbilt

The Holistic Teaching/Learning unit offers graduate programs leading to the Master of Science degree with a major in Curriculum and Instruction, concentrations in elementary education, reading education, social science education, elementary teaching and in secondary teaching, and with a major in Special Education, concentration in general special education; the Specialist in Education and the Doctor of Education with a major in Curriculum and Instruction; and the Doctor of Philosophy with a major in Education. The unit also houses programs for students seeking licensure in early childhood, primary, and middle school education (grades K-6 and 1-8), reading endorsement, special education licensure, and secondary social studies. See Education under Fields of Instruction for full description of all degree requirements.

The unit's central emphasis is on holistic, integrative, and interdisciplinary teaching/learning as opposed to teaching disciplinary subject content (e.g., science, mathematics, language arts) as separate entities. The focus on integration is more in line with how children learn and how language is central to the teaching/learning process. The role of the teacher in holistic teaching and learning becomes more of a facilitator of learning as opposed to a traditional role of teacher as the dispenser of content in the classroom. Central to the philosophy of holistic teaching and learning is knowing each individual child's learning style, abilities, and interests.

For further information, write the Holistic Teaching/Learning unit.

GRADUATE COURSES

419 Psychology and Education of Students with Mild Disabilities (6) Nature and characteristics of persons with mild handicaps and educational strategies appropriate for these persons. Prereq: Special Education Principles, Special Education Strategies, and Admission to Teacher Education Program. Coreq: 420.

420 Field Experience in Modified Programs (3) Practicum in teaching in modified programs planning, developing, implementing and evaluating instructional program. Prereq: Special Education Principles and Special Education Strategies, Admission to Teacher Education Program and Curriculum and Instruction 422. Coreq: 420. S/N only.

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 two fields. Not open to students with recent course or background in teaching science and social studies. Prereq: Admission to teacher education. F, Sp.

422 Elementary and Middle School Teaching Methods I (6) Methods and materials (knowledge base) for teaching reading, language arts, mathematics, social science and social studies, content and curriculum overview, Unit planning, daily planning, evaluation, etc., and language and concept development.

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-readiness and writing). Not open to students with recent course in language arts methods. Prereq: Admission to teacher education. F, Sp.

430 Elementary and Middle School Developmental Reading Instruction (3) Word recognition (including phonics), comprehension, evaluation, and materials. Not open to students with recent course in reading methods. Prereq: Admission to teacher education. F, Sp.

431 Field Experience in Comprehensive Programs (3) Prereq: Special Education Principles and Special Education Strategies, Admission to Teacher Education and Curriculum and Instruction 422. Coreq: 430. S/N only.

432 Psychology and Education of Students with Moderate/Severe Disabilities (6) Nature and characteristics of persons with moderate/severe disabilities and educational strategies appropriate for these persons. Prereq: Special Education Principles and Special Education Strategies. Admission to Teacher Education Program and Curriculum and Instruction 422.

434 Topics in Reading Education (1-6) Prereq: Admission to teacher education and course in reading education. May be repeated. Maximum 6 hrs. E.


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; assessment and integration of oral and written communication skills into existing curriculum, especially for high incidence special education students.
500 Thesis (1-15) P/NP only. E
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N or letter grade. E
504 Studies and Theory in Language Development (3) Studies and theory of language development in children. Prereq: 1 elementary language arts course or consent of instructor. F
505 Elementary and Middle School Teaching Methods II (6) Content area teaching and development of strategies for teaching of students to apply methods. Prereq: 422, Coreq: 575.
515 Seminar in Social Studies Research and Theory (3) May be repeated. P/NP only. E
518 Educational Specialist Research and Thesis (3) May be repeated. P/NP only. E
521 Teaching Social Studies in Elementary and Middle Schools (3) Planning and techniques. Trends in curriculum, development of concepts and generalizations, integration of educational theories. Prereq: Consent of instructor. F
523 Diagnosis and Correction of Children’s Difficulties in Learning Mathematics (3) Children’s difficulties in learning mathematics and procedures for helping classroom teachers deal with these difficulties. Prereq: 522 or equivalent or consent of instructor. Sp
525 Strategies, Programs and Materials for Teaching Elementary Social Studies (3) Analysis of new and innovative social studies program materials and techniques. Exploration of current trends in social studies education. Prereq: Previous course in teaching of social studies or consent of instructor. Su
527 Elementary School Curriculum (3) Examination, evaluation and application of curriculum designs in elementary school settings. Prereq: Consent of instructor. F,Su
528 Teaching Language Arts Elementary and Middle School (3) Recent trends and current materials and methods in teaching language arts and literature. Prereq: Consent of instructor. F,Su
529 Practicum in Diagnosis and Remediation of Difficulties in Learning Mathematics (3) Assessment and diagnosis of students’ difficulties in learning elementary school mathematics. Prereq: 523 or consent of instructor. Su
530 Teaching Reading in Elementary and Middle Schools (3) Trends in methods, materials, basic approaches, and assessment of reading instruction for classroom teachers of students in grades 2-8. Prereq: Course in teaching of reading or consent of instructor. F,Su
531 Seminar in Reading Education (1-4) May be repeated. Maximum 6 hrs. E
532 Psychology of Reading (3) Reading act, relationship between learning theory and reading, role of reading in child’s overall intellectual development. Affective and cultural factors. Prereq: 500-level course in reading education or consent of instructor. F
537 Diagnosis and Correction of Classroom Reading Problems (3) Procedures, methodologies and materials for diagnosing and correcting classroom reading problems. Prereq: Course in reading education, equivalent teaching experience, or consent of instructor. Sp,Su
538 Practicum in Diagnosis of Reading Problems (3) Theoretical and practical applications of specific reading diagnostic instruments; testing and grading of elementary and 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. Sp
550 Assessment and Correction of Learning Disabilities (3) Procedures and materials for diagnosing and correcting learning disabilities; analysis of children’s work. Prereq: At least one language arts course or consent of instructor. Su
553 Assessment of Exceptional Students (3) Current issues related to assessment; advanced study of evaluation models for special education; dynamic and innovative assessment approaches; advanced study of educational programming; basic statistics and application in assessment.
554 Developmental Reading Pracitcum (2) Diagnosing children having developmental and organic reading needs. Prereq: Course in diagnosis and correction of reading problems or consent of instructor. May be repeated. Maximum 4 hrs. Su
555 Characteristics of Affective/Motivational Functioning in Children with Disabilities (3) Definition, methods, identification and symptoms of children with affective/motivational disabilities. Comparison to normal development and that of children labeled disturbed or behavior disordered.
556 Instructional Systems for Affective/Motivational Education for Children with Disabilities (3) Educational and training 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, bibliotheraphy, and group interactions. Prereq or coreq: 555 or consent of instructor.
579 Special Topics (1-3) Prereq: Admission to graduate program. May be repeated. Maximum 9 hrs. S/N or letter grade.
588 Teaching Secondary School Social Studies (3) Strategies, projects, materials, and programs in social studies. Prereq: Undergraduate course in teaching of social studies. F,Su
586 Seminar in Research Techniques in Special Education (3) Evaluation of appropriate research methodologies with handicapped populations.
590 Application of Microcomputer Technology in Special Education and Vocational Rehabilitation (3) Application of microcomputer technology to special needs of exceptionalities. Microcomputer software, special switch access, authoring systems, telecommunication, and strategies for cognitive development.
591 Clinical Studies (4) Relationship between educational theory and application during internship; research post, development of portfolio, and capstone experience.
593 Independent Study (1-3) May be repeated. S/N or letter grade. E
594 Supervised Readings (1-3) May be repeated. S/N or letter grade. E
595 Special Topics (1-3) May be repeated. S/N or letter grade. E
596 Clinical Experience in Assessment and Instruction (3) Academic remediation applied in lab field set-

599 Seminar in Social Studies Education (3) Research, trends, and issues in secondary social studies.
600 Doctoral Research and Dissertation (3-15) P/NP only. E
602 Seminar in Reading Education (1-6) May be repeated. Maximum 6 hrs. E
603 Advanced Studies and Theoretical Models of Reading (3) Research on reading processes. Current theoretical models related to how learners process print. Prereq: 500-level courses in reading education or consent of instructor. Sp
604 Seminar in Curriculum and Instruction (1) Required 2 consecutive semesters. S/N or letter grade.
606 Research in Elementary Education (3) Analysis of research in elementary education with application to classroom teaching. Prereq: Research course. Su
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 or letter grade.
611 Trends and Issues in Curriculum and Instruction - An Interdisciplinary Perspective (3) Current trends and issues in field of curriculum and instruction. Prereq: Admission to Ed.D. program. E
620 Internship in Research in Special Education and Rehabilitation (3) Placement with professional engaged in the 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 or letter grade.
621 Seminar in Social Studies Research and Theory (2) 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. May be repeated. Maximum 4 hrs. E
630 Internship in Institutional Leadership in Special Education and Rehabilitation (3-9) Advanced level field experience in leadership setting. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/N or letter grade.
651 Advanced Studies in Elementary Language Arts (3) Selected issues in elementary language arts. Prereq: Graduate course in elementary language arts or consent of instructor. Sp
679 Special Topics (1-3) Prereq: Admission to doctoral program. May be repeated. Maximum 9 hrs. S/N or letter grade.
689 Internship (1-3) Experiences in application of principles and practices of curriculum development and instructional improvement. Prereq: Program prerequisites and consent of instructor. May be repeated. Maximum 9 hrs. S/N or letter grade.
693 Independent Study (1-3) May be repeated. S/N or letter grade. E
694 Supervised Reading (1-3) May be repeated. S/N or letter grade. E
695 Special Topics (1-3) May be repeated. S/N or letter grade. E

Home Economics Education

See Human Ecology
Human Ecology

(College of Human Ecology)

MAJOR ........................................ DEGREE
Human Ecology .................................. M.S., Ph.D.

The College of Human Ecology offers the Master of Science and Doctor of Philosophy degrees with a major in Human Ecology.

ADMISSION REQUIREMENTS

A completed file for review includes the Graduate School application form, College of Human Ecology application, Graduate Record Examination (GRE) scores for the general section (for the M.S. program in Human Ecology, the Miller's Anology Test (MAT) score is acceptable), and three Graduate School Rating Forms completed by individuals who can attest to the potential for graduate education. Forms may be obtained from the Dean's Office, College of Human Ecology.

THE MASTER’S PROGRAM

The Master of Science with a major in Human Ecology is a college-wide, multidisciplinary program. This degree provides a flexible graduate program for students wishing to pursue in-depth study across subject areas of human ecology. Teachers, extension personnel, family life educators and other professionals interested in broad-based areas will find that a diversity of subject matter combinations can be tailored to meet individual needs.

The M.S. with a major in Human Ecology offers two tracks. Track 1 is designed to meet the needs of professional who work in programs encompassing all areas of human ecology. Track 2 is designed for students seeking initial teacher licensure in home economics education. Thesis and non-thesis options are available for both tracks.

Track 1 - The thesis option (33 hours)

includes 8 hours of statistics and/or research methodology, 9 hours in program planning, implementation, and evaluation (may be selected from agricultural extension, human ecology, or other courses approved by the committee), 3 hours of Human Ecology 510, and 9 hours in courses in the college (must be selected from three departments within the college). The thesis option requires 6 hours of Thesis 500 and an oral defense.

The non-thesis option (48 hours) includes 3 hours of statistics and/or research methodology, Human Ecology 540, 545, 574, 591, 12 hours in courses in the college (must be selected from three departments within the college), 575 (12 hours) and 6 hours of approved electives. The non-thesis option requires a creative project (3 hours) and a written and oral comprehensive examination.

THE DOCTORAL PROGRAM

Graduate study leading to the Doctor of Philosophy with a major in Human Ecology is available in the Departments of Child and Family Studies, Health, Leisure, and Safety Sciences; Human Resource Development; Nutrition, and Textiles, Retailing, and Interior Design. Concentration areas are child development, family studies, community health, human resource development, nutrition science, textile science, and consumer environments. A major challenge of the doctoral program in Human Ecology is to draw upon the basic research generated from the natural sciences, social sciences, humanities, and the arts, and to provide a holistic perspective that contributes to the improvements of individual and family well being. Within the College of Human Ecology, research from one discipline is enhanced by encompassing and utilizing the findings of research from other disciplines.

The Ph.D. is a research degree granted only to individuals who demonstrate proficiency in conducting original research. Course requirements for the degree are determined by the student’s faculty committee, based upon college and departmental requirements and student needs and interests. The Graduate School sets minimum requirements for the doctoral degree. Additionally, the college has requirements that include:

1. Selection of a concentration and fulfillment of the requirements as directed by the major professor and approved committee;
2. Minimum of 78 semester hours in courses beyond the baccalaureate degree (exclusive of master’s thesis), including College Professional Seminar in Human Ecology 610, minimum of 9 semester hours of 600-level coursework (not including dissertation), and 24 semester hours of dissertation;
3. Successful completion of written/oral comprehensive examinations as provided by each department’s procedures and the student’s doctoral committee;
4. Original research project, which culminates in a dissertation;
5. Defense of the dissertation;

More specific information about the course of study is given under the individual academic departments that administer the Ph.D. concentrations.

CONCENTRATION IN CONSUMER ENVIRONMENTS

The consumer environments concentration is designed to be most appropriate for students with interests in retail and consumer sciences, foodservice and lodging administration or interior design.

Requirements are a minimum of 60 hours including:

1. HE 530.
2. HE 610.
3. HRA 532, ID 510, and RCS 550 or 641.
4. HRA 537 or RCS 590 or ID 590 (2 hours).
5. Minimum 9 hours of statistics and research methods.
6. Six hours from RCS 511, 550 or 641, ID 575, 625, HRA 555, 610, 620.
7. Twenty-four hours of dissertation.
8. Electives for: 34 hours approved by the committee, including a minimum of 9 hours required at the 600 level. (Students must take at least 18 hours in one of three specialty areas: foodservice and lodging administration, retail and consumer sciences, or interior design.)

MINOR IN GERONTOLOGY

An interdepartmental/interdisciplinary minor in gerontology gives the graduate student an opportunity for combining the knowledge and experience about aging in American society with his/her own major concentration.

Core courses and a practicum are offered by the College of Social Work and selected departments within the colleges of Human Ecology, Education, and Arts and Sciences. A cross-listed seminar between contributing programs is designed to integrate experiences from different sources and to demonstrate the multi-faceted nature of working within an aging society.

Declaration of a Minor

Prior to earning more than one-half the total hours required for this minor, students must complete a “Declaration of a Minor in the College of Human Ecology” form. Copies of this form are available in the Dean’s Office, Room 110, Jessie Harris Building.

Core Experience

Students must complete a core experience of 12 semester hours taken from at least 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, Interior Design 575, Nutrition 518, Public Health 523, Social Work 566, Sociology 415, Adult Education 522, 513.
2. Applied practicum. 2 hours required. Students should register under practicum experiences in the “home” department of the supervising faculty.
4. Successful completion of a written comprehensive examination covering subject matter of the minor.

Graduates Committee

At least one faculty member from the Gerontology Policy Committee who is qualified to work with graduate students, must serve on the graduate committee of each student who declares a gerontology minor. Contact Dr. Jim Moran, Associate Dean in Human Ecology, for a current list.

Admission to Candidacy

When application is made for admission to candidacy, a statement of purpose must be noted on the Admission to Candidacy form.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal
residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The Ph.D. program in Human Ecology is available to residents of Alabama, Kentucky, Mississippi, Virginia (concentration in health education only), or West Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

**GRADUATE COURSES**

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

501 Microcomputer Research Applications in Human Ecology (3). Advanced microcomputer concepts and applications for research. Overview of statistical analysis software, computer graphics, computer-assisted design and national data base searchs.

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

510 Integrative Nature of Home Economics (3) History and philosophy of home economics. Analysis of current programs and future directions in field. Examination of research, integrative framework. F, A

520 Directed Study in Human Ecology (1-3) Integrative topics. Prereq: Consent of advisor. Departmental approval required of graduate study in college including courses from at least two departments or consent of instructor. May be repeated. Maximum 6 hrs. E

525 Practicum in Home Economics (1-6) Field based experiences. Prereq: Consent of advisor. E

530 College Teaching in Human Ecology (3) Instructional effectiveness, techniques, organization, and evaluation. Prereq: Consent of instructor. Sp

540 Curriculum in Home Economics (3) Program planning, design of instruction and development of teaching materials for home economics classrooms. Prereq: 325. Coreq: 575. F


563 Family Life Education Programs (3) (Same as Child and Family Studies 563.)

574 Analysis of Teaching for Professional Development (2) Strategy to document and analyze effectiveness of teaching and of professional development. Study and application of various approaches. Coreq: 575. F

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

580 Special Topics in Home Economics Education (1-3) Current issues and trends in home economics. Prereq: Consent of instructor. May be repeated. Su, A

581 Directed Study in Home Economics Education (1-3) Prereq: Consent of instructor. May be repeated. E

585 Seminar in Gerontology (1) Scope of gerontology as discipline and as related to other academic and professional disciplines. Speakers both internal and external to UTK. Prereq: Consent of instructor. May be repeated. Maximum 3 hrs. (Same as Counselor Education and Counseling Psychology 585, Exercise Science 555, Nursing 585, Public Health 585, Psychosocial Development 585, Social Work 585, and Sociology 585.) S/N only.

591 Clinical Studies (4) Group and individual seminar activities during at least 8 hrs. Application and evaluation of professional core competencies. Completion and presentation of portfolio and analysis of teaching project. Coreq: 575.

610 Professional Seminar in Human Ecology (3) Review of various approaches taken by different disciplines to study of ecology; ecological applications in human ecology; temporal/spatial properties of human ecosystems; model building/systems thinking and futures thinking in human ecology. Sp

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**Human Resource Development**

*(College of Human Ecology)*

**MAJORS**

**DEGREES**

- Human Ecology Ph.D.
- Human Resource Development M.S., Ed.D.
- Vocational-Technical Education Ed.S.

**Peter Dean, Head**

**Professors:**

- Campbell, C. P., Ed.D.......................... Maryland
- Cheek, Gerald D., Ph.D.......................... Kansas State
- Coakley, Carroll B. (Chairperson), Ph.D........ Wisconsin
- Craig, D. G., Ed.D............................... Cornell
- Hanson, R., Ph.D.............................. Purdue
- Haskell, R. W., Ph.D............................ Purdue
- Matthews, John I. (Emeritus), Ph.D............ Arizona State
- Reed, J. L. (Emeritus), M.S.......................... Oklahoma State
- Wegner, G. A. (Emeritus), M.S.......................... Indiana

**Associate Professors:**

- Dean, Peter J., II, Ph.D.......................... Iowa
- Lifedford, B. J., Ed.D............................. Tennessee
- Mann, E. C., Ed.D................................. Penn State
- McGinnis, Jackie H., Ph.D.......................... Florida State
- Petty, G. C., Ph.D.............................. Missouri
- Stout, Vickie J., Ed.D............................ Tennessee

**Assistant Professors:**

- Mims, Cheryl M. Virginia Tech
- Pierce, R., Ph.D.................................... Ohio State
- Powell, Terrence L., M.S.......................... Oklahoma

**THE MASTER'S PROGRAM**

The Department of Human Resource Development offers graduate programs leading to the Master of Science with a major in Human Resource Development. Two tracks are available. Track 1 is for students who are already certified to teach or those who are seeking a master's degree without certification. Track 2 is for students seeking initial licensure. Thesis and non-thesis options are available for both tracks.

**Track 1** - Concentrations are available in business and marketing education, industrial education, industrial training, and vocational-technical education. The thesis option requires the completion of 33 semester hours including 6 hours of thesis. The non-thesis option requires the completion of 36 hours of coursework.

**Track 2** - Concentrations are available in business and marketing education, and technology education. The non-thesis requirements are Human Ecology 574 and 591, 6 hours; for business and marketing education, 531 and 532, 6 hours; for technology education, 553 and 555, 6 hours; internship, 12 hours; and 12 hours of specialty courses as approved by the student's committee for a total of 42 hours. The thesis option requires 6 additional hours of thesis 500 for a total of 48 hours.

**THE SPECIALIST PROGRAM**

The Ed.S. program is a cooperative undertaking involving all vocational service areas. Concentrations are available in agricultural, business, marketing and distribution, home economics, industrial, and technical education, and in general vocational education. The degree requires a minimum of 60 hours of graduate study. Credits earned for the masters degree may meet program requirements in the courses which contribute to the program objectives of the candidate. A major core of studies offers advanced concepts in human resource development.

**THE DOCTORAL PROGRAM**

The comprehensive Ed.D. program in the department is designed to provide opportunities for graduate students to achieve professional objectives, develop leadership competencies, and gain desirable experiences and understanding of human resource development.

The minimum requirements in the doctoral program consist of the following: department specialization, 12 hours; core electives, 21 hours; cognate field, 9 hours; professional education core, 9 hours; research techniques, 12 hours; and dissertation, 24 hours. A minimum of 90 hours above the baccalaureate is required.

The Doctor of Philosophy in a major in Human Ecology offers a concentration in human resource development.

**ACADEMIC COMMON MARKET**

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

**GRADUATE COURSES**

401 Utilization of Community Resources (3) Strategies of developing linkages between vocational education and private sector through advisory committees, councils, and working partnerships. Development and management of public relations programs. Prereq: 3 yrs teaching experience. Sp

415 Coordination Techniques (3) Necessary procedures, duties and responsibilities to implement, maintain, and evaluate successful cooperative education program. Prereq: Senior standing and consent of instructor. Sp

430 Principles and Organization of Business and Marketing Education (3) Historical background and development needs. Principles of vocational education in business and marketing, curriculum implications; establishing, evaluating, and improving programs.

432 Methods and Materials in Business and Marketing Education (3) Teaching techniques, aids and evaluation in subject matter fields. Prereq: Consent of instructor. F, Su

436 Supervised Occupational Experience (3-9) Practical field experience in business and marketing settings under supervision of practitioner and departmental representative. May be repeated. Maximum 9 hrs.

439 Areas of Marketing (3) Marketing, personnel development, operations, and management as affects instructional leadership program in marketing education. Prereq: 432, F, Su

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**Human Resource Development**
510 Foundations of Human Resource Development

515 Training Aids Development (3) Study and preparation of instructional aids and non-print media commonly used in education and training applications. Prereq: Senior standing or consent of instructor. F, Su

455 Performance-Based Evaluation (3) Assessing effectiveness of training through development of performance-based measures. Evaluation of incumbent worker job performance. Prereq: Senior standing or consent of instructor. Sp, Su

458 Organization and Operation of VICA/HOSA (3) Planning, organizing and implementing youth-club activities in vocational-technical programs. Prereq: Senior standing or consent of instructor. Sp, Su

451 Adapting Vocational Instruction for Special Needs Learners (3) Modification of vocational-technical programs for special needs learners. Economic, social, educational and legal considerations for providing relevant vocational-technical education for special needs learners.

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

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

503 Problems in Lieu of Thesis (3) May be repeated. Maximum 6 hrs. S/NC only. E


505 Selection, Placement, and Follow-up Procedures in Human Resource Development (3) Methods and procedures in establishing selection criteria for trained selection and placement in instructional programs and in jobs. Collecting, analyzing, and reporting follow-up data appropriate for making program improvements. Prereq: Consent of instructor. Sp, Su

509 Internship in Human Resource Development (3) Practical field experiences in selected settings under supervision of practitioner and departmental representative. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E


511 Issues and Trends in Human Resource Development (3) Academic, socioeconomic, cultural, and other handicaps of special students. Prereq: 9 hrs of graduate credit. F, Su

513 Special Topics in Human Resource Development (1-3) Specific objectives, activities and evaluation. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E

514 Individual Study in Human Resource Development (3) Prereq: Consent of supervising instructor. Approval form must be filed in office of department head. May be repeated. Maximum 6 hrs. E

515 Microcomputer Operations and Programming in Education (3) Operating procedures and BASIC programming for education instruction applications. Hands-on experience in operating and programming microcomputers, writing, debugging, and running educational programs using sequential data files. Prereq: Teaching, administrative, or related experience in education or training, or consent of instructor. E

516 Microcomputer Software Development (3) Advanced software design in BASIC: random access and binary files, subroutines, decision algorithms, and bitmapped graphics for educational environment. Hands-on learning and program development. Prereq: 515 or consent of instructor. E

518 Education Specialist Research and Thesis (3) May be repeated. Maximum 9 hrs. P/NP only. E

530 Methods and Materials for VOE Programs (3) Development of instructional aids, recent developments and research, individualized instructional, and occupational clusters. Prereq: 510 or equivalent. Sp, Su

531 Organization and Supervision of VOE and Marketing Programs (3) Developing office and marketing occupancies, guidelines and procedures used in office and marketing program areas. Trends in office and marketing education, physical facilities, state plans, instructor qualifications and advisory committees. Prereq: Consent of instructor. F, Su

535 Curriculum in Business and Marketing Education (3) Curriculum designs in career, secondary, post-secondary education. Legislation, technology, social, economic and research results that affect business and marketing education. Prereq: Consent of instructor. Sp, Su

540 Special Topics in Business and Marketing Education (1-3) Specific objectives, activities, and evaluation. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

542 Problems in Business and Marketing Education (3) Selective research problems in teaching of business and marketing education and related areas. Prereq: Consent of instructor. E

550 Administration of Industrial Education Programs (3) Developing, staffing, administering and evaluating trade, industrial and technical education programs in secondary and post-secondary school settings. Prereq: Consent of instructor. Sp, Su

551 Supervision of Industrial Education Programs (3) Techniques used to improve industrial education programs. Staff development, curriculum improvement, and program updating techniques. Prereq: 455 or equivalent. F, Su

552 History and Philosophy of Industrial Education (3) Social, political, and economic events that impact development of industrial education. Philosophical problems: justification, values, principles and concepts of industrial education. Prereq: Consent of instructor. F, Su

553 Planning Technical Education Facilities (3) Preparation of educational specifications, site selection, and working relationships with other professionals involved in planning of process of planning technical-education facilities. Prereq: Consent of instructor. Sp, Su

554 Technical Program Planning (3) Instructional systems attending to design, analysis, development, implementation, and evaluation of trade, technical supervision and related training. Prereq: Curriculum development course and consent of instructor. F, Su

555 Curriculum Planning for Industrial Education Programs (3) Developing performance-based, criterion-referenced instructional programs. Prereq: 374 or 554 or consent of instructor. Sp, Su

556 Staff Development Programs (3) Strategies for assessing, planning, and implementing programs for professional development of vocational-technical personnel. Prereq: 551 or consent of instructor. Sp, Su

557 Advanced Methods of Teaching Technical Subjects (3) Proper selection and effective application of innovative methods and teaching specialized skills and technical information. Diversifying and individualizing teaching of technical subjects. Prereq: 373. Sp, Su

558 Seminar in Industrial Education (1-3) Current issues, innovations; problems associated with technical programs. Prereq: 12 hrs of graduate courses. May be repeated. Maximum 6 hrs. F, Su

559 Evaluation of Technical Training Programs (3) Internal and external evaluation of training programs to maintain quality control and/or to justify revisions. Prereq: 455 and consent of instructor. Sp, Su

560 International Perspective of Workforce Training (3) Examination and comparison of workforce systems in highly industrialized countries. In-school training programs, out-of-school training systems, update training of incumbent workers, retraining displaced workers, transfer of new technologies, and role and responsibilities of businesses, private sector organizations/agency, and state and federal governments.

562 Grant Writing and Project Implementation (3) Theory and practice of implementing self-directed work teams, motivating employees, increasing employer productivity via teams and related issues.

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

601 Curriculum Planning in Human Resource Development (3) Curriculum theory, models, content, planning, evaluation and implementation of specialized program areas. Prereq: 555 or equivalent. Sp, Su


610 Research Development in Human Resource Development (3) Proposal development, theoretical base, research design, sampling, application of statistics, and evaluation of research in human resource development. Prereq: 8 hrs of advanced statistics courses and consent of instructor. Sp, Su

611 Internship in Human Resource Development (3) Field experience in relevant organizations. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

613 Special Topics in Human Resource Development (3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E

564 Self-Directed Work Teams (3) Theory and practice of implementing self-directed work teams, motivating employees, increasing employer productivity via teams and related issues.

The Inclusive Early Childhood Education unit offers graduate programs leading to the Master of Science with a major in Curriculum and Instruction, concentrations in elementary education and elementary teaching, and in Special Education, concentration in early childhood special education; and the Ed.S. and Ed.D. in Curriculum and Instruction. The unit also participates in the college-wide Ph.D. program with a major in Education. See Education under Fields of Instruction for full description of all degree requirements.

A program of study is available in early childhood education leading to licensure to teach pre-K through grade 3. This program is available through the Department of Childhood and Family Studies in the College of Human Ecology in collaboration with the College of Education. In
addition to the licensure program, master's degree programs may be completed in the College of Education or the College of Medicine.

For further information, write the unit leader.

GRADUATE COURSES


454 Education of the Gifted and Talented Children (3) Orientation to psychometric and behavioral studies of talent identification and intervention approaches used in early childhood special education. May be repeated. Maximum 6 hrs. Sp, Su

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. F

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

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


504 Clinical Experience in Teaching and Supervision of Exceptional Children (3-9) Placement in educational settings. May be repeated. Maximum 9 hrs. S/NC or letter grade. (Same as Rehabilitation and Deafness 504.)

515 Seminar (1-3) Curriculum, instructional technology, elementary education, secondary education, or social foundations as related to goals and student programs. May be repeated. Maximum 6 hrs. S/NC only. E

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

554 Assessment in Early Childhood Special Education (3) Development of knowledge and skills in appropriate formal and informal assessment of handicapped infants and young children: screening, identification, diagnosis, placement and programing assessment issues. Prereq: 553 or consent of instructor.

558 Neuromuscular and Health Disorders: Educational Implications (3) Neurological impairments, physical disabilities and special health conditions, autism. Investigation of instructional techniques and adaptations.

564 Psychosocial Development of Gifted and Talented Children (3) Phenomena of talent development in context of home, school, and society. Implications of 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 correq: 564 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 8 hrs. Sp,Su

567 Application of Theory in Early Childhood Education (K-3) (3) Theoretical perspectives and practices from selected theoretical orientations. Prereq: Course in early childhood education or consent of instructor. May be repeated. Maximum 6 hrs. F,Su

568 Early Childhood Special Education: Theories and Interventions (3) Theoretical perspectives of early childhood special education; exploration of programmatic models, family-focused concepts and curriculum development.

575 Creative Problem-Solving Strategies for Special Educators (3) Techniques for solving problems encountered by special educators in any setting.

579 Special Topics (1-3) Prereq: Admission to graduate program. May be repeated. Maximum 9 hrs. S/NC or letter grade.


591 Clinical Studies (4) Relationship between educational theory and application during internship; research project, development of portfolio, and capstone experience.

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

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

595 Special Topics (1-3) May be repeated. S/NC or letter grade. E

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

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

610 Internship in College Teaching and Supervision (1-9) Supervised practice in college teaching and supervision. Prereq: Admission to doctoral program or consent of instructor. May be repeated. Maximum 9 hrs. S/NC only.

620 Internship in Research in Special Education and Rehabilitation (3-9) Placement with professional engaged in 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/NC only.

630 Internship in Institutional Leadership in Special Education and Rehabilitation (3-9) Advanced level field experiences under supervision of practitioner. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/NC only.

650 Advanced Studies in Early Childhood Education (3) Prereq: 2 graduate courses in early childhood education and consent of instructor. May be repeated. Maximum 6 hrs. S/NC only. E

679 Special Topics (1-3) Prereq: Admission to doctoral program. May be repeated. Maximum 9 hrs. S/NC or letter grade.

689 Internship (1-3) Experiences in application of principles and practices of curriculum development and instructional improvement. Prereq: Program prerequisites and consent of instructor. May be repeated. Maximum 9 hrs. S/NC only. E

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

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

695 Special Topics (1-3) May be repeated. S/NC or letter grade. E

Industrial and Organizational Psychology

(College of Business Administration and College of Arts and Sciences)

MAJOR DEGREES

Industrial and Organizational Psychology ............................................ M.S., Ph.D.

Robert T. Ladd (Liaison), Director

Committee:

Fowler, Oscar S., Management
James, Lawrence R., Management
Jones, Warren H., Psychology
Larsen, John M., Jr. (Emeritus), Management
Russel, Joyce E., A., Management
Schumann, David W., Marketing, Logistics & Transportation

(For complete Faculty Listing, see Departments of Management and Psychology.)

The master's and doctoral programs are offered jointly by the Department of Psychology and the Department of Management. They are designed to prepare students for personnel, managerial, and organizational research; for university teaching; and for consulting relationships with industry. The program emphasizes a scientific/practitioner model in applying and conducting research based on accepted theory, organizational behavior, psychology, management, and statistics. The programs are administered by a joint committee of the two departments, appointed by the Associate Vice Chancellor and Dean of The Graduate School on recommendation of the two department heads 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 gaining the necessary level of sophistication in the areas of deficiency.

ADMISSION REQUIREMENTS

Applicants for admission should request information and application forms from both the Graduate School and the Director, Industrial and Organizational Psychology Program, 320 Graduate Management Center, The University of Tennessee, Knoxville, TN 37996-0545.

Two separate applications must be completed: one application for admission to The Graduate School (apply for major in "Industrial and Organizational Psychology") and one application for admission to the Industrial and Organizational Psychology program. Deadline: New students are admitted in fall semester only, and applications must be received by the Graduate Admissions and Records Office by February 1.

General Requirements

At least one year of college mathematics and one course in statistics are required. Ordinarily, an undergraduate grade point average of 3.0 or above is required with no evidence of special weaknesses 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 tests. (This corresponds to a raw score of approximately 600 on each of the tests.)

THE MASTER’S PROGRAM

A thesis is required with 6 semester hours of Management or Psychology 500.
The master's degree can be completed with a minimum of 33 semester hours in the major as follows:

Management 567, 568 or Psychology 517-
16; Psychology 557; Statistics 537, 538.

Twelve hours of additional coursework to be selected primarily from the following with the approval of the student's advisor: Management 511, 522, 610; Management/Psychology 625, 626, 627, 638; Psychology 505, 550, 610, 620, 624.

Electives, as approved for an individual's plan of study, may be selected from graduate courses in psychology, social work, sociology, management, education, planning, etc. Students who wish to pursue special research interests aside from their thesis may register for Management 525, 526 (Maximum 6 hrs per term; courses may be repeated) or Management/Psychology 690.

An internship, practicum, or field experience is recommended. A student is expected to be in residence full time one year (two years recommended).

A master's candidate must pass a final oral examination.

In addition to course requirements, a master's student must complete a comprehensive examination in general psychology within no more than two years by attaining a score of 630 (or 85th percentile) on the Subject GRE (Psychology-81). An overall "B" average is required in the course sequence Management 567-66 or Psychology 517-18 to continue in the program beyond the first year.

**THE DOCTORAL PROGRAM**

Any student in the doctoral program may be required to prepare a master's thesis by the Industrial and Organizational Psychology Committee. This policy will be implemented by the committee at such time as a review of the student's record suggests that additional data on the qualifications for pursuing a Ph.D. are required.

A dissertation is required with a minimum of 24 semester hours of Management or Psychology 600.

The doctoral degree can be completed with a minimum of 54 semester hours in the major as follows:

Management 567-66 or Psychology 517-18, Psychology 557, Statistics 537-38.

A minimum of five doctoral seminars (15 hours) selected from: Management 610; Management/Psychology 625, 626, 627, 638; Psychology 620, 624. (Five doctoral seminars are viewed as the absolute minimum; more are recommended. Statistics 711 and Psychology 695 are also recommended.)

Electives, as approved for an individual's plan of study, may be selected from graduate courses in psychology, social work, sociology, management, education, planning, etc. Students who wish to pursue special research interests aside from their dissertation may register for Management 525, 526 (Maximum 6 hrs per term; courses may be repeated) or Management/Psychology 690.

An internship, practicum, or field experience is recommended. A student is expected to be in residence full time one year (two years recommended).

Doctoral candidates must pass a final oral examination on their dissertation research.

In addition to course requirements, a doctoral student must attain a score of 550 (90th percentile) on the Subject GRE (Psychology-81) within two years of entry, successfully complete the qualifying examination covering scientific methodology before or during the third fall semester, and successfully complete the comprehensive examination in the areas of the student's major research and professional interests.

An overall B average is required in the course sequence Management 567-66 or Psychology 517-18 to continue in the program beyond the first year.

**ACADEMIC COMMON MARKET**

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

**Industrial Engineering**

(Revised 12/97)

**MAJOR DEGREE**

**MAJOR INDUSTRIAL ENGINEERING ................. M.S.**

C. H. Aikens, Head

Professors:

Bontadelli, J. A., P.E., Ph.D. .......... Ohio State
Claycombe, W. W., Ph.D. ....... VPI
DePorter, Elden L., Ph.D. ........... VPI
Devine, Michael D., Ph.D. ......... Texas
Douilet, Dan C., Ph.D. .......... PE, M.S. , Tennessee
Garrison, G. W. (UTS), Ph.D. .... NC State
LaForge, R. M. (Emeritus), PE, M.S. .... Georgia Tech
Loveless, Howard L. (Emeritus), PE, M.S. .... NC State
Schmitt, Harold W., Ph.D. ....... Texas
Snier, John N., P.E., Ph.D. ....... Ohio State

Associate Professors:

Aikens, C. H. (Liaison), Ph.D., M.S. .... Tennessee
Hailey, M. L. (UTS), Ph.D. ....... Texas Tech
Hungerford, J. C., Ph.D. .......... Ohio State
Hutchinson, D. H., Ph.D. ......... Georgia Tech
Jackson, D. F., Ph.D. ............. Tennessee
Kirby, K. E., Ph.D. .............. Tennessee
Parkinson, E. L. (UTS), Ph.D. ...... Florida

Assistant Professors:

Chatterjee, S., Ph.D. .......... VPI
Goodman, Marvin K. (Emeritus), PE, M.S. .... Tennessee
Sawhney, Rupy S., Ph.D. ........ Tennessee

The Department of Industrial Engineering offers a graduate program leading to the Master of Science degree with major in Industrial Engineering, concentrations in traditional industrial engineering and engineering management. The Ph.D. with a major in Engineering Science is available through the Department of Engineering Science and Mechanics with a specialization in industrial engineering.

**THE MASTER'S PROGRAM**

Students who enroll in the Master of Science degree may select a concentration in either industrial engineering or engineering management. Admissions are open to graduates of ABET-accredited undergraduate curricula in engineering, or to graduates of other technical curricula who satisfy prerequisites depending on their academic backgrounds and industrial experiences. Policies concerning prerequisite requirements will be determined by the Industrial Engineering faculty.

**Industrial Engineering**

Under the industrial engineering concentration, students may select either the thesis or non-thesis option. The thesis option requires 24 hours of coursework plus a major course thesis. The non-thesis option requires 30 hours of coursework plus a 3-hour industrial design project.

Depending upon a student's background and career objectives, graduate work in industrial engineering enables the student to select an area of specialization from operations research, manufacturing and production systems, human factors engineering, information systems engineering, quality and reliability engineering, or general industrial engineering.

**Engineering Management**

The engineering management concentration has an additional admission requirement of two years' industrial experience as a practicing engineer or scientist, or current full-time employment in an appropriate engineering or applied science position. The program is non-thesis and requires 33 hours of coursework plus a 3-hour capstone project. This concentration is fully supported off-campus utilizing electronic media for video taping and interactive distance teaching methods.

Note: Any 400-level course required in the Bachelor of Science in Industrial Engineering program at UT Knoxville may not be used for graduate credit in the M.S. degree program.

**Industrial Engineering**

**GRADUATE COURSES**

400 Manufacturing Materials/Processes (3) Characteristics of materials and processes used in modern manufacturing.

401 Integrated Manufacturing Systems (3) NC and CNC machine tools, robotics and related materials handling systems, product data management systems, and manufacturing control systems. Prerequisite: 400.

402 Production System Planning and Control (3) Theory and application of forecasting systems, regression and time series models, independent demand inventory models, development of safety stock. Coverage of all modules of Manufacturing Resource Planning (MRP) Systems: master production scheduling, resource requirements planning, bill of material and inventory file structures, material requirements planning, capacity planning, shop floor and purchase order control. Overview of
just-in-time Inventory concepts and MRP’s role in manufacturing automation. Prereq: 301.

403 Production Facilities Design and Material Handling (3) Design of production facilities; plant layout, analysis and planning for overall moving, packaging and storage of materials. Office layout and service areas. Design of facilities for such diverse groups as hospitals, banking, industrial plants, etc. Prereq: 301.

405 Engineering Economy (3) Methods and problems in selection or replacement of equipment. Decisions among engineering alternatives involving capital recovery, economic life of equipment, and rate of return on investment.


412 Quantitative Methods in Project Management (2) Project planning, scheduling, and control based on network and premming system. Resource allocation and time-cost trade off algorithms, multi-project control, computer applications, and PERT methods of handling uncertainty in activity time estimates.


421 Information Systems I (3) Systems engineering approach to design, development, implementation, and evaluation of information systems. Information and data aspects of system engineering. Prereq: 304 and senior standing.

422 Senior Industrial Engineering Problems Analysis (3) Application of industrial engineering to field assignments in production planning and control, analysis and presentation. Prereq: 402, 403, and 406.


440 Total Quality Management (3) Philosophy of continuous improvement in organizations: management and implementation issues; definition, identification, and analysis of systems and processes; production and service quality improvement; flowcharts, pareto diagrams, cause and effect diagrams and seven new tools; data collection and control strategies; capability analysis and quality of design; components of variation; measurement issues; issues relevant to continuous processes; managing quality in short-run environments; use of classical statistical tools; correlation and regression analysis; design of experiments; the system value, Lab. Prereq: Quality Control or consent of instructor.

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

501 Design Project (1-3) Enrollment limited to industrial engineering students in non-thesis program. May be repeated. Maximum 6 hrs. S/NC only.

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

513 Facilities Planning and Design (3) Modern materials handling techniques, computer-aided layout techniques, application of new models, and use of these to design manufacturing facility. Prereq: Production Facilities Design and Material Handling or consent of instructor.

514 Information Systems II (3) Systems analysis and system control concepts. Introduction to information systems. Role of IE in offices and factory of future. Management support systems, decision support systems, and integrated support system.

515 Advanced Production and Inventory Systems (3) Advanced topics in production planning and inventory systems. Material requirements planning; production planning and master scheduling; just-in-time concepts, and other selected topics. Prereq: 402 or consent of instructor.


517 Reliability Engineering (3) Continuous time random processes with applications to availability of equipment and manufacturing systems. Failure data analysis, life testing, and maintenance. Reliability-based criteria for product acceptance. Prereq: 516.

518 Advanced Engineering Economy (3) Application of economic engineering analysis in complex decision situations. Inflation and price changes; uncertainty evaluation using nonprobabilistic methods; optimization techniques; and project allocation; evaluation involving equipment replacement, inventory- owned utilities, and public works projects. Prereq: Probability and Statistics for Scientists and Engineers I or equivalent. (Same as Engineering Management 516.)

519 Human Factors Engineering and Ergonomics (3) Application of human factors and ergonomic concepts and principles to design and analysis of man and machine systems. Human as biomechanical system, human information processing, human reliability and error prediction; evaluation of human information processing, human reliability, and system safety analyses. Case histories of industrial accidents and injuries. Prereq: Consent of instructor.

520 Human Factors and Product Safety Engineering (3) Role of human factors and safety engineering, legal implications in product design, product liability, system safety, and system failure analysis. Product testing, reliability, and system safety analysis techniques. Case histories of industrial accidents and injuries, and product liability litigation. Prereq: 519 or consent of instructor.

521 Advanced Human Factors Engineering Methodology (3) Introduction to the methodologies used in human factors, operations research, and psychology. Prereq: Consent of instructor. Prereq: 522, 523.

522 Optimization Methods in Industrial Engineering (3) Optimal design and control techniques for static and dynamic systems. Techniques for optimization, including linear, nonlinear, and integer programming, and penalty function methods. Prereq: 522, 523.

526 Dynamic System Simulation (3) Discrete, continuous, and hybrid models of machine systems. Simulation of systems of information, and the use of simulation software. Systems modeling, design of simulation experiments, and analysis of output. Prereq: Probability and Statistics for Scientists and Engineers I.

527 Lean Production Systems (3) Characteristics and performance of mass and lean production systems. Lean production concepts and principles. Planning, designing, and implementing lean production systems: time balancing, the use of process flexibility, and the control of support and other selected topics. Application at enterprise level to achieve competitive advantages. Prereq: 515 or consent of instructor.

591-92-93 Special Topics in Industrial Engineering (3,3,3) Individual or group research projects. Prereq: Consent of instructor. May be repeated.

601 Operations Research Models in Engineering Economy (3) Mathematical programming techniques applied to capital budgeting; advanced topics in multiple attribute decision making; modern models for sequential decision making; artificial intelligence in complex decision analyses. Prereq: 518, 523.


604 Advanced Topics in Optimization  (3) Multi-stage optimization theory. State increment dynamic programming, adaptive optimization theory. Prereq: 603.


606 Advanced Topics in Human Factors, Safety and Biomechanical Engineering (3) Application of advanced human factors analysis and design methods to man-made systems; epidemiology of accidents and injuries; and study of injury causal mechanisms. Injury models and theories and development of injury, loss, and risk reduction techniques. Current research issues in man-made systems analysis and design. Research into system failures; prevention of injuries. Prereq: Consent of instructor.

691-92-93 Advanced Topics in Industrial Engineering (3,3,3) Forum to study individual or group research topics. Prereq: 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 industrial area academic. Prereq: Enrollment in engineering management. May be repeated. Maximum 6 hrs. S/NC only.

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

516 Statistical Methods in Industrial Engineering (3) (Same as Industrial Engineering 516.)

518 Advanced Engineering Economy (3) (Same as Industrial Engineering 518.)

527 Lean Production Systems (3) (Same as Industrial Engineering 518.)
Information Sciences
(Office of the Vice Chancellor for Academic Affairs)

MAJOR DEGREE
Information Sciences ......................................... M.S.
José-Marie Griffths, Director
Glenn E. Estes, Associate Director
W. David Peninnan, Associate Director

Professors:
Estes, Glenn E. (Liaison), M.S. .... Kent State
Griffths, José-Marie, Ph.D. .......... London (UK)
Penninnan, W. David, Ph.D. .......... Ohio State
Purcell, Gary R. (Emeritus).
Ph.D. .................................................. Case Western
Tenopir, Carol, Ph.D. .. ............. Ohio State
Wilson, P. (Emeritus), Ph.D.......... Michigan

Associate Professors:
Fisher, Patricia L., Ph.D. .......... Florida State
Pemberton, J. Michael, Ph.D. ...... Tennessee
Pollard, Richard, Ph.D. ........... Brunel (UK)
Robinson, William C., Ph.D. ...... Illinois
Sinkankas, George M., Ph.D. ...... Pittsburgh

Assistant Professors:
Bohstedt, Jinx, Ed.M. ................ Harvard
Wang, Pelling, Ph.D. ............... Maryland
Whitney, Gretchen, Ph.D. ........ Michigan

The School of Information Sciences provides a program leading to the preparation of librarians and information professionals for work in all types of libraries and information centers. The program of study includes a graduate curriculum leading to the Master of Science degree. The program is accredited by the American Library Association. A Ph.D. degree program may also be pursued with a major in Communications, contemporary in information science.

The mission of the school is to educate people to live, work and flourish in an information society through excellence in teaching, research, and public service in Information Sciences. The goals and objectives of the school are:

1. Knowledge of the generation, production, management, dissemination and uses of information.
2. Knowledge of the roles of various organizations/institutions in promoting the flow of information.
3. An understanding of the role of the information professional as mediator between information resources and their users.
4. An understanding of the roles of various tools and technologies in facilitating access to information.
5. An understanding of the structure and content of information resources in various formats and subjects.

6. Knowledge of theoretical and practical evolution of information sciences and technologies and their relationship with other disciplines.
7. Competence in creating, managing and accessing information in a variety of formats.
8. To provide services to the state, region, and nation in association, consulting and continuing education activities which will promote the development and improvement of information systems and services such that the school’s contributions reach beyond its immediate academic programs. The school will provide:
   1. Continuing education for information professionals and, on a selective basis, to persons outside the information field.
   2. Advisory services to information organizations.
   3. Leadership for professional associations.
   4. To conduct basic and applied research which promotes the generation of new knowledge, services and technology. The school will encourage:
      1. Research which strengthens its instructional and public service programs.
      2. The use of a variety of research methods.
      3. Sharing the results of its research.

ADMISSION REQUIREMENTS

Applicants to the Information Sciences program must have a minimum undergraduate grade-point average of 3.0 or a satisfactory graduate degree grade-point average for admission as a potential candidate for the MS degree.

The verbal, quantitative and analytical aptitude portions of the Graduate Record Examination (GRE) are required of all applicants unless a graduate degree has been completed prior to application for admission. Applicants should take the GRE at least one semester in advance of application for admission and are expected to score 1500 points or better.

A personal data sheet and three recommendations (obtained from the School of Information Sciences) should be submitted to the admissions office of the school. Foreign applicants are required to take the Test of English as a Foreign Language.

THE MASTER’S DEGREE

The program leading to the Master of Science involves a total of 43 semester hours of graduate courses, 16 hours of which form a core curriculum required of all students. Either a thesis or a non-thesis option is available, with 6 hours of credit required for thesis credit. At least 37 hours must be taken in the School of Information Sciences, allowing up to 6 hours outside the school with a maximum of 6 from outside the University. Upon completion of the program, all students are subject to a final examination. For students who elect the thesis option, the examination will be a defense of the thesis. Students who elect the non-thesis option will be given a written comprehensive examination.

Core Curriculum

The core curriculum is a 16 semester hour sequence of courses required of all students: 490, 520, 530, 560, 580. These courses address the evolving information environment; foundations of information sciences and technologies; information resources selection, acquisition and
evaluation; information content representation; information access and retrieval. The core curriculum includes a one-hour electronic information and communications laboratory experience required of students during the first semester: 504.

The 16 hour core is prerequisite to all elective courses for students enrolled in the MS degree program. Elective courses may begin in the final semester of core course work with permission of the advisor and the instructor of each elective course selected.

Concentrations
Upon completion of the core curriculum, students may select a concentration from one of the following:

Corporate Information Systems and Services: The concentration includes 18 hours (550, 553, 564, 567, 585, 599) of required courses and 9 hours of elective courses, one selected from each of these groups: Group A (554, 555, 565, 592); Group B (531, 532, 533, 537, 538); Group C (562, 583, 564).

Electronic Information and Communications: The concentration includes 18 hours (537, 561, 563, 565, 582, 585, 587) of required courses and 9 hours of elective courses, one selected from each of these groups or all electives selected from one group: development and design aspects (430, 523, 555, 585, 589, Journals 460 or 535 or 580); standards and technical aspects (587, 583, 584, 589, 599); policy and market aspects (538, 599, 565) or (580).

Information Systems and Technology: The concentration includes 18 hours (540, 583, 584 or 587, 587, 589, 599) of required courses and add 9 hours of elective courses.

Scientific and Technical Information: The concentration includes 18 hours (450, 532, 535, 540, 555, 599) of required courses and 9 hours of elective courses.

Youth Services in Public and School Libraries: The concentration includes two specializations: public library youth services and school library media services. Within the concentration, 21 hours (567, 571, 572, 573, 585, 599, one elective) are common and 6 hours are taken in the specialization (public library: 554, 592; school library: 475, 551).

FINANCIAL ASSISTANCE OPPORTUNITIES

Employment with the University of Tennessee Libraries may prove 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 may extend the period required for the degree. Similar opportunities exist with other libraries and information agencies in the Knoxville area.

Work opportunities in a scientific-technical environment are available through subcontracts with Oak Ridge National Laboratory and the Department of Energy.

A limited number of graduate teaching assistantships are available through the school. Assistantships 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, 804 Volunteer Blvd., Knoxville, TN 37996-4330

ACADEMIC COMMON MARKET

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

GRADUATE COURSES

430 History of the Book (3) History of writing and various methods of bookmarking.
450 Writing About Science, Technology and Medicine (3) (Same as Journalism 450).
475 Utilization of Instructional Media (3) (Same as Education in the Sciences, Mathematics, Research and Technology 475).
485 Electronic Communications and Information Resources on Internet (3) Exploration of worldwide information and communication resources including e-mail, gopher, Archie, Veronica, WAIS, WWW, and newsgroups.
490 Information Environment (3) Generation, production, management, dissemination, and use 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) F,Sp,Su,A
502 Registration and Use of Facilities (3-15) Required for the student not otherwise registered during any semester when the student uses University facilities and for faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N only.
504 Electronic Information and Communications Laboratory (1) Methods for creating and managing information in electronic form. Communication of electronic information in networked environment. Location and use of electronic information and communication resources. For GSLIS graduate students only; must be completed satisfactorily in first semester. S/N only.
520 Information Content Representation (3) Principles of distinguishing, describing, and indexing intellectual work; current approaches: citation systems, descriptive cataloging, non-subject indexing, pre- and post-subject coordinate subject indexing, classification and categorization; authority control of index terms; standards, F,Sp,Su,A
521 Cataloging and Classification (3) Basic library-oriented cataloging and classification techniques, tools, and supporting operations. Descriptive cataloging, choice and form of non-subject entries, subject heading work, general classification, authority control, bibliographic utilities, online library catalogs.
522 Advanced Cataloging and Classification (3) Cataloging and classification of more difficult materials, use of larger classification systems and subject heading systems. Library of Congress Classification, Library of Congress Subject Headings, and introduction to Medical Subject Headings, Premed, 521, Sp
523 Abstracting and Indexing (3) Philosophies, standards, and procedures for manual and automatic document indexing, back-of-the-book indexing, vocabulary control, thesaurus construction, and abstracting.
530 Information Access and Retrieval (3) Media for information storage, logical and physical information structures, query logic and languages, search strategies and heuristics, user interfaces, evaluation of retrieval system performance. Search techniques for various types of databases including multi-media, full-text, numeric, bibliographic, F,Sp,Su,A
531 Sources and Services for the Social Sciences (3) Information sources in political science, sociology, psychology, geography, history, anthropology, business, and education.
532 Sources and Services for Science and Engineering (3) Information sources in engineering, physical and life sciences.
533 Sources and Services for the Humanities (3) Information sources in philosophy, religion, fine arts, performing arts, literature and language. Organization and management of regional collections.
534 Government Information Sources (3) Selection, acquisition, organization, and utilization of government information in various formats from legislative, 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 delivery, article delivery, full-text databases, evaluation and testing.
536 Creation and Distribution of Information and Knowledge Resources (3) Historical, political, and societal dimensions of creation, dissemination, growth, and internationalization of information and knowledge from Aristotle's Lyceum to twentieth century university and research environments.
537 Information Industry (3) Issues and trends concerning information industry: products and services. Standards, cataloging techniques, 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 trade-offs; 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 national and international policy areas related to information creation, production, and distribution; development of information policy for organizations.
540 Research Methods (3) Research methods in various fields 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 concerns, strategies, and techniques applicable to information professional work in libraries, archives, records management, and other information organizations.
551 School Library Media Centers (3) Planning, implementing, evaluating school library programs. Curricular involvement, role of technology, site-based management, relationships with district and state services.
552 Information Centers in Higher Education (3) Development, mission, trends, issues, users, services, and environment of campus information centers including libraries and alternatives; learning resources center and library-computer center models.
553 Specialized Information Agencies (3) Development and present status, scope and objectives. Administration of organizational problems and techniques.
554 Public Library Management and Services (3) Development, roles, political environment, governance, organization, fiscal management, services, marketing, and performance evaluations.
555 Scientific and Technical Communications (3) 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 users of information and information systems. Includes practical experience.
560 Information Resources Selection, Acquistion, and Evaluation (3) Principles of development and management of collections in information agencies; community analysis; users and uses; policies and processes.
duresevaluation of items and collections; selecting
items to meet particular needs. F, Sp, Su, A

561 Contemporary Book Publishing (3) Creation,
design, production, marketing, and distribution; various
types of publishers. Sp

562 Serials (3) Serials collections; selection, acquisi-
tion, storage, preservation, use, and public services. Su, A

563 Graphic Design and Media (3) Principles and
practice in visual aspects of communications. Graphic
design, typography, production techniques and publica-
tion design, as these apply to electronic information
delivery systems.

564 Corporate Information Systems (3) Objectives
and functional elements of records systems, archival
programs, management information systems and tech-
nologies within various types of organizations. Sp

565 Electronic Publishing and Imaging (3) Document
types, document imaging, data compression, document
interchange formats and standards, document transfer
and rendering, electronic publishing mechanisms, and
electronic document delivery systems.

566 Environmental Scanning for Information Profes-
sionals (3) Principles and practice of environmental
scanning; information evaluation and synthesis, role
of strategic information in modern organization.

567 Information Network Applications (3) Scholarly
and community-based electronic communications. Na-
tional and international standards, tools, resources; iden-
tification, analysis, evaluation, and management of tools
and resources; construction of local technologies as
developed and applicable. F

569 Advanced Production of Audiovisual Software
(3) (Same as Education in the Sciences, Mathematica,
Research and Technology 569.) F, Sp

571 Resources for Children (3) Critical survey of
books and related materials for children, development of
genres. Evaluation, selection, and utilization for school
and public libraries. Sp

572 Resources for Young Adults (3) Critical survey of
books and related materials for young adults; personal,
vocational, and recreational needs and interests. Evalua-
tion, selection, and utilization for school and public
libraries. Su

573 Programming for Children and Young Adults (3)
Philosophy and objectives of public and school library
services for children and young adults. Reading, listen-
ing, and viewing; guidance for individuals and groups;
Program planning, implementation, and evaluation. Pre-
req: 571 or 572. Su

574 Adult Materials and Services (3) Popular informa-
tional and recreational materials and services to meet
adult interests in variety of formats. Development of
specialized collections.

580 Foundations of Information Sciences and Tech-
nologies (3) Definitions of information, information
sciences, and information technology; theories of infor-
mation, information representation, retrieval, and trans-
fer; standards and technologies for information process-
ing and distribution; research front; bibliometrics and
infometrics; relationships with other disciplines. F, Sp, Su, A

582 Library Automation (3) Computer-based applica-
tions and systems for libraries including MARC, bibli-
ographic utilities, retrospective conversion, circulation
systems, online catalogs, computer-based reference
services, acquisitions and serials control, systems plan-
ning and implementation. F

583 Information Systems (3) Systems concept, defin-
ing system, analysis and design of information systems.
Selecting and using information systems to support various
activities. User involvement in the development process.
F, Sp

584 Database Management Systems (3) Defining data
needs, data structures, role of operating systems in data
management, file organization, database management
systems, logical data models, internal data models,
database administration and evaluation. Design and
implementation of application using database manage-
ment system. Sp

585 Information Technologies (3) Evolution, trends,
capabilities, and limitations of technologies applied to
information capture, storage, preservation, access, and
distribution. F, Sp

586 Information Retrieval Systems (3) Historical
perspective on information retrieval research; statistical
and probabilistic retrieval techniques; cognitive user
modeling; expert intermediary systems; associations,
relations and hypertext. F

577 Information System Design Project (3) Super-
vised and structured experience in design and develop-
ment of computer-based information systems. Prereq:
583, 584 or 588, 589, and 589. F, Sp

588 Psychology of Human-Computer Interaction (3)
Survey of human-computer interaction and introduction
to psychological and other behavioral science knowl-
edge and techniques useful in design of computing
systems for human use. Basic psychological phenomena
of human cognition, memory, problem solving, and
language and how these processes relate to and condi-
tion interaction between humans and interactive com-
puting systems. Sp

589 Information Networking Technologies (3) Con-
cepts and terminology of information transmission. Infor-
mation network architecture and standards, contemporary
and emerging information networking technologies. F

590 Problems in Information Sciences (3-6) Prereq:
Consent of instructor. May be repeated. Maximum 6 hrs.

591 Supervised Readings in Information Sciences
(3) Prereq: Consent of instructor. May be repeated.
Maximum 6 hrs. F, Sp

592 Seminar in Information Sciences (3-6) Prereq:
Consent of instructor. May be repeated with consent of
advisor. Maximum 6 hrs. F, Sp

593 Independent Study (3-6) Prerequisite: Consent
of advisor. Maximum 6 hrs. F, Sp

594 Graduate Research Participation (3) Advanced
research techniques under supervision of staff research
director. May be repeated. Maximum 6 hrs.

599 Practicum (3-6) Opportunity to translate theory into
practice under guidance of qualified information profes-
sionals. Prereq: Completion of core and pertinent
advanced courses relevant to student's practicum de-
dsign. Minimum 3.0 cumulative GPA. Written consent
of advisor and approval of practicum coordinator. May
be repeated. Maximum 6 hrs.

601 Advanced Seminar in Information Sciences (3)
Theories, research, and traditional practices of informa-
tion representation, organization, and access and re-
trieval. Research opportunities and methods. Relation-
ship to and interaction with other disciplines.

Interdisciplinary Programs

The College of Arts and Sciences offers a series of interdisciplinary undergraduate majors and
minors through its Interdisciplinary Programs. These programs include African and
American Studies, American Studies, Ancient Mediterranean Civilizations, Asian
Studies, Cinema Studies, Comparative Literature, Latin American Studies, Linguistics,
Medieval Studies, Russian and East European Studies, Urban Studies, and Women's Studies.
Certain courses within these programs are available for graduate credit as listed below. See
the Undergraduate Catalog for program descriptions and directors.

African and American Studies

GRADUATE COURSES

421 Comparative Studies in African and African-
American Societies (3) Education, religion, and social
stratification. Views African-Americans and Africans of
each other and concept of Pan-Africanism.

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 Sci-
cie452.)

461 African Prehistory (3) (Same as Anthropology
461.)

473 Black Male in American Society (3) Development
of historical images, myths and stereotypes. Impact of
critical factors: Black feminism, violence, concepts of
masculinity, family, white males, white females, homo-
sexuality, nationalism, and athletics.

483 African-American Women in American Society
(3) Historical and contemporary socio-eco-political fac-
tors in American society as related to Black women.
(Same as Women's Studies 485.)

510 Special Topics (3) May be repeated. Maximum 6 hrs.

American Studies

GRADUATE COURSES

510 Special Topics (3) May be repeated. Maximum 6 hrs.

Ancient Mediterranean
Civilizations

GRADUATE COURSES

510 Special Topics (3) May be repeated. Maximum 6 hrs.

Asian Studies

GRADUATE COURSES

510 Special Topics (3) May be repeated. Maximum 6 hrs.

Cinema Studies

GRADUATE COURSES

400 Special Topics (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.)

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 6 hrs.

402 Latin American Studies Seminar (3) Selected topics. May be repeated. Maximum 6 hrs.

510 Special Topics (3) May be repeated. Maximum 6 hrs.

Latin American Studies

GRADUATE COURSES

510 Special Topics (3) May be repeated. Maximum 6 hrs.

Linguistics

GRADUATE COURSES

400 Topics in Linguistics (3) Content varies. May be repeated. Maximum 6 hrs.

411 Linguistic Anthropology (3) (Same as Anthropology 411.)

420 The Development of Historical Linguistics as a Science (3) Scientific understanding of language change. Emergence of Neogrammarian paradigm from 19th-century intellectual trends. Impact of synchronic, descriptive, and transformationalist linguistic theories. (Same as Russian 401-02.)

451 Senior Seminar (3) Elective study of selected major novels. (Same as Russian 451-52.)

510 Special Topics (3) May be repeated. Maximum 6 hrs.

Medieval Studies

GRADUATE COURSES

510 Special Topics (3) May be repeated. Maximum 6 hrs.

Russian and East European Studies

GRADUATE COURSES

401-02 Advanced Grammar, Conversation, and Composition (3,3) Prereq: Russian Composition and conversation or equivalent. (Same as Russian 401-02.)

451 Senior Seminar (3) For majors in Russian; minors admitted at discretion of instructor. Intensive study of language, literary style, and literary criticism based on selected major novels. (Same as Russian 451-52.)

510 Special Topics (3) May be repeated. Maximum 6 hrs.

Urban Studies

GRADUATE COURSES

401 The City in the U.S. (3) (Same as Planning 401.)

441 Urban Geography (3) (Same as Geography 441.)

644 Urban Ecology (3) (Same as Sociology 464.)

Women's Studies

GRADUATE COURSES

400 Topics in Women's Studies (3) Content varies. May be repeated. Maximum 6 hrs.

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 1930 (3) (Same as Speech Communication 466.)

476 Rhetoric of the Contemporary Feminist Movement (3) (Same as Speech Communication 476.)

483 African-American Women in American Society (3) (Same as African-American Studies 483.)

510 Special Topics (3) May be repeated. Maximum 6 hrs.

Journalism

GRADUATE COURSES

403 International Communications (3) Development and operations of world mass communication channels and agencies. Comparative analysis of media, media practices, and flow of news throughout world. Print and broadcast systems in terms of their social, economic, and cultural functions. Prereq: Communications 200, or consent of instructor.

412 Opinion Writing (3) Analysis of editorial positions, practices, and pages. Writing of editorials and columns for newspapers, magazines, and companies. Study and use of rhetoric devices and logic. Prereq: Writing for Mass Communication or consent of instructor.

434 Advanced Writing (3) Techniques of writing in-depth articles of mass circulation and specialized magazines. Organizing and presenting material, problems in specialized areas: business, science, agriculture, humanities. Prereq: Communications 200, or consent of instructor.

436 Issues in Journalism (3) Topics vary. Prereq: of instructor. May be repeated. Maximum 6 hrs.


430 Public Affairs Reporting (3) Reporting and writing about courts, government, and public agencies. Event and issue-oriented journalism of politics and public affairs. Prereq: 390, E.

433 Advanced Editing (3) Sensitivity to language and editing skills. Headline writing, layout, and production. Prereq: 203.

444 Journalism as Literature (3) Study of a writer's use of the novel, the essay, and other forms of nonfiction. 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 success...
ossful science writing and write series of articles for general public based on scientific journals, news conferences, technical meetings, and interviews. Prereq: Consent of instructor. (Same as Information Sciences 450.) F,Sp

451 Environmental Reporting (3) Writing for news media on such environmental issues as strip-mining, water pollution, air pollution, sludge dumps, nuclear power, fossil fuel and acid rain. 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.


480 Journalism in the High School (3) Functions and methods of high school publications. Problems related to staff selection, content of publications, copy, layout, photography, printing, advertising, and business. Planning course outlines and curricula for journalism/ mass media studies. Su

490 Advanced Photojournalism (3) Advanced principles and methods of black-and-white photography. Introduction to color photography. News and feature photography and photo essays. Prereq: 290 or consent of instructor. Sp


525 Public Opinion (3) Role of press in developing and influencing public consensus. Social theories of public opinion and analysis of mass media's response. (Same as Public Relations 525.)

535 Publications Management (3) Problems in management, production, market analysis, and design. Techniques of writing, editing, and presenting comprehensive articles and other material; regional and specialized magazines. Individual editorial projects. Prereq: 420 or consent of instructor.

550 Writing and Editing Projects (3) Specialized writing or editing interests: agriculture, politics, labor, finance, science, technical, general publications. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

580 Seminar in Visual Communication (3) Behavioral aspects of communication with images. Theories of psychological effect in color, shape, texture, and other design elements. Prereq: 203 or Advertising 350 or Broadcasting 430 or equivalent.

590 Communications and International Development (3) Relationship between mass communications and development of nations. Role of communications media of developed nations in Third World regions of globe. Communications as facilitator of international cooperation.

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

598 Internship (3) Professional work in journalism supervised by editor or manager with faculty approval. No retroactive credit for previous work experience. Prereq: Completion of core curriculum.

### Language, Communication, and Humanities Education

#### GRADUATE COURSES

**Public Relations**

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: Public Relations Principles or equivalent. F,Sp

516 Seminar in Public Relations Issues (3) Topics vary. May be repeated. Maximum of 6 hrs.

525 Public Opinion (3) (Same as Journalism 525.)

571 Public Relations Management (3) Analysis and management of problems in communication between institutions and organizations and their publics. Measurement and evaluation of effectiveness of communication programs. Prereq: 470 or consent of instructor.

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

598 Internship (3) Professional work in public relations supervised by communications manager with faculty approval. No retroactive credit for previous work experience. Prereq: Completion of core curriculum.

### 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 Instructional Materials and Production Related to the Teaching of Art (3) Development and use of instructional aids concerned with all aspects of teaching art: videotapes, audiotapes, slides, charts, and learning pace.

590 Special Topics in Art Education (3-6) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

### Language, Communication, and Humanities Education

#### GRADUATE COURSES

455 Teaching of Foreign Languages, Grades 7-12 (3) Instructional methods, lesson planning, peer-teaching; materials for teaching foreign language and culture; evaluation techniques. Required for certification in modern foreign languages and Latin. Prereq: Completion or near completion of foreign language hours for certification and admission to Teacher Education Program.

459 Teaching English in the Secondary School (3) Techniques of teaching composition, language, and literature. Prereq: Admission to Teacher Education Program.

460 Teaching Reading and Literature in the Secondary School (3) Approaches for teaching basic reading skills and ways of teaching literature.

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. E

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

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

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

507 Teaching Poetry Grades 7-12 (3) Research and theory to application of teaching of poetry. Design of strategies and materials for teaching and writing of poetry. Review of texts and materials.

508 Teaching Composition in the Secondary School (3) Teaching narrative, 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.

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/N/C only. E

516 Seminar (1-3) Curriculum, instructional technology, elementary education, secondary education, or social foundations as related to goals of students' programs. May be repeated. Maximum 6 hrs. S/N/C only. E

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

See College of Veterinary Medicine and Comparative and Experimental Medicine

Law

(College of Law)

MAJOR

DEGREES

Law ........................................... J.D., J.D.-MBA, J.D.-M.P.A.

Richard S. Wirtz, Dean

Professors:

Best, Reba, M.L.S. ................................ Florida
Blaze, Douglas A., J.D. ......................... Georgetown
Cohen, Neil P., LL.M. ......................... Harvard
Cook, Joseph G., LL.M. ....................... Yale
Hardin, Patrick, J.D. .......................... Chicago
Hess, Amy M., J.D. ............................ Virginia
Jones, Durward S. (Emeritus) , J.D. ........ North Carolina
King, Joseph H., J.D. ........................ Pennsylvania
Lacey, Forrest W. (Emeritus) , S.J.D. .... Michigan
Le Clercq, Frederic S., LL.B. ................ Duke
Lloyd, Robert M., J.D. ........................ Michigan
Miller, Charles H. (Emeritus) , J.D. ...... Duke
Overtoun, Elvin E. (Emeritus) , S.J.D. ....... Harvard
Phillips, Jerry J., J.D. ......................... Yale
Piquet, Cheryl, M.S.L.S. ..................... Tennessee
Rivkin, Dean H., J.D. ............................ Pennsylvania
Sewell, Toxey H. (Emeritus) , S.J.D. ...... Michigan
Sobieski, John L., J.D. ............................. Michigan
Wirtz, Richard S., J.D. ............................. Stanford

Associate Professors:

Aarons, Dwight, J.D. .......................... UCLA
Anderson, Gary L., LL.M. ................... Harvard
Ansley, Frances Lee, LL.M. ................. Harvard
Beirnstein, William J., J.D. ..................... Miami
Black, Jerry F., J.D. ........................... Vanderbilt
Bunker, Mary Garrett, J.D. .................... Washington
Cornett, Judy M., J.D. ............................... Tennessee
Davies, Thomas Y., J.D. ............................. Vanderbilt
Gray, Grayfred B., J.D. ............................ Vanderbilt
Kennedy, Deseriee A., LL.M. ............... Temple
Leatherman, Don A., LL.M. ................. New York
Parker, Carol M., J.D. ............................ Illinois
Pierce, Carl A., J.D. ............................. Yale
Plank, Thomas E., J.D. ........................ Maryland
Raymond, Glenn E., J.D. ....................... New York
Stark, Barbara, J.D. .......................... New York
Stein, Gregory M., J.D. ............................ Columbia
Wertheimer, Barry M., J.D. ............... Duke

Assistant Professors:

Brown, Kelly K., J.D. ........................... Ohio State
Browne, Kelly K., J.D. ........................... Ohio State
Davies, Melinda D., M.S.L.S. ............... North Carolina
F twig, Steven R., J.D. ............................. Mercer

Instructors:

Hoover, Mary Jo, J.D. ............................ Brooklyn
McAlpine, Janice E., J.D. ...................... Michigan
Moore, Jean (part-time) , M.A.L.S. ......... Michigan
Wolf, Pamela L., M.S.S.W. .................... Tennessee

The College of Law offers the Doctor of Jurisprudence degree program; a dual degree program with the College of Business Administration leading to the J.D. and the Master of Business Administration degree; and a dual degree program with the Department of Political Science, College of Arts and Sciences, leading to the J.D. and Master of Public Administration. In addition graduate students may be eligible to take a limited number of law courses to count toward a graduate degree.

Current information regarding admission, financial aid, course requirements, academic policies, extracurricular activities, and student services is available from the Admissions Office, 104 Acosta Court, 862 Volunteer Blvd., Knoxville, Tennessee 37996-4070. Completed applications should be received before January 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.

None of the above courses that average must be maintained on the work of all six semesters and also for the combined work of the grading periods in which the last 28 credit hours taken in residence were earned.

Averages are computed on weighted grades.

Grades are on an alphabetical scale from A+ to F. No credit toward the J.D. degree is awarded for grades of D- or F.

Eligible law students may receive up to six (6) semester hours of credit toward the J.D. degree for acceptable performance in upper-level courses that materially contribute to the study of law and which are taken in other departments at The University of Tennessee. Course selection and registration are subject to guidelines approved by the 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
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
950 Tax Planning for Business Owners

None of the above courses may be taken on an S/N basis (with the exception of 826).

*This course is not required for students who have an undergraduate major in accounting, finance, or business administration, who hold the MBA degree, or who are enrolled in the dual J.D.-MBA program. Waivers may also be granted to students who have acquired the requisite business knowledge through other coursework or through practical experience.

DUAL J.D.-MBA DEGREE PROGRAM

The College of Business Administration and the College of Law offer a coordinated dual
degree program leading to the conferment of both the Doctor of Jurisprudence and the Master of Business Administration degrees. A student pursuing the dual program is required to take fewer hours of coursework than would be required if the two degrees were to be earned separately.

Admissions

Applicants for the J.D.-MBA program must make separate application to, and be competitively and independently accepted by, the College of Law for the J.D. degree and The Graduate School and College of Business Administration for the MBA degree, and by the Dual Degree Committee. Students who have been accepted by both colleges may commence studies in the dual program at the beginning of any term subsequent to matriculation in both colleges provided, however, that dual program studies must be started prior to entry into the last 28 hours required for the J.D. degree and the last 16 hours required for the MBA degree.

Curriculum

A dual degree candidate must satisfy the graduation requirements of each college. Dual degree students withdrawing from the dual degree program before completion of both degrees will not receive credit toward graduation from either college for courses in the other college, except as such courses qualify for credit without regard to the dual degree program. For students continuing in the dual degree program, the J.D. and MBA degrees will be awarded upon completion of requirements of the dual degree program.

The College of Law will award a maximum of nine (9) semester hours toward the J.D. degree for acceptable performance in approved graduate-level courses offered by the College of Business Administration. Three of the 9 semester hours must be earned in Accounting 501, 503, or a more advanced accounting course.

The College of Business Administration will award credit toward the MBA for acceptable performance in a maximum of nine semester hours of approved courses offered by the College of Law.

Except while completing the first year courses in the College of Law, students are encouraged to maximize the integrative facets of the dual program by taking courses in both colleges each year.

Awarding of Grades

For grade recording purposes in the College of Law and the Department of Political Science, grades awarded in courses in the other college will be converted to either Satisfactory or No Credit and will not be included in the computation of the student's grade average or class standing in the college where such grades are so converted.

The College of Law will award a grade of Satisfactory for a graduate business course in which the student has earned a B grade or higher and a No Credit for any lower grade. The College of Law will award a grade of Satisfactory for an approved law course in which the student has earned a grade of C+ 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.

Admission

Applicants for the J.D.-M.P.A. program must make separate application to, and be competitively and independently accepted by, the College of Law for the J.D. degree and the Department of Political Science and The Graduate School for the M.P.A. degree. Applicants must also be accepted by the Dual Degree Committee. Applicants must submit a Law School Admission Test (LSAT) score. An applicant's LSAT score may be substituted for the Graduate Record Examination (GRE) score, which is normally required for admission to the M.P.A. program. Application may be made prior to or after matriculation in either the J.D. or the M.P.A. program, but application to the dual program must be made prior to entry into the last 29 semester hours required for the J.D. degree and prior to entry into the last 15 hours required for the M.P.A. degree.

Curriculum

A dual degree candidate must satisfy the requirements for both the J.D. and the M.P.A. degrees, as well as the requirements for the dual program. The College of Law will award a maximum of 9 semester hours of credit toward the J.D. degree for successful completion of approved graduate-level courses (500 or 600 level) offered in the College of Business Administration. The M.P.A. program will award a maximum of 9 semester hours of credit toward the M.P.A. degree for successful completion of approved courses offered in the College of Law. All courses for which such cross-credit is awarded must be approved by the J.D. M.P.A. coordinators in the College of Law and the Department of Political Science. All candidates for the dual degree must successfully complete Administrative Law (Law 821) and are encouraged to take Local Government (Law 824). An internship is strongly recommended for students in the dual degree program, as it is for all M.P.A. candidates, but an internship is not required.

During the first two years in the dual program, students will spend one academic year completing the required first year of the College of Law curriculum and one academic year taking courses solely in the M.P.A. program. During those first two years, students may not take courses in the opposite area without the prior consent of the appropriate coordinator(s) and the approval of the J.D.-M.P.A. degree candidates 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 of Grades

For grade recording purposes in the College of Law and the Department of Political Science, grades awarded in courses in the other degree 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.
824 Local Government (3) Distribution of power between state and local governmental units; sources of authority for limiting activity of local governments; creation of local boundaries; home rule; problems created by fragmentation of local government units; financing of local services; influence of federal programs on local government finance and decision-making.


827 Business Associations (4) Legal problems associated with formation, operation, and dissolution of business associations. Examination of various types of business entities, legal rights of duty of firm members: principals and agents, partners and limited partners, members, managers, and governors of limited liability companies, and corporate shareholders, directors, and officers; and others with whom members interact in connection with firm's business.

828 Corporate Finance (3) Legal issues arising in conjunction with corporate financial transactions: lien 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 and economic influences in development of capital by new and growing enterprises; securities transactions by promoters, officers, directors and other insiders; regulatory schemes and enforcement of public policies; registration of public offerings under Rule 10b-5 and other antiaffidavit provisions; and provision of legal and other professional services in connection with securities transactions. Recommended prerequisite or coreq: 827.

833 Representing Enterprises (3-5) Capstone course for concentration in business transactions. Simulated business transactions and completion of major planning and drafting project. Topics vary: formation of new business, acquisition of existing business, development of real estate projects, various financing transactions and corporate reorganization. Prereq: Completion of all courses for concentration in business transactions.

834 Antitrust (3) Federal antitrust laws; monopolization, price-fixing, group boycotts, and other anticompetitive practices generally; government enforcement techniques and private treble damage suits.

840 Commercial Law (4) Basic coverage of most significant provisions of the Uniform Commercial Code, security interests in personal property (Art. 9 of U.C.C. and relevant Bankruptcy Code provisions); commercial paper, including checks and promissory notes (Arts. 3 and 4 of U.C.C.); sales of goods, including coverage of portions of Art. 2 of U.C.C. not covered in Contract Law.


842 Contract Drafting Seminar (2) Practical fundamentals of drafting contracts of different types.

843 Debtor-Creditor Law (3) Basic elements of federal bankruptcy law: claims, property of estate, automatic stay, stay of proceedings, relief from stay, and various procedural rights and duties of creditors and debtors; creation and rejection of contracts, priority of distribution, and distinction between liquidation and rehabilitation. Enforcing judgments outside of bankruptcy.

846 Constitutional Law II (3) First Amendment rights to freedom of religion, expression, association, and petition. Fourteenth Amendment rights against discrimination as to race, sex, etc.; rights to franchise and appportionment; substantive due process; civil rights under federal laws enforcing post-Polar War Amendments to Constitution.

848 Civil Rights Actions (3) Litigation to vindicate constitutional rights in private actions against the government and its officials, as well as private parties protected by other civil rights legislation; elements of cause of action under 42 U.S.C. sec. 1983; actions against federal government officers under the Bivens doctrine; institutional and individual immunities; relationship between state and federal courts in civil rights actions; and remedies for violations of constitutional and other civil rights.

849 Discrimination and the Law (3) Comparison of race, sex, and other forms of discrimination with respect to education, employment, housing, political participation and other social and economic activities; 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 Criminal Procedure I (3) Police practices and constitutional rights of persons charged with crimes: arrest, search and seizure; identification; interrogation and confession; electronic eavesdropping; and right to counsel.

855 Criminal Procedure II (3) Pre- and post-trial procedures in criminal cases: bail; preliminary hearing; grand jury; trial; evidence; discovery; plea bargaining; jury trials; double jeopardy; and post-conviction relief. Federal Rules of Criminal Procedure.


860 Family Law (3) Survey of laws affecting personal and family relationships: marital disputes; antenuptial contracts; creation and dissolution of marriage; legal rights of children; support obligations within family; legal separation, annulment, divorce, alimony, and property settlements; custody and child support; abortion; illegitimacy.

862 Family Law II (3) Survey of family law's effect on individual and family relationships: child custody and visitation, adoption, and other legal rights concerning children and families.

863 Fundamental Concepts of Income Taxation (3) The history and development of income taxation; the organization and operation of the federal income tax; the use of income taxation as a tool of social policy; the interaction of income taxation with other forms of taxation; the role of the federal income tax in the global economy.

867 Environmental Law Seminar (2) Selected topics in environmental law.

869 Environmental Protection Law (3) The role of government in regulating the environment; the role of the courts in interpreting and enforcing environmental laws; the role of the public in protecting the environment.

870 Environmental Protection Law II (3) Advanced topics in environmental law.

871 Introduction to International Law (3) The role of international law in the global economy; the role of international organizations in regulating the world economy; the role of international law in promoting peace and security.

872 International Law (3) The role of international law in regulating the international economy; the role of international organizations in regulating the international economy; the role of international law in promoting peace and security.

877 Jurisprudence (3) Critical or comparative examination of legal theories, concepts, and principles. Legal positivism; natural law theory; legal realism; legal pluralism; legal evolutionism; legal constructionism; sociological jurisprudence; policy science; and critical studies.

879 Law and Economics (3) Relationship between legal and economic thought; application of basic economic concepts to legal problems; economic issues in legal decisionmaking; scholarly support for and criticism of economic analysis of law. Designed for students with no undergraduate background in economics or mathematics.

889 Law and Policing (3) The role of police in regulating the international economy; the role of police in promoting peace and security.

890 Law and Policing II (3) Advanced topics in law and policing.

891 Legal and Economic Thought (3) The role of economic thought in the development of law; the role of economic thought in the development of legal theory; the role of economic thought in the development of legal policy.

892 Legal and Economic Thought II (3) Advanced topics in legal and economic thought.

893 Legal and Economic Thought III (3) Advanced topics in legal and economic thought.

894 Legal and Economic Thought IV (3) Advanced topics in legal and economic thought.

895 Labor Relations Law (3) Legal and economic influences in development of federal labor rela-
927 Interviewing, Counseling and Negotiation (3) Communication of facts to be made on behalf of others. Practical sessions on interviewing, counseling, and negotiation. Required preparation of writes research papers that synthesize Tennessee and federal law in plain language. Prereq: 816.

929 Teaching Clients the Law (3) Communication of law to practicing attorneys. Prerequisite: 920 and third-year standing. May be repeated.

935 Gratuity and Transfers (4) Nature, creation, termination, and modification of transfers. Prerequisite: 920 and third-year standing. May be repeated.


940 Land Use Law (3) Development of skills by team-teaching a practical law course to high school or adult students and by writing expository essays on aspects of law in plain language. Prereq: 813.


943 Land Use Law (3) Privateland use controls: nuisance, easements, real covenants, equitable servitude and home owner associations; public land use controls; zoning, subdivision controls, eminent domain, and regulatory takings.

959 Intellectual Property (3) Intellectual property and management of intellectual property and intellectual property rights. Prerequisite: 895.


969 Civil Advocacy (6) Supervised field work, requiring students to assume professional responsibility for representing clients with various civil legal problems. Exploration of theory, practice and ethics of interviewing, counseling, planning, investigation and discovery, drafting, negotiation, trial, arbitration, and techniques of dispute resolution. Not open to students, strategies and perspectives from recent literature on understanding interviewing, counseling and negotiation.

970 Tax Theory (3) Method and purposes of government revenue collection through examination of economic and political theory; comparative analysis of various tax systems and proposed tax systems. Required preparation of expository essay on aspect of tax theory chosen by student. Limited enrollment.

972 Income Taxation of Business Organizations (3) Survey and comparative analysis of federal patterns of income taxation of partnerships, subchapter S corporations, and limited liability companies; introduction to transactional analysis and tax planning. Required preparation of written essays exercises covering business combinations, construction of portions of partnership agreements, opinion letters, and legal memoranda. Prereq: 816.

973 Wealth Transfer Taxation (3) Taxation of gratuitous transfers of wealth during life (gift tax) and at death (estate and gift) and generation skipping transfers. Prereq or coreq: 935.

974 Moot Court (1) Participation as member of faculty or student. Participation as member of faculty or student. Participation as member and by the Dean or the Dean's designee. May be repeated.

975 Tax Theory (3) Method and purposes of government revenue collection through examination of economic and political theory; comparative analysis of various tax systems and proposed tax systems. Required preparation of expository essay on aspect of tax theory chosen by student. Limited enrollment.

976 Business Law Seminar (2) Survey and comparative analysis of federal patterns of income taxation of partnerships, subchapter S corporations, and limited liability companies; introduction to transactional analysis and tax planning. Required preparation of written essays exercises covering business combinations, construction of portions of partnership agreements, opinion letters, and legal memoranda. Prereq: 816.

977 Moot Court (1) Participation as member of faculty or student. Participation as member of faculty or student. Participation as member and by the Dean or the Dean's designee. May be repeated.

978 Teaching Clients the Law (3) Communication of law to practicing attorneys. Prerequisite: 920 and third-year standing. May be repeated.
Leadership Studies in Education
(College of Education)

MAJORS

College Student Personnel  M.S.
Education  Ph.D.
Leadership Studies in Education  M.S., Ed.S., Ed.D.

Grady Bogue, Leader

Professors:

Bogue, Grady (Liaison), Ed.D.  Memphis State
Harris, G. W., Jr., Ph.D.  Michigan
Mertz, Norma T., Ed.D.  Columbia
Ubben, Gerald C., Ph.D.  Minnesota

Associate Professors:

Connelly, Mary Jane, Ed.D.  VPI
Husen, Peter M., Ed.D.  Stanford

Assistant Professor:

Aper, Jeffrey P., Ph.D.  VPI

The Leadership Studies unit offers graduate programs leading to the Master of Science with majors in Leadership Studies in Education, concentration in educational administration and supervision, and College Student Personnel; the Specialist in Education with a major in educational administration and supervision; the Doctor of Education with a major in Leadership Studies in Education, concentration in educational administration and supervision, educational administration and supervision for practicing administrators, and higher education; and the Doctor of Philosophy with a major in Education. See Education under Fields of Instruction for full description of all degree requirements.

The higher education doctoral program combines theory and practice in an innovative demonstration of scholarly study and research. A blend of classroom instruction, individualized advising, and supervised practice and internships allows students to develop a specialization in academic administration, community/Junior college administration, student personnel administration, financial management, and college teaching. The concentration for practicing administrators focuses on k-12 administrators currently in the field.

For additional information, contact the unit leader.

ADMISSION REQUIREMENTS

General test of the Graduate Record Examination; writing sample if GRE verbal is below 50th percentile; leadership potential judged by activities in organizations; and rating forms or letters of recommendation. The Ed.D. applicant must also interview with all faculty members on campus or elsewhere.

Educational Administration and Supervision

GRADUATE COURSES

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

515 Human Relations and Communication in Administration (3) Development and use of effective interpersonal communication skills and channels, interpersonal relations, supportive work climates, personnel motivation, conflict management skills, and role of values, ethics, and supervision. F

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

529 Politics of Education and Educational Environments (3) School/community relations in political context of modern, complex society. Administrator and supervisory competencies: political, social, ethnic, cultural, and racial environments in which schools operate. Prereq: M.S. introductory core or consent of instructor. F, Su

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

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

547 Educational Facility Planning (3) Concepts and skills for development, evaluation, construction, renovation, maintenance, and operations of quality educational environments and facilities. Prereq: M.S. Introductory core or consent of instructor. F, Su

548 Introductory Supervision and Personnel (3) Basic supervisory and personnel concepts and related competencies; building (or micro- organizational) level; interviewing, personnel planning, collecting and maintaining employee information, supervision of instructional and non-instructional personnel, clinical supervisory staff evaluation, and staff development. Prereq: Introductory M.S. core or consent of instructor. Sp, Su

553 Strategies of Educational Planning (3) Processes for improving decision-making function through use of both quantitative and qualitative planning techniques. Policy analysis, CPM, PERT, Delphi. Prereq: Introductory M.S. core or consent of instructor. F, Su

554 School Law (3) Logical arrangement of case and statutory materials for public school administrators and teachers; problems concerning law and public education. Prereq: M.S. introductory core or consent of instructor. Sp, Su

580 Internship in Educational Administration (3) Field experience in appropriate educational setting working directly with administrator. At end of planned program of study. Placement by department assignment. Some on-campus classes in conjunction with 583 or 582. Prereq: 21 hrs in educational administration and supervision or consent of instructor. F, Su

582 Educational Leadership and District-Level (3) Role of central administrative team; relationships, behaviors, concepts and competencies for developing and maintaining effective school organization. At end of planned program of study. Prereq: 21 hrs in educational administration and supervision or consent of instructor. F, Su

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

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

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

595 Elementary Principals Seminar (1-3) For in-service training of elementary school administrators. Development, problems, programs, and trends of elementary schools and management skills of elementary school administrators. Prereq: Presently elementary school administrator or consent of instructor. May be repeated. S/N or letter grade. F, Sp

596 Middle School Principals Seminar (1-3) For in-service training of middle school administrators. Development, problems, programs, and trends of middle schools and management skills of middle school administrators. Prereq: Presently middle school administrator or consent of instructor. May be repeated. S/N or letter grade. F, Sp

604 Seminar in Educational Administration and Supervision (1) Current educational issues, problems and research. Required two consecutive semesters during doctoral residency. May be repeated. S/N or letter grade only. E

605 Advanced Seminar in Administrative Theory (2) Interdisciplinary seminar: Faculty selected by faculty for research and scholarly value from early to current classic theoretical studies and current periodic literature in educational administration. Required of Ph.D. students in Education. Prereq: Doctoral student in Education.

610 Internship in Educational Administration (3) Opportunity for doctoral students and advanced graduate students to gain experience in performance of critical tasks of educational administration under supervision of practitioner and University representative. May be repeated at discretion of student's committee. Maximum 12 hrs. S/N only. E

614 Statistical Methods for School Administrators (3) Descriptive and experimental research methods, parametric and non-parametric statistical techniques used in research in educational settings. F

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

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

629 Seminar in Politics of Education (3) Political theories and practices as they affect operation of public school systems and institutions. Prereq: 18 hrs of interdisciplinary discussion of community power structures and special interest groups, based on literature and research from educational sociology, and political science. Field inquiry. Prereq: 529, 516 or equivalent or consent of instructor. F

644 Educational Finance and Business Management (3) Contemporary educational finance policies and their influence upon education, nation and citizens. Superintendency team concept, management of school logistical services. Prereq: 544 or consent of instructor. F, Su


655 State-Federal Relations in Education (3) Interrelationships of state, and local responsibilities and organizations for education. Prereq: 18 hrs of interdisciplinary discussion of community power structures and special interest groups. Field inquiry. Prereq: 546 or consent of instructor. F, Su

658 Legal Foundations of Public Education (3) School law, constitutional foundations as they relate to public education at state and local levels. F, Su

668 Conflict Management (3) Social conflict and its management. Causes of interpersonal, intergroup, and organizational conflict; skills and strategies used to man-
Higher Education

**GRADUATE COURSES**

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

535 Assessment of Student Learning and Experience 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. F

536 Seminar on Policy Issues in Quality Assurance (3) Exploration of historic and contemporary approaches to definition and demonstration of quality in higher education and examination of contemporary policy issues related to quality assurance in colleges and universitieS. F

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. F

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

570 Introduction to Student Personnel Work in Higher Education (3) Historical, philosophical and organizational perspectives. Functional areas comprising field and major issues. F

572 Theory and Practice in Student Personnel Services (3) Theoretical framework of college student personnel services and practical application of theory in student services environment. Applicable administrative theory, human development theory and evaluation assessment techniques. Sp

599 Practicum in College Student Personnel (1-6) Prereq: Consent of instructor. May be repeated. S/N only. E

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

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

640 College and University Law (3) Legal precedent affecting organizations, administration, and finance of higher education. Academic freedom, faculty termination, religion, tort liability, administrative law, academic due process and affirmative action in employment. Sp

645 Curriculum and Instruction in Undergraduate Higher Education (3) Content and organization of institutional strategies and curricular structure in higher education. F, Su

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

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

**Leadership Studies**

**GRADUATE COURSES**

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

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


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

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

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

606 Leadership Forum (2) Development of research, evaluation, policy analysis and critical analysis and evaluation of philosophies of leadership contributing to American education. Continuous enrollment for 2 years, on-campus for students in Ed.D. alternative residence program. May be repeated. Maximum 12 hrs. S/N only.

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

Life Sciences

(College of Arts and Sciences)

**MAJOR DEGREES**

Life Sciences ............... M.S., Ph.D.

W.F. Harris, Chair

Coordinating Council:

Schwarz, O.J., Plant Physiology and Genetics

Doughall, D.K., Biotechnology

The programs leading to the M.S. and Ph.D. degrees in Life Sciences are interdepartmental and intercollegiate and are designed to augment offerings of individual departments in the following concentrations: biotechnology, (M.S. only), and plant physiology and genetics. Students interested in these areas should contact either the Life Sciences chairperson or the director of the area of interest. Each program is overseen by a committee and may have unique admission requirements.

**ADMISSION REQUIREMENTS**

1. A Bachelor's degree with a major in a biological, behavioral, or physical science.
2. GRE (general) scores.
3. Three letters of recommendation.
4. Coursework including a year of calculus (differential and integral), one year of chemistry, and a year of physics. Specific course deficiencies may be corrected during the first year.

**DEGREE REQUIREMENTS**

The master's degree requires a minimum of 30 semester hours of study approved by the student's committee, a thesis, and an oral examination. Within the biotechnology program only, a non-thesis M.S. option is available. Students choosing this option are expected to complete: (1) two summers' co-op experience in an appropriate industry. An evaluation by supervisor and a written report are required (529, Biotechnology Practicum Cooperative Experience, maximum 4 hrs.); (2) a written report in the form of a scientific paper in an area of specialization chosen by the student and advisor. The minimum requirements for the doctoral degree include at least 6 hours above the 600 level, 24 semester hours of course 600, a pattern of courses approved by the student's committee, a comprehensive examination, a doctoral dissertation, and a defense of dissertation. Individual programs may have additional requirements.

**CONCENTRATIONS**

Biotechnology (M.S. only)

The biotechnology program will prepare students to participate in the wide variety of opportunities presented by the use of living cells and their components for the production of useful materials. This will be achieved at the M.S. level by a prescribed course of study of the biology and biochemistry of cells and molecules; by formal study of cells and of engineering aspects of biotechnology; and by the development of special expertise in areas such as animal embryo manipulation, automated chemical synthesis of macromolecules, bioprocess engineering, bioproducts and biotransformations, liposomes, microscopy and image processing, monoclonal antibodies and hybridoma technology, plant tissue culture, recombinant DNA technology and risk assessment, and modeling. The production of a research thesis or an industrial co-op experience plus an area of specialization will also be an important part of the training experience.

Required courses are Life Sciences 509, 511, 512, 531, 532; Biochemistry and Cellular and Molecular Biology 511; Microbiology 410; Botany 451; Chemical Engineering 475; and Ecology and Evolutionary Biology 507.

Plant Physiology and Genetics

This program provides the opportunity for intensive training and research experience in areas transcending the usual boundaries of botany, biochemistry, and agricultural plant sciences. It devotes itself to seeking solutions of problems concerning the interactions of physiology and genetics in applied and fundamental aspects of plant science.

Required courses are Life Sciences 510; Botany 521, 522; Biochemistry and Cellular and Molecular Biology 511, 512; Plant and Soil Science 471 or Ecology and Evolutionary Biology 560; Plant and Soil Science 552; Microbiology 410.

**GRADUATE COURSES**

500 Thesis (1-19) P/NP only. E

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

509 Biotechnology Seminar (1-2) Topics of importance to biotechnology. May be repeated. Maximum 6 hrs.

510 Special Topics in Life Sciences (1-3) Specializations in biotechnology: cellular, molecular, and developmental biology; environmental toxicology; ethology; plant, physiology and genetics; and physiology. May be repeated. Maximum 9 hrs.

511 Advanced Cellular Biology (3) Cell structures and functions at molecular and supramolecular levels. Membrane structure, function, and biogenesis; cellular communication; receptors and membrane flow; growth regulation and oncogenes; plant cell structure and function; contractility and motility; mitosis and meiosis; blood and immune cells.

512 Advanced Molecular Biology (4) (Same as Biochemistry and Cellular Biology 512.)

525 Research Practicum in Life Sciences (1-3) Individual sections for each of biotechnology: cellular, molecular and developmental biology; environmental toxicology; ethology; plant, physiology and genetics; and physiology. May be repeated. Maximum 9 hrs.

529 Biotechnology Practicum Co-operative Experience (2) Work experience in commercial organization for students undertaking the thesis option of biotechnology concentration. Evaluation by supervisor and written report by student. May be repeated. Maximum 4 hrs.

531 Biotechnology Laboratory (3) Growth of microorganisms, analysis of extracellular and intracellular components.

532 Biotechnology Laboratory (3) Pilot scale yeast cultivation, enzyme isolation, purification and characterization. Application of purified enzymes to food production fermentations and fermentation process control.

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

610 Advanced Topics in Life Sciences (1-3) Topics vary. May be repeated. Maximum 6 hrs.

Logistics
See Marketing, Logistics and Transportation

Management
(215x95) Management 127

MAJOR
DEGREES
Business Administration .................. MBA, Ph.D.

Oscar Fowler, Head

Professors:
Boling, Ronald W. (Emeritus), Ph.D. .... Stanford
Dewhirst, H. Dudley, Ph.D. .................. Texas
Gilbert, Kenneth C., Ph.D. ................. Tennessee
Hake, David A., Ph.D. ....................... Tennessee
James, Lawrence R. (Pilot Chair of Excellence), Ph.D. .......... Pennsylvania
Kealy, A. H. (Emeritus), MBA .......... Pennsylvania
Ladd, Robert T., Ph.D. ...................... Georgia
Larsen, John M., (Emeritus), Ph.D. ....... Purdue
Miller, Alex, Ph.D. ......................... Washington
Neel, C. Warren, Ph.D. ................... Alabama
Reese, Don (Emeritus), Ph.D. ............ Ohio
Russell, Joyce E. A., Ph.D. ............... Akron
Stahl, Michael J., Ph.D. ................... Rensselaer
Vance, S. C. (Emeritus) (W.B. Stokely Prof.), Ph.D. ........ Akron

Wagoner, George A. (Emeritus), M.S. .... Indiana
Whitlock, G. H. (Emeritus) (Distinguished Prof.), Ph.D. ........ Tennessee

Associate Professors:
Bowers, Melissa R., Ph.D. ............... Clemson
Fowler, Oscar S., Ph.D. ..................... Georgia
Fryxell, Gerald E., Ph.D. ................. Iowa
Indiana
Judge, William O., Ph.D. ................. North Carolina
Maddox, Robert C., Ph.D. ............... Texas
Noon, Charles E., Ph.D. ................... Michigan
Srivastava, M. M., Ph.D. ................. Northwestern

Assistant Professors:
Cleland, lain J., Ph.D. ................. Southern California
Dean, J. Thomas, Ph.D. ................ Colorado
Edinishing, Chenaka F., Ph.D. .... British Columbia

BUSINESS ADMINISTRATION

CONCENTRATIONS
For complete list of MBA and Ph.D. program requirements, see Business Administration.


Minimum course requirements for management--Three courses from the following: 511, 512, 521, 522, 531, 541, 542, 551, 571, 573, 581, 595, 600, 611, 612, 613.

Business Administration 510. 699, 695. Selection must be approved by the Management Department MBA advisor. For forest industries management--511, Foresty 560, 565. Environmental management--510 plus two approved courses from the following list: Ecology and Evolutionary Biology 520, 525; Environmental Engineering 510, 555; Chemical Engineering 581; Economics 677, 678; Agricultural Economics 570; Sociology 560, 665; Law 557, 607; Geography 577. Additional courses may be accepted subject to approval by Management Department Chairperson or designated faculty.

Ph.D. Concentration: Management.

Minimum course requirements are: For operations management--541 and 542; two semesters of 640 (may be repeated for credit); one additional semester of approved doctoral seminar work. For strategic management--610, 611, 612, 613.

MINOR IN ENVIRONMENTAL POLICY

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

GRADUATE COURSES

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

502 Registration for Use of Facilities (3-18) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

504 Management of Organizational Behavior (3) Integration of individual and group differences, organization theory and design, motivation, leadership, human resources planning, and decision making.

511 Organizational Theory: Integrated Structure and Behavior (3) Cases, group projects, discussion; organizational theories, organizational effectiveness; contextual factors of organizations; environment, size, technology; organizational structure configurations, organization design; social influences on organization effectiveness; motivation, leadership, group behavior, intergroup relations, organizational change and development.

512 Labor Relations and Collective Bargaining (3) American labor history, structure and philosophy of bargaining, dispute settlement, and contract administration. (Same as Economics 562.)

526-26 Industrial and Organizational Psychology (1-3) Regression in industrial and organizational psychology. Available only by prearrangement with supervising faculty member. May be repeated. Maximum 6 hrs. S/NC only on letter grade.

531 Management of Technology-Based Organizations (3) Role of technology and innovation in formulation and implementation of strategy. Management of research and development function and coordination with other functions. Management of scientists and engineers.

541 Operations Management I (3) Techniques applicable to design of systems in operations function.

542 Operations Management II (3) Publications planning and control function. Application of models to real-world systems.

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 venture plan, case analysis.

567-68 Proseminar in Industrial/Organizational Psychology (3) Presentations in industrial and organizational psychology. Must be taken in sequence during student's first year of study in industrial and organizational psychology program. Consent of instructor required for all non-industrial/organizational psychology program students. (Same as Psychology 571-18.)

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 sustainable business performance. Cases, field projects, research papers.

593 Directed Independent Study (1-3) Topic of mutual interest. Available only by prearrangement with supervising faculty member. May be repeated. Maximum 6 hrs. S/NC only on letter grade.

595 Selected Topics in Current Management Issues (3) In-depth consideration of current issues. Managerial impact of emerging topics. Preq: Consent of instructor.

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

601 Research Methods (3) Seminar covering broad range of issues: research process as applied to study of strategic management, literature and examples of research. Research proposal.

610 Seminar in Advanced Management 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.

625 Seminar in Organizational Psychology (3) In-depth analysis of current theories, concepts, and issues associated with psychology of organizational leadership and work motivation. Preq: 567, 568, consent of instructor. May be repeated. (Same as Psychology 625.)
626 Seminar in Industrial Psychology (3) In-depth analysis of current issues, concerns, and methods: advanced quantitative psychometrics and employee selection. Prereq: 567, 568, consent of instructor. May be repeated. (Same as Psychology 627.)

627 Seminar in Applied Industrial Psychology (3) In-depth analysis of current issues, concerns, and methods: advanced quantitative psychometrics and employee selection. Prereq: 567, 568, consent of instructor. May be repeated. (Same as Psychology 627.)

583 Current Topics in Industrial/Organizational Psychology (3) In-depth analysis of various topics: organizational change and development, psychology and problems of interviewing, consumer behavior. Prereq: 567, 568, consent of instructor. May be repeated. (Same as Psychology 583.)

690 Field Work in Industrial and Organizational Psychology (1-12) Supervised field practice in industrial and organizational psychology. 1 hr per 30 hrs of practice. May be repeated. Maximum 12 hrs. (Same as Psychology 690.)

Management Science

(College of Business Administration)

MAJORS

DEGREES

Management Science ..................... M.S., Ph.D.

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

Melissa R. Bowers, Chairperson

Committee Members:

Bowers, Melissa R., Management; Bozdogan, Hamparsum, Statistics; Edirisinghe, Chenaka F., Management; Fowler, Oscar S., Management; Gilbert, Kenneth C., Management; Leitnaker, Mary G., Statistics; Noon, Charles E., Management; Ralston, Bruce A., Geography; Srinivasan, M. M., Management.

THE MASTER'S PROGRAM

The M.S. program in Management Science is designed as preparation for a career in the application of quantitative techniques for the solution of complex problems. The program's flexibility also makes it appropriate as preparation for doctoral study in Management Science.

Management Science coursework will expose students to both the theoretical development of quantitative techniques and their application to managerial decision making. In addition to the development of sufficient mathematical maturity for creative use of quantitative skills, the program requires concentrated study in a supporting area. Supporting areas are available in other departments of the College of Business Administration (excluding statistics) as well as in computer science, public administration, ecology, and other areas, subject to approval by the Management Science Committee.

Admissions Requirements

The master's program requires three applicant recommendation forms and the GRE or GMAT. Applications are encouraged from all majors, but 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 three semesters by full-time students. However, students may start the program in any semester and may pursue an M.S. degree in Management Science on a part-time basis.

Course Requirements

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<tr>
<th>Hours</th>
<th>Core Requirements</th>
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<td>14</td>
<td>Management Science 531, 532, 533, 534</td>
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Applied specialization area (approved by advisor)

Mathematics elective—500 level or above (approved by advisor) or

Statistics elective—500 level or above (approved by advisor)

Electives selected from mathematics, statistics, computer science, and/or management science area

TOTAL 38

A thesis option is available to qualified students who substitute 6 hours of thesis credit for the following 9 hours of course work: Management Science 534, 3 hours in the applied concentration area and 3 hours of electives in any area. The Management Science Committee will work closely with the student in tailoring a program to his/her needs. The committee will 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. For example, an undergraduate mathematics major with a strong background may be allowed to take 6 additional hours of electives in place of the mathematics requirements. On the other hand, a student lacking experience in rigorous senior-level mathematics courses will be asked to take such courses to fulfill the 6-hour mathematics requirement. The total course load will remain 38 hours for all non-thesis students and 36 hours for all thesis students; however, the number of hours of electives can be reasonably expected to vary between 6 and 12 as a function of prior background.

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 School's requirements.

Coursework

A minimum of 48 semester hours of coursework taken for graduate credit (exclusive of thesis or dissertation) is required. Some of this must be from the coursework from a master's program although a master's is not a prerequisite for the doctorate. The candidate must complete a minimum of 24 semester hours at The University of Tennessee, Knoxville, at least 6 of which must be at the 600 level. Both of these requirements are also exclusive of thesis or dissertation credits. Enter 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. This requirement is met 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 determines appropriate. This exam, which is beyond the minimum 48 hours of coursework, normally is completed in the third year of the program.

ACADEMIC STANDARDS

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

PREREQUISITES FOR MANAGEMENT SCIENCE COURSES

The Management Science Program is interdisciplinary and students in other degree programs are encouraged to enroll in management science courses. Course prerequisites are designed to indicate the level at which courses are taught. Interested students whose prior coursework does not match the prerequisites are encouraged to seek the instructor’s guidance and consent to enroll.

BUSINESS ADMINISTRATION CONCENTRATION

For complete listing of MBA program requirements, see Business Administration.

MBA Concentration: Management Science

Minimum course requirements are 531, 532 and 534.

GRADUATE COURSES

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

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


532 Stochastic Models in Management Science (3) Discrete-time Markov chains, Poisson processes, continuous-time Markov chains, renewal theory, and queueing theory. Prereq: Statistics 563 and Mathematical Analysis or consent of instructor. Sp

533 Computational Mathematical Programming (3) Advanced modeling, computational and reporting techniques in practical mathematical programming. Prereq: 531 and proficiency in PASCAL.

534 Application of Management Science Methods (3) Application of methods from 531 and 532 to real-world problems. Exposure to existing problem in industry or elsewhere.


581 Special Topics in Management Science (3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

593 Management Science Problems (1-6) Directed study on subject of mutual interest. E

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

621 Network Flows (3) Treatment of network optimization algorithms, transportation and transshipment models, and primal-dual and primal-dual basis tree methods. Prereq: 531 or equivalent.

651 Integer Programming (3) Theoretical and computational aspects of linear programming with integer variables, branch and bound, cutting plane, and group theoretical algorithms. Prereq: 531 or equivalent.

652 Nonlinear Optimization (3) Solution of constrained and unconstrained nonlinear programming problems. Practical algorithms that perform well in recent practice. Prereq: 531 or equivalent.


681 Special Topics (3) Prereq: 531, 532 and consent of instructor. May be repeated. Maximum 9 hrs.

991-92 Management Science Seminar (1, 1) Subjects selected from current literature. S/N/C only.

Marketing, Logistics and Transportation

(College of Business Administration)

MAJOR DEGREES

Business Administration............ MBA, Ph.D.

David W. Schumann, Head

Professors:

Barnaby, D. J., Ph.D.................. Purdue
Cadotte, E. R., Ph.D................... Ohio State
Davis, F. W., Jr., Ph.D............... Michigan State
Dicer, G. N., DBA.................... Indiana
Frye, J. L. (Emeritus), Ph.D........ Florida
Hendrix, F. L. (Emeritus), Ph.D..... North Carolina
Langley, C. J., Jr., Ph.D........... Penn State
Menzer, J. T. (Business Administration Chair of Excellence), Ph.D............. Michigan State
Mundy, R. A., Ph.D................. Penn State
Patton, E. P., Ph.D.................. North Carolina
Woodruff, R. B., DBA.............. Indiana

Associate Professors:

Foggin, J. H. (Liaison), DBA........ Indiana
Gardial, S. F., Ph.D................. Houston
Heiizeinisten, R. C., Ph.D........... Cornell
Rentz, J. O. (Liaison), Ph.D........ Georgia
Schumann, D. W., Ph.D............ Missouri

Assistant Professors:

Dabholkar, P. A., Ph.D............. Georgia State
Holcomb, M. C., Ph.D.............. Tennessee
Johnston, T. C., Ph.D............... California
Moon, M. A., Ph.D................ North Carolina

BUSINESS ADMINISTRATION CONCENTRATIONS

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

MBA Concentration: Logistics and Transportation, Marketing

Minimum course requirements for logistics and transportation--501, 508, and one course from the following: 504, 506, 507, 593, and 599.

For management--511 and 512.

Ph.D. Concentration: Logistics and Transportation, Marketing

Minimum course requirements for logistics and transportation--12 hours to include 601, 602, 603. For marketing--12 hours from among the following courses: 601, 602, 603, 604, 605, 606.

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/N/C only.

503 Buyer Behavior--Analysis for Marketing (3) Consumer behavior concepts and processes developed and applied to market analysis and design, and control of marketing programs. Social psychology and demographic factors that affect consumer product, brand and patronage decisions. Prereq: Business Administration 504 and 505 or consent of instructor.

504 Analyzing Market Opportunity for Marketing Decisions (3) Major determinants of opportunity in markets, framework for finding markets and analyzing them for opportunity, application of market opportunity analyses to marketing strategy decisions. Prereq: Business Administration 504 and 505 or consent of instructor.

505 Marketing Research and Information Planning (3) Design of a rigorous marketing study from inception to implementation of results by recognizing key decision points and critically evaluating merit of research project. Prereq: Business Administration 504 and 505 or consent of instructor.

506 Marketing Strategy (3) Integration of concepts and analytical skills from each component area of marketing to formulate cohesive, well-organized marketing programs. Prereq: Business Administration 504 and 505 or consent of instructor.

507 Global Marketing (3) Strategic issues related to international and multi-national marketing operations; identification and evaluation of opportunities in overseas markets; coordination of strategies in world markets.

510 Principles of Marketing Management for Non-MBA Students (3) For students from other disciplines interested in obtaining knowledge of marketing disciplines at graduate level.

511 MBA Marketing Concentration (6) Determination of customer value. Principles of consumer behavior, marketing research, and building customer value. Prereq: Business Administration 504 and 505 or consent of instructor.

512 MBA Marketing Concentration II (6) Delivery of customer value. Communication of customer value, marketing strategy, and providing customer responsive organizations. Prereq: Business Administration 504 and 505 or consent of instructor.

550 Market Opportunity Analysis for New Ventures (3) Concepts for understanding coverage of new venture MOA and various information sources as an aid to opportunities and analysis in marketing for new product or service. Prereq: Consent of instructor.

583 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: nonbusiness marketing applications, macroenironmental issues, market segmentation, international marketing, services marketing, marketing channels, and related issues. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

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

601 Marketing Theory (3) Nature and scope of marketing, role of theory development and theory testing important to marketing research.

602 Research Methods I (3) Research Process: problem formulation, research and experimental design, measurement and implementation of results. Design: experimental design, survey research, and measurement.

603 Marketing Thought (3) Marketing literature across number of research areas and individual work, determine state of research in each area, and identify areas that merit further study.
Materials Science and Engineering
(College of Engineering)

MAJORS

Metallurgical Engineering ............. M.S., Ph.D.
Polymer Engineering .................. M.S., Ph.D.

Joseph E. Spruiell, Head

Professors:
Brooks, C. R., Ph.D. ................. Tennessee
Buchanan, Raymond A., Ph.D. ........ Vanderbilt
Clark, Edward S., Ph.D. ............. California
Fellers, J. F., Ph.D. .................. Akron
Liaw, P. K. (Rachell Chair of Excellence), Ph.D. .......... Northwestern
Lowndes, Douglas H., Ph.D. .......... Colorado
Lundin, Carl D., Ph.D. .............. Rensselaer
Oliver, Ben F., Ph.D. ............... Penn State
Pedraza, A. J., Ph.D. ............... National (Argentina)
Phillips, Paul J., Ph.D. .............. Liverpool (UK)
Spruiell, Joseph E. (Liaison), Ph.D. ....... Tennessee
Stansbury, E. E. (Emeritus), Ph.D. ......... Cincinnati

Graduate programs are offered leading to the degrees of Master of Science and Doctor of Philosophy in Metallurgical Engineering or Polymer Engineering. Both the metallurgical and polymer programs are flexible and interdisciplinary in nature. Students may be admitted from a wide range of disciplines, including physics, chemistry, chemical engineering, mechanical engineering, electrical engineering, materials engineering, and other engineering disciplines. Prospective students should consult with their home department concerning development of individual concentrations or special programs compatible with their backgrounds and goals.

Areas of concentration within the metallurgical engineering program include physical metallurgy; materials processing; welding, metalurgy, and materials joining; corrosion behavior; failure analysis; and mechanical and physical behavior of materials. Specializations in electronic and ceramic materials are available. Areas of concentration within the polymer engineering program include rheology and polymer processing; polymer morphology, mechanical, physical, and chemical behavior of polymers; and composite materials.

THE MASTER’S PROGRAM

Thesis Option

A total of at least 33 hours in graduate courses is required for the M.S. degree in either Metallurgical Engineering or Polymer Engineering. Additional requirements include:

1. A major consisting of 12 to 18 semester hours of graduate courses in metallurgical engineering or polymer engineering. The polymer engineering major must include 540, 541, 543, 546, 549, 550 and 572 unless similar material has been covered in prior coursework.

2. Additional courses amounting to 6 to 12 hours total in any approved engineering, chemistry, mathematics, physics, or other related fields.

3. Master’s thesis, 500 totaling 6 to 12 hours. All resident students are required to register for and participate in the graduate seminar in metallurgical engineering or polymer engineering, as appropriate, during each semester in which it is offered. Credits for the seminar do not count towards satisfying the coursework requirements.

Non-Thesis Option

Under certain conditions, a candidate may apply for a non-thesis option. To be eligible, the candidate must show evidence of significant professional experience after the baccalaureate degree; at least five years of industrial experience or research publications would be examples of such evidence. A departmental faculty committee will consider each application individually. Upon acceptance, a supervisory committee of three will be appointed, at least two being from the Department of Materials Science and Engineering. The requirements for completion of the non-thesis option are as follows:

1. A total of at least 33 hours in graduate courses in metallurgical engineering, polymer engineering, and related areas. The minimum requirements are 21 hours in the Department of Materials Science and Engineering and up to 12 hours in other engineering or science courses. The candidate’s degree program must be approved by the faculty committee.

2. Satisfactory completion of a review of the literature in an area related to metallurgical or polymer materials engineering (580).

3. Satisfactory performance in an oral examination to be conducted by the faculty committee and covering the review paper and other areas of metallurgical or polymer engineering.

THE DOCTORAL PROGRAM

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

Department requirements consist of the satisfactory completion of:

1. Graduate courses in materials science and engineering amounting to approximately 24 semester hours, at least 8 of which must be in 600 series courses.

2. Supporting courses in related scientific and engineering fields amounting to approximately 24 semester hours, subject to approval by the student’s faculty committee. These related fields will normally include chemistry, mathematics, physics, and engineering.

3. The comprehensive examination, usually given in two parts, and covering such topics as materials science and engineering, metallurgical or polymer engineering operations and processes, thermodynamics, chemistry, mathematics, physics, chemical engineering, and 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.
ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The Ph.D. program in Metallurgical Engineering is available to residents of Kentucky, Louisiana, or Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE COURSES

405 Structural Characterization of Materials (4) X-ray diffraction and fluorescence; scanning and transmission electron microscopy; microanalytical techniques.

421 Mechanical Behavior of Materials II (3) Description of stress and strain; linear elastic constitutive equations, isotropic and anisotropic moduli in various materials; yield criteria; brittle fracture; crazing; plastic strain constitutive equations, forming operations and limit criteria. Prereq: Mechanical Behavior of Materials, Mechanism of Materials.

422 Chemical Process Metallurgy (3) Application of chemical thermodynamics to metal processing. Ferrous and nonferrous pyrometallurgy refining, slag-metal equilibria, solidification, gas-metal processing. Prereq: 300.

426 Materials Joining (3) Processes for joining metals, polymers and ceramics: mechanical, adhesive, fusion-solidification/crystal growth; surface characteristics necessary for joining and chemical bonding; thermal effects on structure and properties of joints; design of joints. Prereq: Introduction to Materials Science and Engineering.

443 Polymer Processing (3) Rheological measurements; flow through tubes and slits, and effects to 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. Sp

470 Environmental Degradation of Materials (3) Mechanisms, techniques and control of environmental degradation processes in metals, polymers, ceramics and composites; materials selection and design considerations; introduction to Materials Science and Engineering. Recommended for chemical engineering, mechanical and engineering science and mechanics majors.

472 Fundamental Principles of Composite Materials (3) Establishment of physical principles basic to design, manufacture and application of fiber reinforced polymers, metals and ceramics. Prereq: 300 or equivalent.

474 Biomaterials (3) Metals, polymers and ceramics used in orthopaedic, cardiovascular, and dental surgical implant devices and degradation problems; material properties of primary importance; tissue response to synthetic materials. Prereq: 201. Recommended for engineering science and mechanics majors.

475 Fracture-Safe Design (3) (Same as Engineering Science and Mechanics 463.)

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

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

503 Graduate Seminar in Metallurgical Engineering (1) Prereq: Admission to graduate program. May be repeated. S/NC only. E

504 Graduate Seminar in Polymer Engineering (1) Prereq: Admission to graduate program. May be repeated. S/NC only. E

505 Engineering Analysis (3) (Same as Chemical Engineering 505.)

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 on hardening behavior; deformation modeling of polycrystalline behavior in terms of single crystal deformation mechanisms; texture formation. Prereq: 301, 320 or consent of instructor.

524 Metallurgical Thermodynamics (3) Applications of chemical thermodynamics to metallurgical problems: refining, oxidation, surface treatments, alloy systems. Prereq: 570 or equivalent.

525-26 Welding Metallurgy (3,3) Welding processes, physical metallurgy of welding, phase transformations, heat flow, residual stresses, theories of hot cracking, cold cracking and porosity formation; applications to process utilization.

528 Ceramic Matrix Composites: Material and Mechanics (3) (Same as Engineering Science 528.)

529 Diffusion in Solids (3) Phenomenology and atomic mechanisms of diffusion in solid state: Solution and applications of diffusion equations; random walk problem and mechanisms of diffusion; diffusion in dilute and concentrated alloys; Kirkendall effect; high diffusivity paths.

530 Phase Transformations in Metallic Materials (3) Thermodynamics of phase equilibrium, theory of nucleation in solids; kinetics and morphology of diffusion controlled growth; kinetics of interface controlled phase transformations; crystallography and kinetics of martensitic transformations.

531 Advanced Corrosion (3) Analyses of corrosion processes in terms of polarization measurements and Pourbaix diagrams. Influence of environmental and mechanical factors contributing to pitting, crevice, fretting, wear, fatigue and stress corrosion. Prereq: 470 or consent of instructor.


540 Basic Polymer Chemistry (3) Synthesis, reactions and degradation of polymers; monomer characterization; solution methods and spectroscopy. Prereq: Semester of organic chemistry and thermodynamics or equivalent.

541 Fluid Mechanics and Polymer Processing (3) Navier-Stokes equations and illustrative problems; application of engineering methods to polymer injection molding. (Same as Chemical Engineering 541.)

542 Further Topics in Polymer Processing (3) Description and analysis of selected polymer processing operations. Prereq: 541.


544 Polymer Solution Thermodynamics and Characterization (3) Theories of solutions, statistical thermodynamics, Characterization of polymers, formation, viscosity, light scattering and osmotic pressure. Prereq: Undergraduate physical chemistry.

545 Mechanical Properties of Solid Polymers (3) Types of mechanical behavior, Hookean and rubber elastic properties, deformation, fracture, linear viscoelasticity; dynamic mechanical behavior and testing; loss tangent; experimental methods. Introduction to mechanical properties of polymeric composites.

549-50 Laboratory Methods in Polymer Engineering (1,1) Basic experimental techniques and instrumentation associated with characterization, x-ray and light scattering, calorimetry, rheometry, mechanical properties of solid polymers, polymer processing operations. Coreq: 540 or consent of instructor.

560 Principles of Ceramic Processing (3) Treatment of ceramic processing; preparation and characterization; powder consolidation; drying, firing, sintering techniques, mechanisms and kinetics. Prereq: 380 or equivalent.

561 Inorganic Glass Forming Systems (3) Physical and chemical nature of glass; structural theories of glass formation; major glasses forming systems: silica, other oxide glasses, nitrate glasses, water glasses, and chalcopyrite glasses. Prereq: 360, Chemistry 371.

562 Experimental Mechanics of Composite Materials (3) (Same as Engineering Science 562.)

571 Electron Microscopy (3) Operation of electron microscope; kinematic and dynamical diffraction theories; structure determination; analysis of lattice defects. Prereq: 465 or equivalent.

572 X-Ray Diffraction (3) Symmetry of crystals, space group theory, reciprocal lattice and application to definition of structures; powder and single crystal x-ray techniques; introduction to crystal structure determination; characterization of orientation: application to inorganic, metallic and polymer structures.


578 Special Topics in Materials Science and Engineering (3) Topics of current significance and interest. Prereq: Consent of Instructor. May be repeated.


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

621-22 Theoretical Metallurgy (3,3) Topics in solid state physics as applied to metallurgy; introduction to quantum theory, specific heats, electron theory of solids, electrical and thermal conductivity, magnetic properties, theories of alloy formation. Prereq: Consent of Instructor.

623-24 Solidification and Crystal Growth (3,3) Theories of solidification, fluid flow effects, magneto hydrodynamics of incompressible fluids, growth stability theory, thermodynamic applications, rapid solidification theory, metastability. Prereq: Consent of instructor.

641 Advanced Rheology and Viscoelastic Theory (3) Continuum mechanics, formulation of viscoelastic theorems 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 of 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 polymers; crystallization of polymers; nucleation, growth and morphology; secondary nucleation theory; solidification of polymers; crystallization under stress. Prereq: 543.

671 Quantitative Microscopy (3) Principal acoustic, optical, x-ray neutron, electron and field-ion techniques for examination of microstructures of materials. Prereq: 405.

675 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.
(College of Arts and Sciences)

MAJOR
Mathematics ........................................... M.M., M.S., Ph.D.

John B. Conway, Head

Professors:
Alexiades, V., Ph.D. ................................ Delaware
Allakos, N., Ph.D. ........................................ Brown
Anderson, D. F., Ph.D. ................................ Chicago
Baker, G. A., Ph.D. ..................................... Cornell
Bradley, John S. (Emeritus), Ph.D. ............... Iowa
Carruth, J. H., Ph.D. .................................. Louisiana State
Clark, C. E., Ph.D. ..................................... Louisiana State
Conway, J. B., Ph.D. .................................. Louisiana State
Daverman, Robert J., Ph.D. ......................... Wisconsin
Dobbs, D. E., Ph.D. .................................... Cornell
Dydek, J., Ph.D. ........................................ Warsaw
Frandsen, Henry, Ph.D. ............................. Illinois
Gross, L. J., Ph.D. ...................................... Cornell
Hallam, T. G., Ph.D. .................................. Missouri
Hinton, D. B., Ph.D. ................................... Tennessee
Husch, L. S., Ph.D. ..................................... Florida State
Johannson, K., Ph.D. ................................. Bielefeld
Jordan, G. Samuel, Ph.D. ......................... Wisconsin
Karakashian, O. Ph.D. ............................... Harvard
Kupershmidt, B. A. (UTSI), Ph.D. ................. MIT
Lenhart, S., Ph.D. ...................................... Kentucky
McConnell, R. M., Ph.D. .............................. Duke
Matthes, H. T., Ph.D. ................................ Tulane
Miller, D. E. (Emeritus), Ph.D. .................... Michigan
Rajput, B. S., Ph.D. ................................... Illinois
Reddy, K. C. (UTSI), Ph.D. ......................... Indian IT
Rosinski, J., Ph.D. ..................................... Wroclaw
Schaefer, P. W., Ph.D. ............................... Maryland
Serbin, Steve, Ph.D. .................................. Cornell
Simpson, H., Ph.D. .................................... Cal Tech
Sonni, K. Ph.D. ......................................... Oregon State
Sonni, R. Ph.D. .......................................... Oregon State
Stallman, F. W. (Emeritus), Ph.D. ............... Giessen
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:
Freire, A., Ph.D. ....................................... Princeton
Kimble, K. R. (UTSI), Ph.D. ....................... Ohio State
Kot, Mark, Ph.D. ....................................... Duke
Kuo, Y., Ph.D. .......................................... Cincinnati
Maly, S., Ph.D. ......................................... Purdue
Pfaltz, Conrad, Ph.D. ............................... Maryland
Richter, Stefan (Liaison), Ph.D. ................. Michigan
Row, W. H., Jr., Ph.D. .............................. Wisconsin
Smith, J. Ph.D. ........................................... California

Assistant Professors:
Collins, Charles R., Ph.D. ......................... Minnesota
Feng, Xiaobing, Ph.D. ............................... Purdue
Gavrilets, Sergey, Ph.D. ............................ Moscow State
Guo, B. Ph.D. ........................................... Massachusetts
Polignone, Debra, Ph.D. .............................. Virginia
Qin, Jinshui, Ph.D. ................................ Pennsylvania State
Xiong, Jie, Ph.D. ...................................... North Carolina

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.

THE MASTER OF MATHEMATICS PROGRAM

Before admission to the Master of Mathematics program, the applicant must have either (a) certification for teaching secondary mathematics in at least one state, or (b) three years of elementary school, secondary school, or community college teaching experience. Applicants must have successfully completed one year of calculus (141-42 or equivalent) and a course in matrix algebra (251 or equivalent). The following requirements must be met:
1. Complete 30 hours of coursework of which 11 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 12 additional hours of work in acceptable courses numbered above 400. Of the additional hours, 6 must 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. The coursework 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 a term paper or project is required.

THE DOCTORAL PROGRAM

For the Ph.D. program in Mathematics, the student must meet the following requirements in addition to those of The Graduate School:
1. Satisfy either the standard program or the interdisciplinary mathematical ecology concentration. A student intending to work in mathematical ecology must keep either and 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. have been met, this examination will be given by a committee appointed by the department head. A student may take this specialty examination only twice.
4. Pass a one-year, 600-level sequence in mathematics outside the student's area of specialization. The sequences selected to fulfill this requirement must be approved by the department head and the student's doctoral committee. (Such approval may occur after completion of the sequence.)

Requirements 1-4 must be completed no later than the start of a student's seventh year (as a mathematics graduate student at UT Knoxville).

Standard Program

Demonstrate knowledge in five subjects selected from the groups listed below by passing written examinations in three subjects and by earning grades of B+ or better each semester in the courses associated with two additional subjects. The three subjects selected for written examinations must be from Groups I, II, III. At least two groups must be represented in the three written examinations. At least three groups must be represented in the five subjects.

Group I. Probability 523-34, Real Analysis 541-42, Applied Linear Algebra 547-48

Group II. Complex Analysis 543-44, Modern Algebra 551-52, Topology 561-62


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 UTK graduate program in mathematics no longer than one year may take written examinations at one time during that year without having that sitting for the examinations or any incurred failure(s) count toward the limits imposed above.

d. At least two examinations must be taken, and at least one must be passed before the start of a student's fourth year. Three examinations must be passed before the start of a student's fifth year.

"In lieu of earning a grade of B+ or better each semester in a sequence from Group I, II, or III, a student may demonstrate proficiency in that subject by passing the associated written examination. For this purpose, only one examination may be taken for each of up to 4 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 each of the 4 subjects from the groups listed in the standard program. This requirement may not be satisfied with courses from outside the department. At least one of the subjects used to meet this requirement or the written examination subject in 2. must be from Groups I and II.

Except for the privilege of utilizing as a Group IV course a course from outside the department, this concentration is subject to the constraints and privileges specified in the standard program, including the restrictions on related subjects, the conditions a. through d. placed on the taking of written examinations, and the option to pass a written examination in lieu of earning a grade of B+ or better each semester in a sequence from Group I, II or III.

GRADUATE COURSES

400 History of Mathematics (3) Development of major ideas in mathematics from ancient to modern times and influence of ideas in science, technology, philosophy, art, and other areas. Writing emphasis course: at least one in-class essay examination and 3000 words of writing outside classroom. Prereq: Matrix Algebra I and Introduction to Abstract Mathematics.

401 Mathematics and Microcomputers (3) Primarily for students seeking certification as mathematics teachers at secondary level. Use of microcomputers to study concepts and problems in mathematics. Does not satisfy the major requirements for 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 II or Biocalculus II.


421 Combinatorics (3) Introduction to problems of construction and enumeration for discrete structures: sequences, partitions, graphs, finite fields and geometries, and designs. Prereq: Probability and Statistics or consent of instructor.


424 Probability II (3) Elements of stochastic processes: Random walk, Markov chains and Poisson processes. Other topics as selected by instructor. Prereq: 423.

425 Statistics (3) Derivation of standard statistical distributions: t, F, and 2; independence of sample mean and variance; basic limit theorems; point and interval estimation, Bayesian estimates; statistical hypotheses; Neyman-Pearson theorem; likelihood ratio and other parametric and non-parametric tests; sufficient statistics. Prereq: Probability I or consent of instructor.


455-55 Abstract Algebra II (3,3) Algebraic structures: groups, rings, fields, vector spaces and linear transformations. Prereq: Matrix Algebra I.


457-55 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.


460 Geometry (3) Axiomatic and historical development of Euclidean, and hyperbolic geometry stressing proof techniques 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, continuity, functions, homeomorphisms, and continua and topological invariants. Prereq: Calculus III and Introduction to Abstract Mathematics, or consent of instructor.

471 Numerical Analysis (3) Computation, instability, and error in numerical methods and approximation by polynomials and piecewise polynomials. Quadrature and numerical solution of initial and boundary value problems of ordinary differential equations, stiff systems. Prereq: Numerical Algorithms I or consent of instructor. (Same as Computer Science 471.)

472 Numerical Algebra (3) Direct and iterative methods for systems of linear equations. Solution of linear equations by direct methods; eigenvalues and eigenvectors. Prereq: Numerical Algorithms I or consent of instructor. Recommended prereq: 453. (Same as Computer Science 472.)

475 Industrial Mathematics (3) Modeling, analysis, and computation applied to scientific/technical/industrial problems. Prereq: Differential Equations I and either Computer Literacy for Mathematicians or Numerical Algorithms, or consent of instructor.

480 Readings in Mathematics (1-3) Open to superior students with consent of department head. Independent study with faculty guidance. Prereq: Consent of faculty mentor to supervise independent work. May be repeated. Maximum 9 hrs.

499 Seminar in Mathematics (1-3) Topics vary. Requires out-of-class projects and in-class presentations by students. Credit hours announced for each seminar. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

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

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

504 Discrete Mathematics for Teachers (3) Mathematical logic and methods of argument, sets, functions and relations, combinatorics. Normally first graduate course for students seeking M.S. 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 polynomials and integers. 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.


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.


511-12 Methods in Applied Mathematics (3,3) Fundamental techniques associated with discrete and continuous models of physical, engineering and biological systems: difference equations, networks and graphs, optimization, time series analysis, stability analysis of differential and difference equations, and other topics. Coreqs: 510, Prereq or coreq: 445 or 447, and 453.
Mechanical and Aerospace Engineering and Engineering Science  
(College of Engineering)  

**MAJOR**  
**DEGREES**  
Aerospace Engineering  
Engineering Science  
Mechanical Engineering  

D. W. Darreing, Head  

Professors:  
Antar, B. (UTSI), Ph.D.  
Anamili, R. V., Ph.D.  
Baker, A. J., PE, Ph.D.  
Braun, G. W. (Emertus), Ph.D.  
Carley, T. G. (Liaison), PE, Ph.D.  
Collins, F. G. (UTSI), PE, Ph.D.  
Crawford, R. A. (UTSI), Ph.D.  
Darewing, D. W., PE, Ph.D.  
Dubey, R. V., Ph.D.  
Edmondson, J. A., PE, Ph.D.  
Flando, G. A. (UTSI), Ph.D.  
Forrester, J. H., PE, Ph.D.  
Forty, J. W. (Emertus), Ph.D.  
Garson, G. W. (UTSI), Ph.D.  
Hodgson, J. W. (Fisher Prof.), PE, Ph.D.  
Holland, R. W. (Emertus), PE, M.S.  
Jendrucko, R. J., PE, Ph.D.  
Johnson, W. S., PE, Ph.D.  
Keefe, D. R. (UTSI), Ph.D.  
Keyhani, M. (Liaison), Ph.D.  
Kim, K. H., Ph.D.  
Krieh, R. D. (Condra Chair of Excellence), Ph.D.  
Lo, C. F. (UTSI), Ph.D.  
McCay, M. H. (UTSI), PE, Ph.D.  
McClay, T. D. (UTSI), Ph.D.  
Maxwell, R. L. (Emeritus), Ph.D.  
Milligan, M. W., PE, Ph.D.  
Newman, M. K. (Emertus) (UTSI), Ph.D.  
Parang, M. PE, Ph.D.  
Parsons, J. R., PE, Ph.D.  
Peters, C. E. (UTSI), D.A.S.  
Pih, H. (Emeritus), Ph.D.  
Plitt, D. R. (Emeritus) Ph.D.  
Smith, G. V., PE, Ph.D.  
Snyder, W. T., Ph.D.  
Sollman, O., PE, Ph.D.  
Speckhart, F. H. (IBM Prof.), PE, Ph.D.  
Stair, W. K. (Emeritus), M.S.  
Stoker, J. E., PE, Ph.D.  
Tuckerman, M. (Emertus), M.S.  
Wasserman, J., PE, Ph.D.  
Weisberg, Y., Ph.D.  
Weiss, J. M. (UTSI), Ph.D.  
Wiesel, H. J., PE, Ph.D.  
Wilson, C. C., Ph.D.  
Wu, J. M. (UTSI), Ph.D.  
Young, R. L. (Emertus) (UTSI), Ph.D.  

Associate Professors:  
Becker, S. E., PE, Ph.D.  
Boulet, J. A. M., Ph.D.  
Caruthers, J. H., Ph.D.  
Engels, R. C. (UTSI), Ph.D.  
Frankel, J. L., Ph.D.  
Hamel, W. R., Ph.D.  
Madhukar, M.S., Ph.D.  
Mathews, A., PE, Ph.D.  
Moulden, T. H. (UTSI), Ph.D.  
Nguyen, K., Ph.D.  
Schnreer, R. A. (UTSI), Ph.D.  
Steinhoff, J. S. (UTSI), Ph.D.  
Vekili, A. D. (UTSI), Ph.D.  

Assistant Professors:  
Casseaux, J. J., Ph.D.  
Jannelli, G. S., Ph.D.  
Kwiecien, G. Ph.D.  
Lynne, J. E., M.D., Ph.D.  
Ploone, C. D., Ph.D.  
Rao, A. L. (UTSI), Ph.D.  
Yue, N., Ph.D.  

Graduate programs leading to the degrees of Master of Science and Doctor of Philosophy are available with majors in Mechanical Engineering, Aerospace Engineering, and Engineering Science. Changing from one of these programs to another requires departmental approval. Each applicant is advised as to any prerequisite courses before entering a program.  

In Mechanical Engineering, program concentrations include energy conversion and utilization; propulsion; heat transfer and fluid mechanics; thermodynamics; space engineering; gas dynamics; machine design and dynamics; power generation; and stress analysis.  

In Aerospace Engineering, program concentrations include energy conversion and utilization; propulsion; heat transfer and fluid mechanics; thermodynamics; space engineering; aerodynamics and gas dynamics; flight mechanics; aeroacoustics; and structures and stress analysis.  

In Engineering Science, program concentrations include energy conversion and utilization; propulsion; heat transfer and fluid mechanics; computational mechanics; biomedical engineering; and optical engineering (UTSI only). In each of these concentrations, interdisciplinary programs are arranged to meet individual needs or interests. The flexibility and interdisciplinary approach of the program ensures that the 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 can best be met by interdisciplinary study in engineering. The program’s course offerings and research activities are also intended to meet the needs of students who seek preparation for employment in engineering areas requiring specialization in mechanics or in related interdisciplinary studies such as biomechanics.  

Mechanical Engineering or Aerospace Engineering, entrance into the Master of Science program is available to qualified graduates of recognized undergraduate curricula in mechanical or aerospace engineering and to qualified graduates of other curricula who satisfy the necessary prerequisites. Admission into the doctoral program will be granted to those applicants who have demonstrated superior achievement in their engineering backgrounds. The general GRE is required for all international applicants for admission.  

In Engineering Science, entrance into the graduate program is available to graduates of recognized curricula in engineering, mathematics, or one of the physical or biological sciences. A program application is required in addition to the Graduate School application. The names and addresses of four references must be included with the program application. The general GRE is required of all international applicants for admission. Each student must satisfactorily complete a program of study that has been approved by his/her advisory committee and complies with the requirements of the Graduate School. In Engineering Science, the student’s major professor may be selected from a department other than the Department of Mechanical and Aerospace Engineering and Engineering Science; however, at least one member of the student’s graduate advisory committee must be on the faculty of the Department of Mechanical and Aerospace Engineering and Engineering Science.  

THE MASTER’S PROGRAM  

In both Mechanical Engineering and Aerospace Engineering, three M.S. options are
offered. Option I requires a thesis, while options II and III do not. Option I is the normal program for recent graduates. Options II and III provide graduate students with significant professional work experience the opportunity to focus their programs in special areas through either greater course work or selected engineering problems. Credit requirements for these three options are summarized below.

<table>
<thead>
<tr>
<th>Course Areas</th>
<th>Hours Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option I</td>
<td>12</td>
</tr>
<tr>
<td>Option II</td>
<td>18</td>
</tr>
<tr>
<td>Option III</td>
<td>12</td>
</tr>
<tr>
<td>Coursework</td>
<td>24</td>
</tr>
<tr>
<td>(500 level or above) (minimum)</td>
<td>6</td>
</tr>
<tr>
<td>Mathematics (400 level or above)</td>
<td>6</td>
</tr>
<tr>
<td>Engineering courses below 500 (maximum)</td>
<td>6</td>
</tr>
<tr>
<td>Thesis credit</td>
<td>3</td>
</tr>
<tr>
<td>Problems credit (590)</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
</tr>
</tbody>
</table>

All three program options require participation in the departmental graduate seminars program, and passing a final examination on all work submitted for the degree. Option II final examination will cover all course work. Option III final examination will cover all the selected engineering problems.

The thesis option, Option I, requires submission and defense of a written thesis that demonstrates the ability to conduct and report an independent investigation.

The problems option, Option III, requires a formal report to be written for each selected engineering problem.

In Engineering Science, two M.S. options are offered: Option I requires a thesis, while Option II does not. The Option II is restricted to those students who have had significant engineering professional work experience. In Option I, a minimum of 30 semester hours including the thesis is required. In Option II, a minimum of 30 hours is required. Credit requirements for these two options are summarized below.

<table>
<thead>
<tr>
<th>Course Areas</th>
<th>Hours Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option I</td>
<td>12</td>
</tr>
<tr>
<td>Option II</td>
<td>18</td>
</tr>
<tr>
<td>Option III</td>
<td>12</td>
</tr>
<tr>
<td>Coursework</td>
<td>24</td>
</tr>
<tr>
<td>Mathematics</td>
<td>6</td>
</tr>
<tr>
<td>Engineering courses (Major concentration may include but is not restricted to courses offered by the Department)</td>
<td>12</td>
</tr>
<tr>
<td>Related courses (May include additional courses in mathematics, computer science, or the physical and life sciences as well as engineering courses)</td>
<td>6</td>
</tr>
<tr>
<td>Thesis</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
</tr>
</tbody>
</table>

In Mechanical Engineering or Aerospace Engineering, the courses must include:

1. A minimum of 12 semester hours of graduate credit in mathematics in courses numbered 400 or above with a minimum of 6 semester hours numbered 500 or above.
2. A minimum of 24 semester hours in the department in courses numbered 500 and above, with at least 12 of these semester hours in the major. A minimum of 9 semester hours of courses is required at the 600 level. These are exclusive of thesis, problems, or dissertation credit.
3. 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.
4. A minimum of 12 semester hours in mathematics, engineering courses, or computer science in courses numbered 400 and above, exclusive of a first course in ordinary differential equations.

Additional requirements for all students include:

1. Participation in the departmental seminar program.
2. Meet all departmental examination requirements, which include passing a written and oral comprehensive examination.
3. Presentation of a dissertation proposal to the student's advisory committee and approval of that proposal by that committee.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The Ph. D. program in Aerospace Engineering is available to residents of the states of Arkansas or Kentucky. The M.S. program in Aerospace Engineering is available to residents of the state of Florida (concentration in biomedical engineering only). Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE CREDIT FOR UNDERGRADUATE COURSES

Students majoring in Mechanical Engineering or Aerospace Engineering may not normally use more than one 400-level engineering course to meet their advanced degree requirements. For students majoring in Engineering Science, four hundred-level courses in engineering may be used for graduate credit at the discretion of the advising committee. However, at least two-thirds of minimum required credit hours in a master's degree program must be at or above the 500 level. With the approval of the student's major department, a student whose major is outside the Department of Mechanical and Aerospace Engineering must take at least two-thirds of their degree requirements outside the Department of Engineering and Engineering Science to meet senior (400-level) courses in the Department for graduate credit. Such students should consult with instructors regarding prerequisites for undergraduate courses.

Aerospace Engineering

NOTE: Not all the courses listed below are available at both the UT Knoxville and the UTSI campuses.

GRADUATE COURSES

422 Aerodynamics (3) Theory and design of aerodynamic bodies for desired characteristics. Potential flow theory, viscous effects, compressibility effects. Subsonic. Prereq.: 370, F

423 Viscous Flow (3) Boundary layer theory; laminar and turbulent flow; compressibility effects; numerical solution methods. Prereq.: 422 or Heat Transfer or consent of instructor. Sp

424 Astronautics (3) Propulsion, trajectories, guidance, control, and atmospheric reentry of space vehicle systems. Prereq.: 362, Mechanical Engineering 332. Sp

425 Propulsion (3) Principles of propulsion devices; turbojet, ramjet and rocket engines. Prereq.: 351, F

426 Introduction to Aerospace Design (2) Design processes, synthesis, safety, reliability, patents, product liability, economic analysis, optimization, design standards, test methods, individual design reports. Prereq.: 351, 370, 353. Coreq.: Mechanical Engineering 344. F

429 Aerospace System Design (4) Synthesis and design of complete aerospace system, economic and technical aspects. Participation in team design effort, formal presentations and design report. Prereq.: 425, 426. Sp

449 Aerospace Engineering Laboratory (3) Designing, conducting, and reporting results of experimental exercises. Test and specification data and analysis of conclusions. Prereq.: 345, 351, 3 labs. F

495 Selected Topics in Aerospace Science (1-4) Current problems and topics in aerospace science. Prereq.: Consent of instructor.

511 Inviscid Flow (3) Kinematics and dynamics of incompressible fluids; potential flow about bodies, conformal mapping. Prereq.: 422 or Mechanical Engineering 531, Mathematics 425 or equivalent. F

512 Viscous Flow (3) Equations of viscous fluid flow; laminar and turbulent flow; transition; separation; boundary layer theories; exact and approximate solutions. Prereq.: Mechanical Engineering 551 or equivalent. F

513 Experimental Methods in Fluid Mechanics (3) Experimental methods with laboratory 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 or Mechanical Engineering 531.

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, propulsion systems, vehicle performance characteristics, and trajectory optimization. Prereq.: 422; 515 for 516. F

521-22 Aerodynamics of Compressible Fluids (3,3) One-dimensional and two-dimensional flows, non-dimensional analysis, small perturbation theory; slender body theory; similarity rules; method of characteristics. Prereq.: 422 for 521; 521 for 522.

525 Hypersonic Flow (3) Hypersonic flight, hypersonic flows, viscous interactions, free molecule and rarefied gas flow. Prereq.: 512.
527-28 Aerospace Ground Test Facilities (3,3) Atmospheric models and similarity considerations; aerodynamic test facilities: continuous and intermittent tunnels and ballistic ranges; propulsion test facilities or air breathing and rocket engines, space environment and space vehicle test facilities. Prereq: 512 and 521, Mechanical Engineering 522.

529 Rarefied Gas Dynamics (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. Kinetic simulation; experimental techniques; introduction to hypersonic real gas flows. Prereq: 522, Mechanical Engineering 522.

531 Magnetohydrodynamics (3) Electromagnetic field theory; chemical kinetics; thermal effects and thermophysical properties of plasmas; governing equations and applications. Prereq: 422 and Mathematics 471.

532 Introduction to Turbulence (3) Microsopic effects, analogies, statistical treatment, correlation functions, energy spectra, diffusion; energy transport of turbulent jets and pipe flow. Prereq: 511-12.

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.

544 Transonic Flow (3) Nature of flow at transonic speeds; effects of shock waves; shock wave phenomena; shock wave interactions; strong viscous interaction phenomena; solution techniques. Prereq: 522.


554 Aerospace Vehicle Stability and Control (3) Static and dynamic longitudinal directional and lateral stability and control. Coupled modes. Motion with fixed and free flight surfaces. Automatic control systems. Prereq: 523, 551.

556 Vertical or Short Take Off and Landing Aircraft (3) Performance, stability, control of rotary wing, tilt wing, vectored lift and jet and vertical takeoff aircraft. Vertical and translational flight modes. Lift and thrust analysis. Automatic controls. Simulation facility types and flight testing. Prereq: 555.


561 Fundamentals of Aeroacoustics (3) Generation, propagation and absorption of sound in static and moving media. Prereq: Consent of instructor.

564 Spacecraft Attitude Dynamics and Control (3) Rotational attitude dynamics of space vehicles. Gyroscopic instruments, passive and active attitude control devices. Linear control theory and attitude stabilization. Prereq: 551, Mathematics 471.

574 Space Engineering: Satellite Technology (3) Satellites and rockets (orbit, launch vehicles and launching), spacecraft structure, power systems, attitude control systems and instruments, and navigation and communication systems, spacecraft testing, reliability, and application of satellites (communication, weather, Earth observation, and future applications). Prereq: 425, Mathematics 471.

580 Selected Engineering Problems (2-6) Enrollment limited to students in programs program. Prereq: Consent of advisor.

599 Special Topics in Aerospace Engineering (1-3) May be repeated. Maximum 6 hrs.

631 Magnetohydrodynamics (3) Electromagnetic field equations, motions of single charged particle, statistical description of plasma, Boltzmann equation, conduction and diffusion in ionized gases, continuum magnetohydrodynamics 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 model of channel flow, engineering applications of magnetohydrodynamics, production and power generation. Prereq: 631 and Mathematics 562.

641-42 Physical Gas Dynamics (3,3) High speed, high temperature gas flow from molecular point of view. Kinetic theory, statistical mechanics, equilibrium flow, vibrational and chemical rate processes, non-equilibrium vibrational and chemical flow, non-equilibrium kinetic theory, flow with transition non-equilibrium. Prereq: 622, Mechanical Engineering 522.

645 Theory of Turbulence (3) (Same as Engineering Science and Mechanics 645.)

651-52 Advanced Aerodynamics (3,3) Subsonic, transonic, supersonic, and hypersonic flows treated in generalized and unified manner with various viscous effects. Relationships among various ranges of fluid flows. Fundamental assumptions, limitations of approximations and consequences. Foundations of gas dynamics, applications to airplanes, rocket, ground testing and jet propulsion. Discussion of special topics according to interest of students. Prereq: 511, 522.


690 Advanced Topics in Aerospace Engineering (3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

**Engineering Science**

**GRADUATE COURSES**

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Prereq.</th>
</tr>
</thead>
<tbody>
<tr>
<td>421 Materials of Engineering (3)</td>
<td>Mechanical properties of engineering materials; data collection and processing; time dependent and cyclic dependent properties. Prereq: 321, Materials Science and Engineering 201, 3 hrs or 2 hrs and 1 lab.</td>
</tr>
<tr>
<td>423 Fracture-Safe Design (3)</td>
<td>Critical review of variables controlling fracture toughness; past and present geometry, materials, analysis techniques; characterization of fracture toughness by stress intensity factors, strain energy release rates, integral, COD data, transition fracture behavior; use of fracture toughness as a damage design parameter. Prereq: 321 and Materials Science and Engineering 201. (Same as Materials Science and Engineering 475.) 3 hrs or 2 hrs and 1 lab.</td>
</tr>
<tr>
<td>433 Dynamic Systems (3)</td>
<td>Three dimensional dynamics of particles and rigid bodies; gyroscopic; variable mass systems; central force motion; Lagrange's equations; stability; transfer functions. Prereq: Dynamics.</td>
</tr>
<tr>
<td>435 Engineering Acoustics (3)</td>
<td>Concepts of acoustics, measures of sound and their units; noise generation and transmission, noise control principles and application, materials and procedures for noise abatement. Prereq: Senior standing or consent of instructor.</td>
</tr>
<tr>
<td>442 Fluid Mechanics II (3)</td>
<td>Differential forms of basic laws; compressibility, isentropic flow, shocks, duct flows, water waves, waves in liquid and gas, boundary layers, free surface flows. Prereq: 441.</td>
</tr>
<tr>
<td>461 Experimental Stress Analysis (3)</td>
<td>Theory, techniques and instrumentation of resistance strain gauges; theory and techniques of brittle coating method; introduction to other strain measuring devices. Prereq: 321, Electrical and Computer Engineering 301. 2 hrs and 1 lab.</td>
</tr>
<tr>
<td>485 Dynamic Data Acquisition (3)</td>
<td>Use and calibration of instruments for measuring and recording dynamic events; Fourier analysis, transfer function analysis, digital signal processing, transduction, experimental parameter estimation with applications to modal vibration analysis. Prereq: 431, Electrical and Computer Engineering 301. 2 hrs and 1 lab.</td>
</tr>
<tr>
<td>471 Clinical Engineering and Biomechanical Instrumentation (3)</td>
<td>Function and characteristics of health care delivery systems; hospital organization and health care economics; development and management principles for hospital, clinical engineering and biomedical instrumentation system operational characteristics, performance of transducers, signal conditioning, data reading and storage devices, shock devices, biocompatibility of medical devices, available systems, selection and procurement methods, custom-designed system, equipment maintenance and control programs for hospitals. Ethical issues and professionalism in clinical engineering. Prereq: Biomedical engineering, Introduction to Pattern Recognition.</td>
</tr>
<tr>
<td>473 Biomechanics (3)</td>
<td>Mechanical properties of living tissues; biomechanics of injury; mechanics of prostheses; material compatibility of prosthetic devices; biomechanical problems related to impact. Prereq: 321.</td>
</tr>
<tr>
<td>494-95 Special Engineering Science Topics (1-3)</td>
<td>Problems related to recent developments and practice. Open to juniors or seniors. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.</td>
</tr>
<tr>
<td>523 Theory of Elasticity (3)</td>
<td>Equations of equilibrium, strain-displacement relations, compatibility, and constitutive equations in three-dimensions. Beams, disks, thick-walled tubes, plates with holes; stress concentrations. Ainy and complex potential stress function, plane stress and plane strain in rectangular and polar coordinates. Thermal stresses in beams, rings, plates, and shells; thermal buckling problems.</td>
</tr>
<tr>
<td>525 Theory of Plates (3)</td>
<td>Classical bending theory of thin plates; buckling and large deflection problems. Prereq: 523 or 535.</td>
</tr>
<tr>
<td>528 Ceramic Matrix Composites: Material and Mechanics</td>
<td>Micromechanics and microstructural design; fabrication of ceramic matrix composites; interface characterization and mechanics; electron microscopy examination; nondestructive evaluation; fracture; fatigue; applications. Prereq: 459 or consent of instructor. (Same as Materials Science and Engineering 528.)</td>
</tr>
<tr>
<td>535 Energy Methods in Applied Mechanics (3)</td>
<td>Virtual work, potential energy, variational methods; momentum, higher-dimensional systems. Lagrange's equations of motion; variational methods. Examples from structures, plates and shells, buckling, vibrations, dynamics and fluid mechanics.</td>
</tr>
</tbody>
</table>
Mechanical Engineering

NOTE: Not all the courses listed below are available at both the UIU Knoxville and the UTI campuses.

GRADUATE COURSES


536 Advanced Engineering Acoustics (3) Introduction to theory and application of acoustic analysis; vibration of continuous systems; plane and spherical waves, transmission phenomena, reflection, scattering; resonators, filters, absorption mechanisms, microphones, ultrasonic transducers. Prereq: 435 or undergraduate vibrations course.

539 Continuum Mechanics (3) Cartesian tensors, transformation laws, stress, strain, deformation, constitutive equations, conservation laws for mass, momentum, energy. Applications in solid and fluid mechanics.

541 Fluid Dynamics I (3) Kinematic, kinematic and dynamic properties of fluids; flow in pipes; development of boundary layer equations; potential flow, transonic, boundary layer approximations; coupled heat/mass transfer models. Coreq: 539.

542 Fluid Dynamics II (3) Development of basic concepts and governing equations for turbulence and turbulent flow. Formulation for correlation function, energy spectra, diffusion tensor, turbulent flow transport processes, free turbulence, wall turbulence; use of engineering turbulence closure models; examination of modern numerical and experimental methods. Prereq: 541.

557 Computational Mechanics Seminar (1) Current developments in computational fluid/thermal/structural mechanics. For departmental thesis students only. May be repeated.

562 Experimental Mechanics of Composite Materials (3) Stress-strain relations for orthotropic and transversely isotropic materials; analysis of composite laminate and laminate; stress and strain transformation; laminates plane stress theory; fiber, matrix, fiber-matrix interface, and composite mechanical properties (tensile, flexure, compressive, shear); physical properties; notch-tip stress field, stress intensity factor, notch sensitivity; strain energy release rate, composite fracture toughness; failure modes. Lab. Prereq: Mechanical and Aerospace Engineering Science 521 or consent of instructor. (Same as Materials Science and Engineering 562.)


565 Laser Processing of Materials II (3) Advanced problems in mechanics, group or individually. Prereq: 564. May be repeated with consent of instructor.

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

589 Measurement Science II (3) (Same as Nuclear Engineering 588 and Aviation Systems 589.)

621 Analysis and Design of Thin Shell Structures (3) Geometry of surfaces, derivation of thin shell theory for arbitrary shell geometry; kinematics of thin shell applications of theory in structural engineering. Prereq: 525 or Civil Engineering 562.

624 Viscoelasticity (3) Viscoelastic constitutive relations; isothermal boundary value problems; wave propagation in viscoelastic materials; stability problems; determination of viscoelastic properties. Prereq: 523 and 539 or Polymer Engineering 541.


641 Advanced Topics in Fluid Mechanics and Convection Heat Transfer (3) Convective momentum, heat and mass transfer; boundary layer analysis; stability, transition, turbulence, closure models; Navier-Stokes equations; closure procedures; time- and ensemble-averaging, large-scale structure, high-speed flow, reacting, nonreacting, excitation, ionization. Applications in propulsion, lasers, aerodynamics. Prereq: 542.

646 Theory of Turbulence (3) Mathematical descriptions of turbulence; isotropic turbulence, energy spectra, Kolmogorov's theory, large and small eddy structure; turbulence flows, turbulent diffusion by continuous movement; application to turbulent jets, wakes, pipe flow, boundary layers. Coreq: 542. (Same as Aerospace Engineering 645.)

657 Computational Mechanics Seminar (1) Current developments in computational fluid/thermal/structural mechanics. For departmental thesis students only. May be repeated.

661 Systems and Controls (3) Analytical models of physical systems comprised of combinations of mechanical, fluid, electrical, and thermal components; feedback control systems, transfer function and frequency response, state-space analysis; non-linear or linear control of linear systems; sampled data systems, digital filters. Prereq: Mechanical Engineering Instrumentation and Measurement, Circuits and Electro-Mechanical Components. F, Sp.

655 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 effort; design report. Prereq: 332, 344, F.


471 Refrigeration and Air Conditioning (3) Vapor compression cycle and absorption cycle; heat pump systems; psychrometric processes; air washers; cooling towers; solar radiation; building heat transmission. Prereq: 332, 344, F, Sp.

475 Thermal Engineering (3) Thermal systems, turbomachinery, heat exchangers, combustion and system analysis and design, second law and economic analysis. Prereq: 332, 344, F, Sp.


494-95 Selected Topics in Mechanical Engineering (1-3) Special topics of current interest in mechanical engineering. Prereq: Consent of instructor.


507 Application of Numerical Linear Algebra in Systems and Control Engineering (3) (Same as Chemical Engineering 507 and Electrical Engineering 507.)


514 Phase Change Heat Transfer (3) Mechanisms and modeling of nucleation, transition and film boiling processes; critical heat flux; forced convective boiling and post dry-out heat transfer; condensation processes; heterogeneous nucleation; dropletwise and filmwise condensation; phase change processes; moving phase fronts; mathematical modeling. Prereq: 344, 511.
521-22 Thermodynamics I and II (3.3) Macropscopic thermodynamics, including First and Second Law analyses, availability. Chemical equilibrium criteria, combustion, gas mixtures, and property relations, determination of thermodynamic properties from molecular structure, spectroscopic data, kinetic theory, statistical mechanics, quantum physics, Schrödinger equation. Prereq: 332.

523 Special Topics in Thermodynamics (3) Application of thermodynamics to topics of current interest in mechanical engineering. Prereq: Consent of instructor.

525 Combustion and Chemically Reacting Flows I (3) Fundamentals of chemical kinetics, chemical kinetics and conservation equations; phenomenological approach to laminar flames; diffusion and premixed flame theory; single droplet combustion; deflagration and detonation theory; stabilization of combustion waves in laminar streams; flammability limits of premixed laminar flames; introduction to turbulent flames. Prereq: 522, 531, or consent of instructor.

526 Combustion and Chemically Reacting Flows II (3) Advanced topics: phenomenological approaches to turbulent flames; fundamentals of turbulent flow; application of probability density functions to turbulent flows; turbulent reacting flows with premixed and non-premixed reactants; spray combustion models; fluidized bed combustion; chemically reacting boundary layer flow; gas turbine combustion; multicomponent combustion; high heat fluxes; introduction to supersonic combustion and hypersonic flows. Prereq: 525.


551-53 Mechanical Engineering Design (3.3) Design of mechanical engineering devices and systems. Prereq: Consent of instructor.

553 Development of Superior Products and Processes (3) Case studies of latest techniques of superior product and process development practiced in industry. Case study of product or process yielding superior results developed by student. Prereq: B.S. in Engineering or consent of instructor.

571 Metal Machining and Forming (3) Mechanics of cutting and removal of workpiece material; process design, mechanisms of friction and tool wear and effects of temperature; selection of cutting fluids and tool materials, chip control, mechanics of rolling, forging, and bending. Prereq: Intermediate materials engineering course, undergraduate heat transfer class.

581 Rocket Propulsion I (3) Rocket propellant fundamentals; thermodynamics of nonreacting and chemically reacting ideal gases, rocket nozzle design; ideal rocket performance parameters; rocket heat transfer, chemistry of propellants; liquid rocket engine systems; ground testing; introduction to solid propellant rockets. Prereq: Consent of instructor.

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; effects of chamber pressure on propellant burn rates, erosive burning; analysis of two-phase solid rocket exhaust flow. Introduction to nuclear and electric propulsion systems. Prereq: Mechanical and Aerospace Engineering 532.

589 Mechanics of Control of Robot Manipulators (3) Fundamentals of robot manipulation; kinematics and dynamics of manipulator arms, controller design for industrial robots, trajectory planning, compliant motion control and force control. Prereq: Matrix Computations, undergraduate dynamics and controls.


590 Selected Engineering Problems (2-6) Enrollment limited to students in major. Prereq: Consent of advisor. May be repeated. S/N only.

599 Special Topics in Mechanical Engineering (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

610 Advanced Topics in Fluid Mechanics and Heat Transfer (3) Advanced theory and application of fluid mechanics and heat transfer: natural convection, multi-phase flow, high speed reacting and nonreacting flows, advanced boundary layer techniques, combustion, turbulent and chaotic flows. Prereq: 512 and consent of instructor.

611 Advanced Convection Heat Transfer, Fluid Mechanics and Heat Transfer (3) Stagnation point and high speed viscous boundary layer flows; problems in heat transfer at high supersonic and hypersonic speeds; laminar and turbulent boundary layer heat transfer with surface roughing, adverse pressure gradients, passive species recombination, stagnation point heat transfer, Lee's integral solution for high speed boundary layers; heat flux scaling rules; mass transfer and radiation cooling techniques. Prereq: 512 and consent of instructor.


613 Advanced Radiation Heat Transfer (3) Radiation heat transfer in absorbing, emitting and scattering media; interaction of thermal radiation with conduction and convection heat transfer. Prereq: 511, 512.

621 Advanced Topics in Solid Mechanics (3) Advanced theory and applications in mechanics, dynamics, vibrations and control. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

642 Advanced Topics in Thermodynamics (3) Comparison of macroscopic and microscopic approach; equilibrium of pure substances, metastable states. Non-equilibrium thermodynamics. Prereq: Consent of instructor.


Mechanical and Aerospace Engineering and Engineering Science

GRADUATE COURSES

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

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

521-22 Advanced Strength of Materials (3.3) Three-dimensional transformations for stress and strain, elementary theory of elasticity, un symmetrical bending, beams on elastic foundation, energy methods, shear center, beam-columns, thick-walled pressure vessels, elementary theory of plates. Prereq: Mechanics of Materials II or Mechanical Engineering 466, Mathematics 431 or Analysis.


553 Computational Solid Mechanics (3) Finite element analysis techniques in structural mechanics and elasticity, nonlinearity. Two and three-dimensional formulations, beam, plate and shell elements. Prereq: Mechanics of Materials II or Mechanical Engineering 466, Mathematics 431 or Analysis.


559 Computational Mechanics Laboratory (1) Utilization of networked personal computer workstations for solving computational fluid and structural mechanics problems. May be taken for credit with each of courses 551, 552, 553, and 557. Coreq: 551.

575 Applied Artificial Intelligence (3) (Same as Nuclear Engineering 575.)

576 Expert Systems in Engineering (3) (Same as Nuclear Engineering 576.)

577 Neural Networks in Engineering (3) (Same as Nuclear Engineering 576.)

588 Measurement Science I (3) (Same as Nuclear Engineering 588, Aviation Systems 588, Civil Engineering 588.)

595 Seminar (1) All phases of mechanical and aerospace engineering and engineering science, reports on current research at UT and UTSA. May be repeated. S/N: NC only.

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

651-52 Advanced Topics in Computational Fluid Dynamics (3.3) Approximation theory; analysis of accuracy, convergence, and stability for smooth and non-smooth solutions; shocks, artificial dissipation, two- and three-dimensional, compressible viscous and inviscid
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 work should be (1) a full year of general biological science, (2) one year of calculus, (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 familiarize the student with laboratory facilities. Usually the student selects a research professor toward the end of the laboratory rotation period. The major professor assists in the selection of and and carrying out of a suitable research program and in the naming of the research 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; (3) 12 hours of credit have been earned in courses graded on the A-F system; (4) a 3.0 GPA in courses taken in the department; (5) a complete course sequence in biochemistry or molecular biology; (6) 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) 3.0 GPA in all courses taken for graduate credit; (2) a 3.0 GPA in all courses taken for graduate credit; (3) satisfactory performance in at least one semester as a teaching assistant; (4) one semester of physical chemistry; (5) one course in statistics; (6) two semesters of biochemistry or molecular biology; (7) satisfactory performance in a comprehensive examination that must be attempted before the end of the fifth semester in the program and passed before admission to candidacy; and (8) the presentation of a research dissertation and its oral defense.

GRADUATE COURSES

410 Bacterial Physiology (3) Modern concepts of structure and function of bacterial cell. Prereq: Introduction to Microbiology. F

411 Bacterial Genetics (3) Transmission and expression of genetic information by bacteria. Prereq: Introduction to Microbiology. Sp

420 Medical Microbiology (3) Disease-producing microorganisms, including bacteria, rickettsiae, chlamydia and fungi. Prereq: Introduction to Microbiology. Sp

429 Medical Microbiology Laboratory (2) Laboratory exercises designed to accompany 420. Prereq: Introduction to Microbiology Laboratory. Coreq: 420. Sp

430 Immunology (3) Principles of inflammation and immunity; immunoglobulin structure and theories of formation; and diversity; complement; hypersensitivities; cell cooperation and recognition in immune mechanisms; soluble factors. Prereq: Biology 220. (Same as Biochemistry and Cellular and Molecular Biology 430). F

439 Immunology Laboratory (2) Laboratory exercises designed to accompany 430. Coreq: 430. (Same as Biochemistry and Cellular and Molecular Biology 439). F


449 Virology Laboratory (1) Laboratory procedures for isolation, handling, and culturing of animal viruses. Prereq: 440. Coreq: 440. Sp

470 Microbial Ecology (3) Physiological diversity and taxonomy of microorganisms from natural environments. Functional role of microorganisms in natural and simulated ecosystems. Prereq: 310. F

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

502 Registration for Use of Facilities (3-15) Required only. E

562 Journal Club in Microbial Physiology (1) Readings and discussions based on current literature. E

575 Microbial Pathogenesis (3) Bacterial and fungal pathogens and their interactions with host cells. Prereq: Microbiology. E

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

601 Journal Club in Microbial Physiology (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. S/NC only. E

602 Journal Club in Microbial Pathogenesis (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. S/NC only. E

603 Journal Club in Immunology (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. S/NC only. E

604 Journal Club in Virology (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. S/NC only. E
Music

Music at the beginning of each semester.

Psychology of Music Teaching (3) Research on musical perception and cognition and its application to teaching of music. Prereq: Consent of instructor.


560 Psychology of Music Teaching (3) Research on musical perception and cognition and its application to teaching of music. Prereq: Consent of instructor.

560 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.

593 Special Problems in Music Education (3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

Music Ensemble

GRADUATE COURSES

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 Ensemble (1) May be repeated.

510 Percussion Ensemble (1) May be repeated.

511 Marimba Ensemble (1) May be repeated.

515 Chamber Music Ensemble (1) May be repeated. Maximum 12 hrs.
Music Theory

GRADUATE COURSES

430-44 Counterpoint Ill (3.3) Study of species counterpoint in modal and tonal styles, works of Palestrina and J. S. Bach. Prereq: 520. 440-Writing of contrapuntal forms of 18th century and fugue; analysis of works from 18th through 20th centuries. Prereq: 430.

450 Choral Arranging (2) Analysis of scores and writing of arrangements for choirs. Prereq: Theory IV or consent of instructor.

510 Musical Styles (3) Elements of design and their role in definition of musical styles. Prereq: Consent of instructor.

520 Analytical Techniques (3) Analytical techniques, contemporary approaches. Tonal and neotonal music. Prereq: Consent of Instructor.

530 Music Theory Pedagogy (3) Techniques, methods, and materials involved in college-level theory programs. Prereq: Consent of instructor.

540 Computer Projects (1-3) Programming languages, design and implementation of projects in computer-managed instruction. Prereq: Consent of Instructor.

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

Music Voice

GRADUATE COURSES

425 Functional Diction for Singers (3) Comprehensive survey of the diction of song 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 Music Theatre Performance Techniques (1) Improvisation, movement, and basic techniques for dramatic vocal performance. Prereq: Vocal major or consent of instructor. May be repeated for credit. Maximum 2 hours.

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 8 hrs.

550-60 Advanced Vocal Pedagogy 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.

570 Vocal Chamber Music Performance (2) Prereq: Consent of instructor.

580-85 Choral Literature II (2, 2) Choral music from middle ages to present with consideration of historical development of major choral genres.

590 Advanced Choral Conducting (3) Expansions and continued refinement of conducting techniques, development of choral rehearsal skills. Prereq: Consent of instructor.

594 Project in Choral Conducting Performance (1-3) Public performance, critical document; recording project. Prereq: Consent of instructor. May be repeated.

595 Choral Conducting Seminar (3) Score reading and preparation; problems of interpretation, performance practices, and conducting techniques. Prereq: 590 or consent of instructor. May be repeated.

Nuclear Engineering

(College of Engineering)

MAJOR DEGREES

Nuclear Engineering ...................... M.S., Ph.D.

Thomas W. Kerlin, Head

Professors:

Dodds, H. L., PE, Ph.D. .................... Tennessee

Kerlin, T. W. (Liaison), Ph.D. ............. Tennessee

Mihalczo, J. T., Ph.D. ...................... Tennessee

Miller, L. F., PE, Ph.D. .................... Texas A&M

Shannon, T. E., Ph.D. ...................... Tennessee

Uhrig, R. E. (Distinguished Prof.), PE, Ph.D. ..... Iowa

Upadhyaya, B. R., Ph.D. .................. California

Associate Professors:

Groer, P. G., Ph.D. ....................... Vienna

Katz, E. M., Ph.D. .......................... Tennessee

Pvey, R. E., Ph.D. ......................... Tennessee

Ruggles, A. E., Ph.D. ..................... Rensselaer

Scott, T. H., PE, Ph.D. ................... Florida

Townsend, L. W., Ph.D. ................... Idaho

Assistant Professor:

Hines, J. W., Ph.D. .......................... Ohio State

The Department of Nuclear Engineering offers programs leading to the Master of Science and Doctor of Philosophy degrees. Students may elect a traditional nuclear engineering M.S. or Ph.D. program (focusing on fission energy or fusion energy) or a radiological engineering concentration at the master's level. The radiological engineering concentration prepares students for careers in the radiation safety field (health physics). The program is designed for graduates of undergraduate programs in engineering, physics, biology and chemistry.

All entering students must have, as a minimum, competency in the sciences through ordinary differential equations, competency in atomic and nuclear physics, and competency consistent with a course in introductory nuclear engineering. If these competencies do not exist, the student must take appropriate courses for undergraduate credit. The department head is the contact for all interested students, both those with nuclear engineering degrees and those from other disciplines.

THE MASTER'S PROGRAM

A graduate program leading to the Master of Science is available to graduates of recognized undergraduate curricula in engineering and physics. Each applicant will be advised as to the necessary prerequisite courses before he/she enters the program.

The student must complete 24 semester hours of coursework approved by the student's advisory committee that includes the following:

1. A major consisting of a minimum of 12 semester hours of graduate courses in nuclear engineering. This must include at least one of the following sequences: 511, 512; 551, 552; 571, 572.

2. A minor of 6 semester hours of elective courses in mathematics, statistics or computer science.

3. Six semester hours in either nuclear engineering or a related field.

The M.S. candidate must also demonstrate research or design capability. This requirement may be satisfied by a thesis project or engineering practice projects as described below:

Thesis - The student performs independent research on a topic approved by the graduate committee. He/she submits a thesis on this research and then must pass an oral examination on the thesis and all graduate coursework. The student must enroll for six semester hours of NE 500 (Thesis).

Engineering Practice - The student performs independent research or design work for two to four separate topics approved by his/her graduate committee. Each project is similar to a thesis project but smaller in scope. He/She submits a report, in thesis format, for each project. The student must then pass an oral examination on his/her engineering practice projects and all graduate coursework. The student must enroll for six semester hours of NE 598 (Nuclear Engineering Practice).

THE DOCTORAL PROGRAM

Students in the field of nuclear engineering desiring to study for the Doctor of Philosophy must have a Bachelor of Science or Master of Science from a recognized university, with a major in engineering or physics. All candidates will be required to demonstrate general competence in a comprehensive examination in the areas of engineering science, mathematics, physics, and nuclear engineering.

Specific course requirements for the Ph.D. in Nuclear Engineering include:

1. A minimum of 48 semester hours beyond the Bachelor's degree, exclusive of credit for the M.S. thesis or Nuclear Engineering Practice.

2. A minimum of 24 semester hours in doctoral research.

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
421 Introduction to Nuclear Criticality Safety (3) Fundamentals of nuclear criticality safety; criticality accidents; safety standards; overview of experiments, computational methods, and Monte Carlo. Prereq: Physics 232.

421 Introduction to Radiation Protection (3) External and internal dosimetry; biological effects of radiation, radiation detection, radiation risk assessment. Prereq: Introduction to Nuclear 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.

433 Reactor Shielding and Dosimetry Laboratory (3) Measurements of radioactivity in various materials; characterization of radiation fields, radiological techniques, alpha and beta spectroscopy, radiation dosimetry.

435 Introduction to Fusion Energy (3) Same as Electrical Engineering 463.

446 Introduction to Fusion Energy II (3) Same as Electrical Engineering 464.

470 Nuclear Reactor Theory I (3) Fundamentals of reactor physics relative to cross sections, kinematics of elastic scattering, reactor kinetics, reactor systems and nuclear data. Analytical and numerical methods applicable to nuclear reactor core design, perturbation theory, and multigroup diffusion equations. Prereq: Introduction to Nuclear Engineering.

471 Nuclear Reactor Theory II (3) Thermal spectrum computational methods: heterogeneous effects in fast reactors, reactor core design, core calculation methods; equations that relate thermal and neutronic variables; power distribution calculations and reactivity control methods. Prereq: 470.

494 Special Topics in Nuclear Engineering (3) Problems related to recent developments and practice. Prereq: Senior standing and consent of instructor. May be repeated. Maximum 6 hrs.

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

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

511-12 Transport Processes in Nuclear Engineering (3) Rheology of Newtonian and non-Newtonian fluids; integral and system conservation equations for single and multi-component fluids; in-depth development of differential conservation equations for mass, energy, and momentum; exact and approximate solutions of equations of motion; boundary layer analysis; numerical analysis of fluid flow and heat transfer.

521 Nuclear Systems Dynamics and Control (3) Introduction to state variable methods for system dynamics and control analysis and application of these methods to nuclear reactor dynamics, simulation and control problems.


541 Reactor Fuel Management (3) Topics relative to in-core fuel management. Applicable topics in reactor physics, fuel depletion, isotopic inventories, reactivity control and numerical methods. Prereq: 401.


543 Selected Topics in Nuclear Criticality Safety (3) Criticality safety computational and experimental methods for enrichments, fabrication, storage, reprocessing, and transport applications; overview of safety practices and regulatory requirements. Prereq: 421 or consent of instructor.

550 Nuclear Instrumentation (3) Physics of electron and gamma interactions with matter and mechanisms of energy loss; methods of radiation detection, internal and external radiation dosimetry, chemical and biological effects of radiation; regulations and standards. Prereq: Introduction to Nuclear Engineering and Differential Equations I or equivalents.

552 Radiation Monitoring and Dose Assessment (3) Methods for work-area and environmental monitoring; dose assessment; pathways analysis; risk projections and regulations. Prereq: 551.

561 Plasma Diagnostics I (3) (Same as Electrical Engineering 561.)

567 Reactor Theory and Design (3) Analytical and numerical techniques for neutronics modeling of nuclear systems, forward and adjoint Boltzmann transport equation, Multidiffusion theory, core analysis methods and codes. Prereq: 401 or consent of instructor.

572 Nuclear System Design (3) Design and analysis of a nuclear system, interface with non-nuclear aspects of system design: system reliability and economics; project. Prereq: 571 or consent of instructor.

575 Applied Artificial Intelligence (3) Symbolic methods for artificial intelligence systems with focus on application to engineering problems. Prereq: Consent of instructor. (Same as Mechanical and Aerospace Engineering 575.)

576 Expert Systems in Engineering (3) Application of expert systems in engineering for: developing expert systems, programming, advanced topics. Prereq: 575 or consent of instructor. (Same as Mechanical and Aerospace Engineering 576.)

577 Neural Networks in Engineering (3) Neural network technology for use in intelligent systems; rationale for neural computing, structure of neural computing systems, programming, Prereq: Consent of instructor. (Same as Mechanical and Aerospace Engineering 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.)


582 Monte Carlo (3) Analysis of radiation transport problems in radiation shielding by Monte Carlo method, development of MOC and MCNP packages, evaluation of integrals, analog transport techniques, determination of variance reduction, forward and adjoint modes of analysis, importance function biasing, splitting/weight window, variance reduction techniques, and convergence theory. Prereq: 581.

585 Process System Reliability and Safety (3) Qualitative and quantitative techniques for assessing and improving process systems reliability and safety. Fault tree analysis and associated dependent failure analysis. (Same as Chemical Engineering 585.)

588 Measurement Science I (3) Principles of measurement, introduction to measuring devices. Prereq: Consent of instructor. (Same as Mechanical and Aerospace Engineering 588.)

589 Measurement Science II (3) Modern industrial measurement systems, advanced topics in measurement. Prereq: 588. (Same as Aviation Systems 589 and Engineering Science 589.)

589 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 senior level 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) 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 and Aerospace Engineering 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 Thomas, Director of Ph.D. Program
Martha Alligood, Director of MSN Program

Professors:
Alligood, Martha R. (Liaison), Ph.D. ...... New York
Dwyer, Theresa, Ed.D. .............. Tennessee
Fano, Mildred M., Ph.D. ............ Vanderbilt
Jolly, Mary Lue, Ed.D. ............... Kentucky
McGuire, Sandra, Ed.D. .......... Tennessee
Modcrn-McCarty, Mary Anne, Ph.D. ...... Tennessee
Smith, Helen, Ph.D. ................. Maryland
Tuck, Inez, Ph.D. .... North Carolina (Greensboro)
Wallace, Debra C., Ph.D. .... South Carolina

Associate Professors:
Bowen, Sheila, Ph.D. .............. Tennessee
Davis, Mitzi, Ph.D. ............... Tennessee
Droppleman, Patricia G., Ph.D. ....... Tennessee
Dwyer, Theresa, Ed.D. ........ Tennessee
Fano, Mildred M., Ph.D. ........... Vanderbilt
Jolly, Mary Lue, Ed.D. .............. Kentucky
McGuire, Sandra, Ed.D. .......... Tennessee
Modcrn-McCarty, Mary Anne, Ph.D. ...... Tennessee
Smith, Helen, Ph.D. ................. Maryland
Tuck, Inez, Ph.D. .... North Carolina (Greensboro)
Wallace, Debra C., Ph.D. .... South Carolina

Assistant Professors:
Brown, Alie J., M.S.N. .... Alabama (Birmingham)
Conlon, Kathleen P., M.S.N. .... SUNY (Buffalo)
Evans, Ginger W., M.S.N. ....... Tennessee
Evans, Maude M., M.S.N. ....... Tennessee
Fox, Marie X., M.S.N. ........... Maryland
Helton, Sally M., M.S.N. ....... Texas Women's Kollmar, Mary Ph., M.D. ...... Tennessee
Pierce, Margaret, M.S.N. ....... Tennessee
Pullen, Lisa, Ph.D. .............. Mississippi State

THE MASTER'S PROGRAM

The College of Nursing offers the Master of Science in Nursing degree with concentrations in adult health nursing, family nurse practitioner, mental health nursing, nursing administration, and nursing of women and children.

Admission Requirements
1. Meet requirements for admission to the Graduate School.
2. Hold a Bachelor's degree in Nursing from a National League for Nursing accredited program or complete the equivalent of an upper division undergraduate major in nursing in addition to meeting all M.S.N. degree requirements.
3. Have an undergraduate GPA of 3.0 or higher or a GPA of 3.3 for courses in the undergraduate major.
4. Submit scores of the general portion of the Graduate Record Examination.
5. Submit Graduate Program Data Form.
6. Submit Graduate School Rating Forms from three individuals familiar with the applicant's current work performance or academic aptitude.
7. New students normally are admitted to the program only at the beginning of fall semester. However, under special circumstances and on a space available basis, a B.S.N. graduate may be admitted at the beginning of spring or summer terms in a temporary non-degree status. Applications for fall admission must be received by February 1.

Special Requirements
1. Each student must hold personal professional liability insurance.
2. Registered nurses must be licensed to practice nursing in Tennessee.
3. Each student must present proof of hepatitis B vaccination and rubella and rubeola immunization or sufficient titer for immunity; TB status.
4. Each student must present evidence of current 2-person CPR certification.
5. Non-registered nurse students must have completed courses in chemistry, nutrition, microbiology, anatomy, and physiology plus 12 semester hours of behavioral science courses.

Thesis and Non-Thesis Options
The thesis option is available for interested students and is especially encouraged for those who are considering pursuit of doctoral degrees sometime in the future. Students who choose the non-thesis option must register for 580 Nursing Project or 582 Supervised Research.

Program Requirements
All students must complete a minimum of 36 semester hours distributed as follows:

Core (12 credits)
503-04 Advanced Clinical Reasoning I, II 6
510 Theoretical Foundations of Nursing 3
520 Advanced Practice Nursing and Health Delivery Systems 3

Research (9-12 credits)
551 Nursing Research: Methods, Design & Analysis 3
500 Thesis 6
590 Nursing Project 3
582 Supervised Research 3

Concentration (12 credits)—choose one
550-31 Adult Health Nursing I, II 12
540-41 Family Nurse Practitioner I, II 12
550-51 Nursing of Women and Children I, II 12
560-61 Mental Health Nursing I, II 12
590-91 Nursing Administration I, II 12

Elective (3 credits)—waived for those who choose thesis option 3

Students who enter the program as non-RNs must complete the following undergraduate nursing courses in addition to meeting the requirements listed above:

301 Clinical Pharmacology 3
302 Introduction to Professional Nursing 5
304 Nursing Assessment and Health Promotion 4
306 Health Deviation Concepts I 3
316 Health Deviation Concepts II 4
330 Nursing of Adults 6
414 Community Mental Health Nursing 6
415 Family/Community Health Nursing 6
431 Nursing of Children 4

Registered nurses whose bachelor's degrees are not in nursing must have completed courses in chemistry, nutrition, microbiology, anatomy, and physiology plus 12 hours of behavioral science courses. They must also complete 305, 313, 332, 403 and 433 and complete or successfully challenge the following:

301 Clinical Pharmacology 3
304 Nursing Assessment and Health Promotion 4
306 Health Deviation Concepts I 3
316 Health Deviation Concepts II 4
331 Nursing of Adults 2
402 Family Health Nursing Theory 3
412 Psychosocial Long Term Nursing Theory 3
432 Nursing of Children Theory 2

Final Examination Requirements
All students must successfully complete a final examination as required by The Graduate School. For thesis students, the examination will consist of an oral defense of the thesis as well as other written or oral questions designed to measure student mastery of the entire program of study. For non-thesis students, the written examination will cover the entire program of study and may, at the discretion of the student's committee, be followed by an oral examination.

Special Policies
1. If the clinical performance of any student for any course is found to be unsatisfactory, the student will receive a grade of "F" for the course.
2. If a student achieves a final grade of "D" or "F" for any required undergraduate or graduate nursing course, he or she will not be permitted to repeat the course and will be required to withdraw from the program.
3. If the clinical performance of any student is characterized by unethical, unprofessional or unsafe behavior, or behavior that places the client in jeopardy, the student will be required to withdraw from the program.

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,
Admission Requirements

1. Meet requirements for admission to The Graduate School.
2. Hold a master's degree in nursing from a program accredited by the National League for Nursing. Most outstanding applicants who are prepared at the bachelor's level may be considered. In such cases, graduate level courses in nursing theory, concentration specialty, and/or research will be integrated into the formal program of doctoral degree requirements.
3. Have a minimum cumulative graduate grade-point average of 3.3 on a 4.0 scale for previous college work.
4. Have a cumulative score of at least 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 at least 550 if native language is not English.
7. Complete Graduate Program Data Form, College of Nursing.
8. Submit Graduate School Rating Forms from three college level instructors and/or nurses and administrators who have supervised applicant's professional work.
9. Submit a sample of scholarly writing (e.g., thesis, published paper).
10. Submit an essay describing personal and professional aspirations.
11. Submit Graduate Application for Admission, academic transcript(s), Graduate Record Examination scores, and, if required, TOEFL scores to the Graduate School.
12. Submit Graduate School Rating Forms, sample of scholarly writing, and Graduate Program Data Form with essay to the Director of the PhD program prior to February 15.

Program Requirements

The following courses are required for all students:

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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>620</td>
<td>Directed Research</td>
<td>3</td>
</tr>
<tr>
<td>601-2</td>
<td>Theory Analysis &amp; Construction I, II</td>
<td>6</td>
</tr>
<tr>
<td>605-6</td>
<td>Nursing Research Seminar</td>
<td>4</td>
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<tr>
<td>607</td>
<td>Qualitative Nursing Research</td>
<td>3</td>
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<tr>
<td>608</td>
<td>Quantitative Nursing Research</td>
<td>3</td>
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<td>609</td>
<td>Research Practicum</td>
<td>3</td>
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<tr>
<td>610</td>
<td>Nursing Science Seminar</td>
<td>2</td>
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<tr>
<td>611</td>
<td>Advanced Nursing Seminar</td>
<td>2</td>
</tr>
<tr>
<td>612</td>
<td>Health and Nursing Policy/Planning</td>
<td>3</td>
</tr>
<tr>
<td>614</td>
<td>Nursing Preceptorship</td>
<td>3</td>
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<td>---</td>
<td>Statistics</td>
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<td>Cognates</td>
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--- Electives ---

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<th>Course Code</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>600</td>
<td>Dissertation</td>
<td>24</td>
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</tbody>
</table>

*Note: A minimum of 1 hour per semester must be taken for 4 semesters.

Possible cognate areas include, but are not limited to, anthropology, child and family studies, psychology, education, management, medical ethics, public health, social work, philosophy, and statistics.

Doctoral Committee

Early in the student's program, a nursing faculty advisor will be selected by the student in consultation with the program director. The student's comprehensive examination committee consists of the faculty teaching core courses and one representative from the cognate area. The student then selects the dissertation committee. Five faculty holding the rank of assistant professor or above comprise the committee, three of whom (including the chair) must be approved by the Graduate Council to direct doctoral dissertations. At least two members of the committee must be from an academic unit other than nursing.

Special Policies

1. A maximum of 6 graduate hours taken before acceptance into the doctoral program may be applied toward the degree.
2. Minimum grades of B in all nursing doctoral courses and a 3.0 cumulative GPA are required for completion of the program.

MINOR IN GERONTOLOGY

Graduate students in the College of Nursing may pursue a specialized minor in gerontology. This interdepartmental/interdisciplinary minor provides the student an opportunity for combining the knowledge about aging in American society with his/her major concentration. Please refer to Human Ecology for specific requirements.

ACADEMIC COMMON MARKET

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

GRADUATE COURSES

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>Thesis (1-15)</td>
<td>1P/1N only.</td>
</tr>
</tbody>
</table>

501 Nursing Research: Methods, Design, and Analysis (3) Basic principles of research in application to clinical questions; critical evaluation of nursing and health-related research. Prereq: coreq: 510, graduate level statistics. F,Sp

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

503 Advanced Clinical Reasoning I (3) Principles of health promotion, education, and innovative strategies for achievement of health; health habits, psychological cultural, and other dimensions of whole person as related to risks for lifestyle diseases. F

504 Advanced Clinical Reasoning II (3) Development of advanced clinical reasoning skills for assessment of client health status and needs; physiological and pathophysiological concepts as dimensions of whole person. Implications for therapeutic nursing interventions. Prereq or coreq: 503. F

505 Advanced Clinical Pharmacology (3) Pharmacological agents utilized to treat common, recurrent health problems; indications, contraindications, side and interactive effects of commonly prescribed drugs. Preq: 301 or equivalent or consent of instructor. F

509 Graduate Seminar in Public Health (1) (Same as Public Health 509; Exercise Science 530, Nutrition 506, and Social Work 509.)

510 Theoretical Foundations of Nursing (3) Historical evolution of nursing science; nursing's epistemological and selected philosophies, conceptual models and theories as structures which guide clinical thinking in analysis, reasoning, and decision making for advanced practice nursing. F,Sp


531 Adult Health Nursing II (6) Continuation of 530. Delivery, provision, and management of health care for adult groups and communities. Preqs: 530. Didactic (2) and practicum (4). F


543 Nurse Practitioner (9) Exploration and application of advanced nursing concepts in the clinical management of common and chronic health problems. Role, function and patient interaction in the delivery of holistic care. Preq: 540. Didactic (2) and practicum (4). F,Sp

550 Nursing of Women and Children I (6) Advanced practice nursing for women and children; clinical experiences in role of nurse practitioner or clinical nurse specialist in a variety of settings. Preq: 540. Preq or coreq: 501, 504. Didactic (2) and practicum (4). F


552 Parent Child Nursing Field Work and Seminar (5) Seminar and interactive clinical practicum designed to facilitate further development of specialized knowledge and skills utilized for advanced practice child nursing. Preq: 550. Preq or coreq: 501, 504. Didactic (2) and practicum (4). F


559 Nurse Midwifery Seminar I (6) Exploration of art and science of midwifery, nature and scope of midwifery practice, professional and ethical issues in advanced practice. Preq or coreq: 501, 510. F

560 Nurse Midwifery Seminar III (6) Exploration of psychological, developmental, and sociocultural theories related to individual and family patterns of illness and wellness. Role of nurse-midwife in advanced prac-

608 Quantitative Nursing Research (3) Exploration and analysis of philosophical bases, theoretical implications, methods, and data analyses of quantitative nursing research. Prereq or coreq: Grade level statistics course.

609 Research Practicum (1-3) Supervised individual or group research experience under guidance of faculty. 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 a selected focus area within nursing science. Prereq: Admission to doctoral program in nursing or consent of instructor. Sp

611 Advanced Nursing Seminar (2) Exploration of historical and current issues of interest to doctoral prepared nurses. F

612 Health and Nursing Policy/Planning (3) Policies affecting nursing education and practice; health policies and political processes; interactions between health professionals, consumer groups, and government in health policy development and health planning activities.

613 Nursing Management of Complex Systems (3) Contemporary organizational and management theories and techniques needed for effective administrative leadership in nursing education, practice, research, and entrepreneurial settings.

614 Nursing Preceptorship (3) Individually designed preceptorship, field, or internship experiences in various administrative, educational, research, or clinical practice settings. Prereq: 501, 520. F

620 Directed Research (3) Exploration of theoretical considerations and research methodologies in nursing research with completion of study under faculty guidance. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. Sp

### Nutrition

(College of Human Ecology)

#### MAJORS

- **DEGREES**
  - Nutrition
  - Foodservice and Lodging Administration
  - Human Ecology

**Professors:**
- Beauchesne, Roy E. (Emeritus), Ph.D.
- Carruth, Betty Ruth, Ph.D.
- Dill, Dileep S., Ph.D.
- Illinois
- Skinnar, Jean D., Ph.D.
- Oregon State
- Smith, John T. (Emeritus), Ph.D.
- Missouri
- Zemel, Michael (Liaison), Ph.D.
- Wisconsin

**Associate Professors:**
- Alam, Youssri, Ph.D.
- Bailey, James W., Ph.D.
- Iowa State
- Brooks, M. D. (Memphis), M.S.
- Alabama
- Costello, Carol, Ph.D.
- Tennessee
- Haughton, B., Ed.D.
- Columbia

**Assistant Professors:**
- Bittle, Joyce (Memphis), Ph.D.
- Chencarich, Judith (Memphis), M.S.
- McGrath, M. (Liaison), Ed.D.
- Moustaif, Naima, Ph.D.
- Paris
- Whelan, Jay, Ph.D.
- Penn State

**Young, Katherine A.**, J.D. — California Western School of Law

**Zemel, Paula, Ph.D.** — Wayne State University

**Jones, K., MBA** — East Texas State University

### ADMISSION REQUIREMENTS

A final file for review includes the Graduate School application form, Graduate Record Examination (GRE) scores for the general section, and three Graduate School Rating Forms completed by individuals who can attest to the applicant’s potential for graduate education. Forms may be obtained from the Department Office, 229 Jessie Harris Building, University of Tennessee, Knoxville, TN 37996-1900.

Admission into any of the graduate programs in the department is dependent on completion of undergraduate courses that give the necessary background for success in the graduate program. For programs in Nutrition, essential undergraduate courses include: general and organic chemistry, physiological chemistry, human ecology, and psychology. Applicants to all programs with related work experience may be given preference.

### THE MASTER’S PROGRAM

Students may choose a thesis or non-thesis option in Nutrition or Foodservice and Lodging Administration. Attendance at HRA 537 (Foodservice and Lodging Administration) or NTR 540 (Nutrition) is required every semester.

**Nutrition**

**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 applied instruction in foodservice and nutrition 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.

Foodservice and Lodging Administration

Thesis Option: The program consists of a minimum of 33 hours with at least 16 hours of coursework in the department. HRA 537, 546, NTR 541 and 3 hours of graduate-level statistics are required. Six hours of Thesis 500 are required. Six hours outside the department are recommended. A minimum of 22 hours at the 500 and 600 level is required.

An oral comprehensive examination is required upon completion of the thesis.

Non-Thesis Option: The program consists of a minimum of 36 hours with at least 20 hours of coursework in the department. HRA 537, 546, NTR 541 and 3 hours of graduate-level statistics are required. 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.

THE PH.D. CONCENTRATIONS

Nutrition Science

The nutrition science concentration enables students to study the science of nutrition from the cellular level to the application of nutritional principles by people in a changing environment. The doctoral program emphasizes human nutrition, nutritional epidemiology, experimental nutrition, and intermediary metabolism. Cognate areas may include anthropology, biochemistry, chemistry, communications, education, food technology, human development, physiology, public health, sociology, statistics, and 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. Professional seminar, HE 610;
5. Six hours of statistics;
6. Six hours in a cognate area;
7. Nine hours at the 600 level;
8. 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.

Consumer Environments

Students enrolled in the Ph.D. program with a concentration in consumer environments are provided with a foundation of coursework relevant to understanding the consumer in the designed environment and management of facilities. From this base, students in foodservice and lodging administration focus on areas of specialization in foodservice systems and in lodging administration to further theory and the application of theory in the field. For further information, see consumer environments concentration under Human Ecology.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S. program in Foodservice and Lodging Administration is available to residents of the states of West Virginia. The M.S. program in Nutrition is available to residents of Arkansas or Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records. For the Ph.D., see Human Ecology.

Nutrition

GRADUATE COURSES

414 Nutrient-Drug Interactions (2) Nutrient effects on efficacy and toxicity of drugs; drug effects on absorption and metabolism of nutrients. Prereq: Fundamentals of Nutrition or equivalent. Sp, A

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

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

508 Culture, Food, and Nutrition (3) Food-related behavior of individuals and groups in United States, Sociocultural, economic, and technological influences. Nutrition and food surveys, public policy, Prereq: Nutrition for Educators or Advanced Nutrition or consent of instructor. F, A

509 Graduate Seminar in Public Health (1) Same as Public Health 509, Exercise Science 509, Nursing 509 and Social Work 509. E

511 Advanced Physiological Chemistry (4) Bioenergetics, flux control and hormonal interrelationships. Prereq: Advanced Nutrition or equivalent. F


513 Community Nutrition I (3) Orientation to community; assessment of nutrition problems, needs, and resources; functional roles of public health nutritionist. Concurrent field experiences. Prereq: Advanced Nutrition or consent of instructor. F

514 Community Nutrition II (3) Planning, implementation, and evaluation of public health nutrition programs. Concurrent field experiences. Prereq: 513 or consent of instructor. Sp

515 Field Study in Community Nutrition (1-12) Personal participation in and analysis of state or regional community nutrition program. Location of in-depth study to be selected in consultation with instructor. Prereq: 513, 514, and consent of instructor. S/N only. Su

516 Maternal and Child Nutrition (3) Nutrition principles related to growth and development during pregnancy, infancy, and childhood to age 5, high risk conditions. Prereq: Advanced Nutrition or consent of instructor. F

517 Childhood and Adolescent Nutrition (3) Application of nutrition principles to school age children; effects of disease on growth and development; nutritional assessment and counseling for nutrition. Prereq: Advanced Nutrition or consent of instructor. Sp, A

518 Nutrition and Aging (3) Nutritional problems of adults; nutritional requirements, dietary intakes; affects of nutrition on biological aging. Prereq: Advanced Nutrition or consent of instructor. Su

520 Nutritional Ecology (2) Examination of issues in natural, political, physical, and social environments that impact availability of food and nutrients in U.S. food supply. F, A

521 Physiological Basis for Diet and Disease (2) Altered nutrient needs as result of metabolic changes that occur in selected disease states. Prereq: Nutrition in Disease or consent of instructor. Sp

522 Nutrition Counseling (2) Individual eating habits and disorders, evaluation strategies for effectiveness of helping process. Prereq: Nutrition in Disease or consent of instructor. F, A

524 Nutrition Education: Principles, Implementation, and Evaluation (3) Conceptual models, principles, application, and evaluation models in nutrition education research. Prereq: 508 or consent of instructor. Su, A

540 Seminar in Nutrition (1) May be repeated. S/N only. E

541 Research Methods (1) Basic principles of planning, conducting, and interpreting nutrition and foodservice systems administration research. Prereq: 6 grad hours in nutrition and food service administration and statistics. Sp

542 Advanced Experimental Nutrition (3) Application of research principles to individual project using experimental animals. Prereq or coreq: 541, Sp

544 Food and Nutrition Survey Methods (2) Project for assessment of food consumption, nutrient intake, nutritional status, and sociocultural economic parameters in populations. Prereq or coreq: 541. Sp

547 Field Experience (3-9) Experience in food-related industry or agency under supervision of faculty member. Prereq: Consent of instructor. S/N only. E

548 Directed Study in Nutrition (1-3) Advanced study in nutrition. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

549 Special Topics (1-3) Recent advances in nutrition or food systems administration. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

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

602 Advanced Topics in Nutrition Science (1-3) Comprehensive individual study and group discussion of topics related to current problems in nutrition. Prereq: 512 or consent of instructor. May be repeated. F

603 Current Trends in Food and Sociocultural Change (2) Critical evaluation of research. Prereq: 508 or consent of instructor. F

Hotel and Restaurant Administration

GRADUATE COURSES

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

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

530 Computer-Assisted Foodservice and Lodging Management (3) Application of computer technology to foodservice and lodging industry; Inventory, cost accounting, production, nutrient analysis, room management, and sales planning and analysis. Prereq: Quantity Food Procurement, Production and Service, Microcomputer Applications or consent of instructor. F, A

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

532 Advanced Human Resource Management (3) Identifying labor needs; development and maintenance of work force. Prereq: Food and Lodging Personnel Development or consent of instructor. F, A

533 Advanced Food Production and Delivery Systems Management (3) Individuals and groups in food production and delivery systems; application of quantitative methods and models to optimize decisions. Prereq: Quantity Food Procurement, Production and Service or consent of instructor. F

534 Special Topics in Foodservice and Lodging Administration (1-3) Lecture/discussion format. Con-
Ornamental Horticulture and Landscape Design

(College of Agricultural Sciences and Natural Resources)

MAJOR DEGREE

Ornamental Horticulture and Landscape Design .......................... M.S.

Don B. Williams, Head

Professors:

Callahan, L. M., Ph.D. .................................. Rutgers
Creater, G. Douglas, Ph.D. .................................. Ohio State
Graham, E. T. (Emeritus), Ph.D. .................. Penn State
Grashoff, Peter M. (Rachelle Chair of Excellence), Ph.D. .......... Australian National McDaniel, G. L., Ph.D. .................................. Iowa State Williams, Don B., Ph.D. ....................... Penn State

Associate Professors:


Trigiano, R., Ph.D. ............................... NC State Witte, Willard T. (Liaison), Ph.D. .............. Maryland

Assistant Professor:

Hamilton, Susan, Ed.D. ........................... Tennessee Menendez, Garry, M.S. ............. Tennessee State Starman, Terri W., Ph.D. .............. Texas A&M

The Department of Ornamental Horticulture and Landscape Design offers the Master of Science with concentrations in floricultural science and technology, nursery science and technology, or turfgrass science and technology. Various interests may be emphasized in any of these commodity areas, including micropropagation, innovative production and maintenance systems, computer-aided management systems, and the molecular biology, genetics, histology and stress physiology of ornamentals. For admission, the student must have a B.S. in ornamental horticulture, horticulture, plant science, or a related agricultural or basic science discipline. Undergraduate transcripts must be evaluated by the department for prerequisite requirements, if any. Graduate research assistantships are available on a competitive basis. For further information, contact the department head.

THE MASTER'S PROGRAM

Thesis Option

1. A thesis is required. A master's committee of no fewer than 3 faculty members will be selected. Prior to research for the thesis, a proposal must be approved by the master's committee. Registration for 6 hours of Thesis 500 is required.

2. In addition to the thesis requirement, a minimum of 24 hours of graduate credit is required. Not more than 10 hours of minimum 300 classes can be below the 500 level. The academic program must be approved by the master's committee, which may require additional coursework if the student's progress or background indicates the need.

3. All students are required to include 510 Research Methods and 2 hours of 590 Seminar in their program and are expected to attend this course and participate in discussions each semester enrolled.

4. Twelve hours of coursework in the major must be at the graduate level, exclusive of Thesis 500.

5. An oral examination covering the thesis and coursework is required.

Non-Thesis Option

1. A master's committee of no fewer than 3 faculty members will be selected.

2. Thirty-hour courses of graduate coursework are required of which 22 hours must be at the 500 level or above.

3. All students are required to include 2 hours of 590 Seminar in their program and are expected to attend this course and participate in discussions each semester enrolled.

4. Twelve hours of coursework in the major must be at the graduate level.

5. Final comprehensive written and oral examinations shall be taken upon completion of no fewer than 32 hours of approved graduate work.

GRADUATE COURSES

410 Nursery Management and Production (3) Modern management methods as applied to the production of ornamental plants and trees, plant propagation and utilization. Important practices include nursery layout, soil preparation, irrigation, pest control, plant development, and economics. Prereq: 220, 330, and Plant and Soil Science 471, or consent of instructor. 2 to 3 hrs and 1 lab. Sp.


440 Advanced Turfgrass Management (4) Principles and scientific basis of turfgrass deterioration: adaptation, ecology, physiology, soil fertility, and pest management. Prereq: 520 or consent of instructor. F.

480 Advanced Landscape Design (4) Comprehensive application of landscape design skills. Design applications involving site layout, landscape grading, applied landscape construction, planting design. Analysis, problem solving, design, detailing, estimation, and applying applicable to a variety of landscape projects. Prereq: 220, 330, and 350, or consent of instructor. 2 to 3 hrs. Sp.

485 Computer Aided Landscape Design (3) Overview of drafting and design (CAD). Site planning and construction of related landscape plan view and 3-D drawings. Introduction to operating systems; techniques on utilization of AutoCAD and LANDCAD software. Prereq: Fundamentals of Landscape Design, Microcomputer Applications to Problem Solving or consent of instructor. 2 to 3 hrs. F.

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

501 Special Topics in Ornamental Horticulture and Landscape Design (1-3) Topics to be assigned. May be repeated. Maximum 5 hrs. Prereq: Consent of instructor. E.


510 Research Methods in Ornamental Horticulture and Landscape Design (2) Literature review; research proposal writing; use of computers for word processing, data entry, statistical analysis, and graphics production. Prereq: 220, 330, and Plant and Soil Science 471, or consent of instructor. F.

511 Plant Disease Fungi (4) (Same as Entomology and Plant Pathology 510.)

550 Plant Microtechnique (3) (Same as Botany 451.)

560 Plant Tissue Culture (3) (Same as Botany 451.)

570 Physiology and Development of Ornamental Plants (3) Physiological and metabolic structures in ornamental, forest, and crop species. Prereq: 8 hrs biological/botanical sciences and consent of instructor. 1 hr and 2 labs. Su.

570 Plant and Soil Science 471 (3) (3) Practical light and scanning electron microscopy methods for investigating aspects of plant development. Analysis of plant growth and development of plant reflectance and pathological structures in ornamental, forest, and crop species. Prereq: 8 hrs biological/botanical sciences and consent of instructor. 1 hr and 2 labs. Su.

580 Plant and Soil Science 471 (3) Practical light and scanning electron microscopy methods for investigating aspects of plant development. Analysis of plant growth and development of plant reflectance and pathological structures in ornamental, forest, and crop species. Prereq: 8 hrs biological/botanical sciences and consent of instructor. 1 hr and 2 labs. Su.

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Pathology
See College of Veterinary Medicine and Comparative and Experimental Medicine

Philosophy
(College of Arts and Sciences)

MAJOR DEGREES

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<th>Philosophy ..........................................................</th>
<th>M.A., Ph.D.</th>
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Kathleen Bohstedt, Head

Professors:
Aguil, Richard E., Ph.D. ...................................... Northwestern
Brenkert, George G., Ph.D. ..................................... Michigan
Cebik, L. B., Ph.D. .............................................. Nebraska
Davis, John W. (Emeritus), Ph.D. ................................ Emory
Edwards, Rem B., Ph.D. ........................................... Emory
Graber, Glenn C., Ph.D. .......................................... Michigan
Nelson, James L., Ph.D. ......................................... SUNY (Buffalo)
Postow, Betty C., Ph.D. ............................................ Yale
Van de Vate, Dwight, Jr., Ph.D. .............................. Yale

Associate Professors:
Bennett, James O., Ph.D. ......................................... Tulane
Bohstedt, Kathleen Emmett (Liaison), Ph.D. ................. Ohio State
Cohen, Sheldon M., Ph.D. ........................................... Northwestern
Nolt, John E., Ph.D. ................................................ Ohio State
Osborne, Martha Lee, Ph.D. ...................................... Tennessee

Assistant Professors:
Baylis, Francoise, Ph.D. .......................................... Western Ontario
Hamlin, H. Phillips, Ph.D. ......................................... Georgia

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 concentrations 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 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 credit if credit for it has been received in another department.

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.

THE DOCTORAL PROGRAM

Students must hold an M.A. with a major in Philosophy or an equivalent degree when entering the Ph.D. program. Twenty-seven hours of coursework beyond the M.A. is required, of which 6 hours will be in courses numbered above 600. See the Philosophy Department Graduate Student Procedures for specific course requirements.

Students must demonstrate a reading knowledge of one foreign language, normally a living language in which there exists a significant body of philosophical literature. (In special circumstances relating to the area of dissertation research, the Graduate Committee may approve a language not satisfying these conditions.) This may be done by passing the doctoral language examination given by the appropriate department, if available, or by passing French 302 or German 302 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 either the Director of Graduate Studies in Philosophy or the Department of Religious Studies.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.A. and Ph.D. programs in Philosophy are available to residents of the states of Alabama, West Virginia, Kentucky, Texas, or Virginia (concentration in medical ethics only); the Ph.D. program to residents of Louisiana, or Mississippi; and the M.A. program to residents of Oklahoma (concentration in medical ethics only). Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE COURSES

400 Special Topics (S) May be repeated when topic varies. Maximum 6 hrs.
411 Modern Religious Philosophies (S) (Same as Religious Studies 411)
412 Classical Indian Systems of Philosophy: The Moksha Tradition (S) (Same as Religious Studies 412)
420 Topics in History of Philosophy (S) May be repeated when topic varies. Maximum 6 hrs.
425 American Philosophy (S) Colonial to early 20th Century. Maximum 6 hrs.
440 Contemporary Ethical Theory (S) Topics in metaphysics and ethics. Maximum 6 hrs.
446 Theoretical Issues in Medical Ethics (S) Maximum 3 hrs.
450 Philosophy of Science (S) Methodological and conceptual issues in natural and social sciences. Maximum 3 hrs.
465 Philosophy of History (S) Speculative and critical aspects of philosophy of history. Maximum 3 hrs.
473 Philosophy of Mind (S) Problems of mind and body in relation to consciousness and personal identity. Maximum 3 hrs.
475 Analytic Metaphysics and Epistemology (S) Topics in metaphysics and epistemology in recent Anglo-American tradition. Maximum 3 hrs.
479 Studies in Recent Continental Philosophy (S) Selected thinkers or topics: existentialism, phenomenology, hermeneutics, structuralism, post-structuralism. Maximum 3 hrs.
500 Thesis (1-15) P/NP only. E
502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. Maximum 6 hrs.
520 Topics in Ancient or Medieval Philosophy (S) Intensive critical work on major philosopher or school. Maximum 3 hrs.
522 Topics in Modern Philosophy (S) Intensive critical work on major philosopher or school. Maximum 3 hrs.
524 Topics in Twentieth-Century Philosophy (S) Intensive critical work on major philosopher or school. Maximum 3 hrs.
528 Topics in Contemporary Philosophy (S) Intensive critical work on themes in late 20th-century philosophy. Maximum 3 hrs.
540 Topics in Ethics or Value Theory (S) May be repeated. Maximum 3 hrs.
542 Topics in History of Ethics (S) May be repeated. Maximum 3 hrs.
544 Topics in Applied Ethics (S) Single author, tradition, or topic in ethical theory, application to issues in health, business, technology, ecology, and other practical fields. May be repeated. Maximum 3 hrs.
546 Orientation to Medical Ethics (S) Survey of ethical theories in application to issues in medical ethics. Maximum 3 hrs.
547 Ethical issues in Mental Health (S) Values in "mental health" and "mental illness," informed consent in psychiatry, competence, patients' rights, involuntary hospitalization and treatment, and behavior control therapies. Maximum 3 hrs.
548 M.A. Clinical Practicum (S) Series of clinical rotations at one or more local health care institutions. May be repeated. Maximum 3 hrs.
Physics and Astronomy

(College of Arts and Sciences)

MAJOR DEGREES

Physics M.S., Ph.D.

William M. Bugg, Head

Professors:

Barnes, F. E., Ph.D. ................. California
Bingham, C. R., Ph.D. .............. Tennessee
Bliss, W. E., Ph.D. ................. Michigan State
Brezaize, M. A. (Emeritus), Ph.D. ............... Michigan State
Breinig, M., Ph.D. .................. Oregon
Bugg, W. M., Ph.D. ................ Tennessee
Burgdoerfer, J. (Distinguished Prof.), Ph.D. ............... Freie Universitat Berlin
Calvoci, T. A., Ph.D. ............... Purdue
Childers, R. W., Ph.D. ............. Vanderbilt
Christophorou, L. G., Ph.D. ........ Manchester

Condo, G. T., Ph.D. ................. Illinois
Cramer, H. W. (UTSI), Ph.D. .............. Yale
Deeds, W. E. (Emeritus), Ph.D. .... Ohio State
Eguiluz, A. G., Ph.D. ............... Brown
Elston, S. B., Ph.D. ................. Massachusetts
Fox, K., Ph.D. ....................... Michigan
Galliot, N. M. (Emeritus), Ph.D. .... Ohio State
Georgiou, S., Ph.D. ................. Manchester
Guldin, M. W., Ph.D. .............. Pennsylvania
Handler, T. H., Ph.D. .............. Rutgers
Harris, E. G. (Emeritus), Ph.D. .... Tennessee
Hart, E. L. (Liaison), Ph.D. ......... Cornell
Jacobson, H. C., Ph.D. ............. Yale
King, D. T. (Emeritus), Ph.D. ...... Bristol
Lewis, J. W. L. (UTSI), Ph.D. ...... Mississippi
Mack, J. (Distinguished Scientist), Ph.D. ............... Rensselaer
Mahan, G. D. (Distinguished Scientist), Ph.D. ............... California
Mason, A. A. (UTSI) (Emeritus), Ph.D. ............... Tennessee
McGregor, W. K. (UTSI), Ph.D. ......... Tennessee
Narazawa, W., Ph.D. ............... Warsaw
Obenshain, F. E., Jr., Ph.D. .......... Pittsburgh
Painter, L. R., Ph.D. ............... Tennessee
Pegg, D. J., Ph.D. ................ New Hampshire
Plummer, E. W. (Emeritus), Ph.D. .... North Carolina
Quinn, J. J. (Willis Lincon Chair of Excellence), Ph.D. ............... Maryland
Riedinger, L. L., Ph.D. ............. Vanderbilt
Sellin, I. A. (Distinguished Prof.), Ph.D. ...... Chicago
Shih, C. C., Ph.D. ................. Cornell
Sorensen, S. P., Ph.D. ............. Copenhagen
Strayer, M. R., Ph.D. .............. MIT
Thomas, J. R., Ph.D. ............... Duke
Thomson, J. O. (Emeritus), Ph.D. ............... California
Ward, B. F., Ph.D. ................ Princeton
Wheeler, G. W. (Emeritus), Ph.D. ......... Yale
White, J. W. (Emeritus), Ph.D. .... North Carolina

Assistant Professors:

Canright, G., Ph.D. ............... Tennessee
Daun, S. J., Ph.D. ................... Queens
Harmat, R., Ph.D. ................. Ohio State
Levin, J. C., Ph.D. ................. Oregon
Menzel, R. (UTSI), Ph.D. .......... Tennessee
Parigian, C. (UTSI), Ph.D. ......... New Zealand
Phillips, W. (UTSI), Ph.D. ........ Tennessee
Rosa, F., Ph.D. ..................... Cornell
Sanders, A. J., Ph.D. .............. Tufts
Siopis, G., Ph.D. ................. Cal Tech
Waiter, H. H., Ph.D. .......... Groningen (Netherlands)

Research Professors:

Chatterjee, L., Ph.D. .............. Jadavpur
Kamychkov, I., Ph.D. ............. ITEP (Russia)
Thonnard, N., Ph.D. .............. Kentucky
Zhang, J. Y., Ph.D. ............... Lanzhou

Research Associate Professors:

McCorde, D. L., Ph.D. ............. Tennessee
Pinnaduwage, L. A., Ph.D. ......... Pittsburgh

Research Assistant Professors:

Datskos, P. E., Ph.D. ............. Tennessee
Davis, L. (UTSI), Ph.D. ............. Auckland
Efremenko, Y. Y., Ph.D. ........ ITEP (Russia)
Mezzacappa, A., Ph.D. ............. Texas
Yost, S. A., Ph.D. ............... Princeton

Instructors:

Fairman, R. C., B.A. .............. Earlham
Riedinger, T., M.S. ............... Vanderbilt

Graduate programs leading to the Master of Science and the Doctor of Philosophy are offered in a number of concentration areas: atomic and low temperature physics, biophysics, chemical physics, elementary particle physics, health physics, heavy ion atomic physics, molecular spectroscopy, nuclear physics, plasma physics, condensed matter physics, theoretical physics, and ultrasonics.

Departmental graduate programs leading to the M.S. and Ph.D. are also available at The University of Tennessee Space Institute, Tullahoma, where opportunities for study and research are available in quantum optics and laser physics, atomic and molecular spectroscopy, fluid physics, and theoretical physics. For additional information, contact the department head.

ADMISSION REQUIREMENTS

A student who enrolls in The Graduate School with the intention of attaining an advanced degree in Physics will have completed an undergraduate major in Physics or its equivalent. Physics 311-12, 321, 361, 431-32, 421, and 411-12 constitute the minimum number of 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.

All first-year graduate students are required, for advising purposes only, to take a qualifying examination in undergraduate physics during the fall semester registration period.

THE MASTER’S PROGRAM

Thesis Option

This program is designed primarily for students intending to go into industrial or governmental laboratories as physicists. The course requirements include 24 semester hours of physics courses, of which at least 12 semester hours are taken from Physics 511-12, 521-22, 531-32, 541-42, or 571-72. Each candidate must present an acceptable thesis, 6 hours of 500, and pass an oral examination on course material and thesis.

Non-Thesis Option

This program is designed primarily for students intending to teach in colleges or universities on the elementary or intermediate level, or for students specifically intending to work toward a Ph.D. Students seeking the nonthesis option must apply to the department graduate committee for permission to enroll under this program. The requirements are the satisfactory completion of 18 semester hours of coursework, a minimum of 6 semester hours in a minor field; and 6 semester hours from other courses numbered above 400 (preferably of advanced laboratory level).
nature.) At least 20 hours must be taken at the 500 level or above. In addition, the candidate must pass a written examination administered by his/her committee.

THE DOCTORAL PROGRAM
All students are expected to take Physics 521-22, 531-32, 541-42, 551, 561, 571-72, and 611. Physics 601-02 are normally required of students specializing in atomic physics; Physics 521-22 of students in nuclear physics; Physics 562-27 of students in elementary particle physics; Physics 663-64 of students in plasma physics; Physics 681-82 of students in health physics; Physics 671-72 of students in solid state physics; and Physics 681-82 of students specializing in molecular spectroscopy.

Students specializing in chemical physics may substitute Chemistry 572 for Physics 551 and should complete at least 6 semester hours chosen from Chemistry 580, 670.

The courses Physics 531-32, 571-72, 521-22, 541-42, 561 constitute the core curriculum. They are the usual basis for the departmental comprehensive examination which is normally taken by a well-prepared student after two years of graduate study.

A reading knowledge of one foreign language is required. German or French is the best. Knowledge of other languages or abilities which may be more efficiently acquired, such as Russian or Spanish, is acceptable. A reading knowledge of Russian or French is required. German 332 or French 302 with a grade of A or B may be substituted for the corresponding language examination.

The dissertation topic will be chosen with reference to one of the fields in which research facilities can be made available either at The University of Tennessee laboratories in Knoxville; the University of Tennessee Space Institute at Tullahoma, Tennessee; the Oak Ridge National Laboratory, Oak Ridge, Tennessee; or at other research facilities used by the University faculty.

Astronomy
GRADUATE COURSES
411 Astrophysics (3) Development of analytical physical models of galactic structure of universe, stellar and interstellar matter, and planetary systems. Topical and interdisciplinary, consideration of quasars, pulsars, black holes and current developments in field. Acceptable for major credit in Physics. Prereq: Physics 252 and consent of instructor.

490 Special Topics in Astronomy (1-3) Topics of current interest in astronomy and astrophysics. Acceptable for graduate credit in physics with consent of department. May be repeated with consent of department. Maximum 9 hrs.

Physics
GRADUATE COURSES

421 Modern Optics (4) Transmission of light in uniform, isotropic media; reflection and transmission at interfaces; radiation from wave motion and interference effects. Rudiments of Fourier optics and holography. Prereq: 431, or Fundamentals of Physics: Wave Motion, Optics, and Modern Physics, or Honors: Mechanics and Heat, and consent of instructor. 3 hrs and 3 labs.


621 Modern Physics Laboratory (3,3) 461 - Introduction to fundamental and modern techniques in experimental physics, and to theory and practice of measurement and data analysis. Selected experiments in nuclear, atomic, molecular and solid state physics, and modern optics. Prereq: Electronics Laboratory and either Fundamentals of Physics: Modern Physics or 411, 462 - Advanced experiments and experimental techniques in modern physics; experimental team work. Thorough quantum mechanical interpretation of results and preparation of scientific reports. Prereq: 461, 6 hrs lab per week.

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

501 Graduate Research Participation (3) Advanced research techniques under supervision of staff research director or research group. Prereq: coinsides with interests of student. Open to all graduate students in good standing. Prereq: Consent of research director. May be repeated with consent of department. Maximum 18 hrs. S/NC only.

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

506 Experimental Methods (3) Principles, real operational behavior, and hazards of laboratory, radiodetection, photomultiplier tubes, image intensifiers, image amplifiers, electronic oscilloscopes. Prereq: Physics 351, 352 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, inversion, stimulated emission, oscillations, fluctuations and noise, laser stability; quantum theory of laser, photon coherence; mode-locking, Q-switching and frequency stabilization; specific laser types: semiconductor and solid-state, excimer, copper vapor and dye lasers.

511-12 Theoretical Physics (3,3) Classical theoretical physics, with limited use of mathematics. Prereq: 312, 432, advanced calculus, differential equations, and vector analysis.


532 Advanced Classical Mechanics (3) Variational principles, canonical transformations, Hamilton-Jacobi theory, nonlinear mechanics, elasticity, fluid mechanics. Prereq: 531.


561 The Theory of Relativity (3) Geometry of space-time, relativistic electrodynamics, particle mechanics and continuum mechanics. Einstein's field equations, Schwarzschild solution, the classical test of general relativity. Prereq or coreq: 531 and 542.


574 Group Theory for Physicists (3) Introduction to abstract group theory, discrete and continuous groups, representation theory, Noether's theorem, symmetries and degeneracies, application of group-theoretical methods to atomic physics, solid-state physics, and particle physics. Prereq: 571-72.

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

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

593 Independent Study (1-15) See Colgate 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.


605 Laser Spectroscopy (3) Application of lasers to spectroscopy of atomic and molecular systems; review of the laser, multi-pole radiation, atomic, U-3 and J-J coupling and Zeeman and Stark effects, spontaneous emission of atomic systems and oscillator strengths, selection rules of dipole and quadrupole transitions; radiation and ionization of atoms, detailed analysis of spectrometers. Experimental techniques. Study of saturated absorption spectroscopy, resonance fluorescence and strong field effects, Hanle effect, optical double resonance, optical pumping and hyperfine spectroscopy. Prereq: 521, 541, 508.
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: 531.

611 Advanced Quantum Mechanics  & Field Theory  (3) Second quantization, quantization of electromagnetic field, emission, absorption, and scattering of light, bremsstrahlung, pair creation and annihilation, quantum field theory methods in condensed matter physics, and quantum optics. Topics vary according to instructor. Prereq: 522 and 542 or equivalent. Prereq or cons: 561 or consent of instructor.

612 Advanced Topics in Quantum Field Theory  (3) Renormalization, Lévy shift, anomalous magnetic moments, gauge theories, electroweak theory, quantum chromodynamics, grand unified theories, and advanced topics in laser physics and quantum optics. Topics vary according to interest of students, instructor and present state of physics. Prereq: 561 or 611 or consent of instructor.

621-22 Nuclear Structure  (3) General properties of nucleus; two-body scattering problems; saturation and symmetry properties of nuclear force; theory of light nuclei; nuclear spectroscopy; special nuclear models; theory of nuclear reactions; theory of beta-decay. Prereq: 517-72.

625-27 Elementary Particle Physics  (3,3) 626-Survey in elementary particle physics covering experimental methods, conservation laws, invariance principles, and models of interactions. 627-Advanced topics: quark models, electroweak interactions and unification of elementary forces. Prereq: 522.

641 Advanced Topics in Classical Theory  (3) To meet special needs of students. Advanced dynamics and hydrodynamics, electromagnetic theory, statistical mechanics, or theory of nonequilibrium processes. Prereq: 522, 542, 551. May be repeated with consent of department. Maximum 9 hrs.

642 Advanced Topics in Quantum Theory  (3) To meet special needs of students. Angular-momentum theory, beta-ray theory, theory of atomic spectra, molecular structure and valence theory, theory of radiation, electric and magnetic phenomena, high energy processes, scattering and collision processes, or theory of fields. Prereq: 522. May be repeated with consent of department. Maximum 9 hrs.

643 Computational Physics  (3) Developing computer algorithms for solving representative problems in various fields of physics: celestial dynamics in astrophysics, boundary value problems in electromagnetism, atomic and nuclear structures, band structure on solid state physics, transport problems in statistical mechanics, Monte Carlo simulation of liquids, fitting and interpolation of data, correlation analysis, or optimization strategy. Prereq: 522, 531, 542, and 572.

661-62 Collision Interactions  (3,3) Interaction of electromagnetic radiation and charged particles with atoms and molecules or free particles, scattering, ionization, transport and diffusion, radiative excitation, pair production, bremsstrahlung, and stopping power. Prereq: 522.

663 Advanced Plasma Physics  (3) (Same as Electrical Engineering 663.)


681-82 Molecular Spectroscopy  (3,3) Spectroscopic methods of determining molecular properties, theoretical and experimental aspects of intra- and inter-molecular energy and charge transfer, group theoretical methods and selection rules in gases and condensed phases, normal coordinates and potential functions, vibration-rotation interaction theory, intensities, frequencies and line shapes of molecular transitions. Prereq: 532 and 542 or consent of instructor.

Planning  
(College of Architecture and Planning)

MAJOR: DEGREE
Planning ........................................... M.S.P.

David A. Patterson, Acting Director

Professors:
Johnson, David A., Ph.D. ................. Cornell
Kenney, Kenneth B., Emeritus. Ph.D. ................. North Carolina
Prochaska, J. M. (Emeritus), M.P. ............... Michigan State
House, Walter L., Emeritus, M.P. ............... Harvard
Spencer, James A., Liaison, M.P.C. ............... Ohio State

Associate Professors:
Boven, George E., M.A. ............... George Washington
Patterson, David, Ph.D. ................. Indiana

Assistant Professors:
Anderson, Annette, M.P.A. ................. Missouri (Kansas City)
Muchane, Mur, M.S.P. ............... Tennessee
Zanetta, Maria C., Ph.D. ............... Ohio State

Lecturers:
Brown, Nancy, M.S.P. ............... Tennessee
Cole, Patrice, M.S.P. ............... Tennessee
Raeae, Kristin, M.S.P. ............... Tennessee
Richardson, Keith, B.Arch. ............... Tennessee

The Graduate School of Planning offers a program of studies leading to the professional degree of Master of Science in Planning. The degree is the normal route for entry into professional positions in urban and regional planning or related positions. Graduates are candidates for positions in regional, city, county, and metropolitan planning agencies; in local, state, and federal agencies concerned with physical, economic, and administrative planning; in private business and organizations dealing with development problems; and in private consulting.

The Master of Science in Planning program is accredited by the Planning Accreditation Board, a joint undertaking of the American Institute of Certified Planners and the Association of Collegiate Schools of Planning.

THE MASTER'S PROGRAM

Admission Requirements
Applicants are to submit an application for admission to The Graduate School, and two letters of reference from faculty familiar with their prior academic work and a statement describing personal career objectives directly to the School of Planning. If the applicant has prior work experience in planning, a reference letter should also be provided by the work supervisor. Graduate Record Examination scores are requested of all applicants whose undergraduate GPA is below 3.0. Other applicants are encouraged to submit them. Students who have not taken an appropriate undergraduate statistics course will be required to take one as part of their graduate program.

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, 511, 512, 515, 520, 521, 530, 531, 532, 540 and 570.

Students should plan to enter the program in the fall term to take core courses in the proper sequence.

Each student is required to develop an area of concentrated competence beyond the core curriculum. After selecting the area of concentration, usually by the end of the second semester, the student takes a minimum number of courses or hours from a prescribed set of courses in the subject area. Further enhancement of the concentration is gained by focusing the thesis or major paper on the subject. Concentration courses are drawn from the planning curriculum and from other departments in the University. Concentrations are available in land use planning, environmental planning, real estate development planning, and transportation planning.

Students have the latitude to propose an alternate specialization consisting of at least 9 hours of coursework, subject to approval of a faculty committee.

Each student is required to demonstrate competence in individual research. This may be done in one of two ways:

Thesis Option—Complete a thesis for 6 credit hours;

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 the criteria for a major project that will include at least 6 hours of subsequent coursework. The proposal shall justify the selection of the topic, describe the approach to the study, and describe the nature of the final product. The topic will normally be expected to reinforce or complement the student's concentration.

Student academic progress is monitored by the faculty. A student failing to reach an acceptable grade-point average may be placed on probation or dismissed from the program.

ACADEMIC COMMON MARKET

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

GRADUATE COURSES

401 The City in the U.S. (3) Development and character of U.S. cities. Contemporary issues and selected case studies. (Same as Urban Studies 401.)

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, comprehen-
sive plan, implementation devices. Planning issues in society. Not for credit for M.S. degree.

446 Housing (3) Nature and demand for housing in U.S. and abroad. Use of market processes and public influences. Problems of change in housing supply, impact of new technology, and governmental programs to improve supply and quality of housing.

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


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

510 Fundamentals of Planning (2) History of planning structure and development of urban areas, operations of contemporary planning, trends and issues.

511 Graphic and Oral Communications in Planning (1)


515 Theory of Planning (2) Analysis of nature and objectives of planning process; role of planner and planning function in public decision-making. Prereq: 510 or consent of instructor.

520 Planning Research Methods (3) Overall structuring of social science research in planning practice; familiarity with structure of planning literature information sources, systematic retrieval techniques, processes and tools, practice in posing research questions relevant to planning.

521 Information Systems and Networks in Planning (3) Use and impact of computer-based information systems and global networks in planning and public management. Development of practical skills in design of planning decision support systems, databases, Internet based tools and geographic information systems (GIS). Prereq: Basic experience with computer software and hardware or consent of instructor.

523 Statistics for Planners (3) Applications of statistical techniques. Intuitive explanations and practical applications. Computer analysis to explore concepts.


526 Library Research for Planning (1) Survey of publications of interest to planners, resources and research techniques. Use of facilities and collections of library.

530 Policy and Land Use Analysis (4) Basic methods of policy analysis and planning. Concept and framework for land-use planning. Population, employment, and economic based studies, and forecasting techniques. Coreq: 520 or consent of instructor.

531 Urban and Regional Analysis (3) Past, present and possible future patterns of urban and regional structures; drawing on contemporary theories, models, and empirical research.

532 Planning Methods (4) Preparation of comprehensive plans for urban areas or regions. Development of baseline data and forecasts, formulation of alternative plans and strategies, and development of plan implementation programs. Extensive laboratory experience. Prereq: 510, 512, 520, 530 and 531 or consent of instructor.

537 Planning and Transportation (3) (Same as Civil Engineering 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, evaluation and designation of sites, legislative needs, financing and administrative organizational arrangements.

540 Legal Aspects of Planning (3) Legal basis for planning and guiding community development. Legal tools of planning. Prereq: 510 or consent of instructor.

545 Planning and Property Development (2) Process of urban physical growth and change; functioning of private sector real estate development and its relationship to planning. Partnership roles of public and private sectors in urban development and redevelopment. Prereq: 510 or consent of instructor.

547 Negotiation (1) Methods, strategies, techniques and skills useful to planners in mediation, negotiation, and dispute resolution concerning urban planning and development.

548 Tourism Planning (3) Planning of tourist resources and programs within a geographic region. Tourism planning models. Relationships among tourism, development and planning of tourist attractions and services. Application of techniques in selected area.

549 Local Fiscal Planning and Capital Improvements (3) Fiscal planning and capital improvements programming in plan implementation. Tax and expenditure limitations, infrastructure financing, municipal bond market, alternative revenue sources: development fees, excise taxes, intergovernmental aid. Economic policies.


551 State and Regional Planning (3) Theory and practice of planning at state, sub-state, and metropolitan levels.


555 Environmental Planning (3) Role of planners and planning in maintenance of balance between natural and built environment. (Same as Ecology and Evolutionary Biology 555.)

560 Policy Analysis and Strategic Planning (3) Models of policy making process and role of strategic planning and applied decision making. Quantitative and qualitative approaches, evaluation and research program and planning process, impact assessment.

570 Plan Implementation Process (1) Interactive community and governmental dynamics in plan implementation. Dynamics of change, conflict, resolution and consensus building.

590 Practicum (3) Prereq: Consent of instructor. S/NC or letter grade.

591 Special Topics (1-3) Prereq: Consent of instructor. May be repeated.

592 Readings in Planning (1-3) Prereq: Consent of instructor. May be repeated.

593 Problems in Planning (1-3) Prereq: Consent of instructor.

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

Plant and Soil Science

(College of Agricultural Sciences and Natural Resources)

MAJOR DEGREES

Plant and Soil Science .......... M.S., Ph.D.

Fred L. Allen, Head

Professors:

Allen, Fred L., Ph.D. ............... Massachusetts
Bell, Frank F. (Emeritus), Ph.D. .......... Iowa State
Bosswell, F. C. (Adjunct), Ph.D. .......... Penn State
Coffey, D. L., Ph.D. .......... Purdue
Conger, B. V. (Distinguished Prof.), Ph.D. .......... Washington State

Duck, B. N., Ph.D. .......... Auburn
Foss, John E., Ph.D. .......... Minnesota
Fribourg, Henry A., Ph.D. .......... Iowa State
Hayes, R. M., Ph.D. .......... Illinois
Josephson, L. M. (Emeritus), Ph.D. .......... Wisconsin
Lewis, R. J. (Emeritus), Ph.D. .......... NC State
Luxmore, R. J. (Adjunct) . California (Riverside)

Miller, R. D., Ph.D. .......... Kentucky
Mullins, C. A., Ph.D. .......... Tennessee
Parks, William L. (Emeritus), Ph.D. .......... Purdue
Reynolds, John H., Ph.D. .......... Wisconsin
Sams, C. E., Ph.D. .......... Michigan State
Seatz, Lloyd F. (Emeritus), Ph.D. .......... NC State
Sprague, L. N. (Emeritus), M.S. .......... Kansas State
Springer, M. E. (Emeritus), Ph.D. .......... California
Swingle, H. D. (Emeritus), Ph.D. .......... Florida

Tyler, D. P., Ph.D. .......... Kentucky
West, D. R., Ph.D. .......... Nebraska

Associate Professors:

Ammons, J. T., Ph.D. .......... West Virginia
Deyton, D. E. (Liaison), Ph.D. .......... NC State
Krueger, W. A., Ph.D. .......... Illinois
Lee, S. Y. (Adjunct), Ph.D. .......... Wisconsin
Lessman, Gary M., Ph.D. .......... Michigan State
Logan, Joanne, Ph.D. .......... Nebraska
Reich, V. H., Ph.D. .......... Iowa State
Wyatt, J. E., Ph.D. .......... Florida

Assistant Professors:

Essington, M. E., Ph.D. .......... California (Riverside)
Mueller, Thomas C., Ph.D. .......... Georgia
Mullen, M. D., Ph.D. .......... Michigan State
Newton, D. (Adjunct), M.S. .......... Kentucky
Wilson, G. V., Ph.D. .......... Arkansas

The Department of Plant and Soil Science offers graduate programs leading to the Master of Science and the Doctor of Philosophy. Concentrations for the graduate programs are offered in soil science, plant breeding and genetics, and crop physiology and ecology. For further information, contact the department head.

THE MASTER'S PROGRAM

Thesis Option

This option requires writing a thesis based on original research. Six hours of 500 Thesis are required. Prior to conducting research, the student must develop a detailed written research plan. In addition to the thesis hours, a minimum of 24 hours of graduate coursework is required, of which at least 14 must be taken in courses numbered 501 and above. The student’s advisory committee may require additional coursework if the student’s progress or background indicates such need. Each student is required to take 1 hour of 501 and 1 hour of 593, and to present an exit seminar on the thesis research.

The student’s advisory committee consists of the major professor, who acts as chairperson of the committee, and a minimum of two other
The doctoral program

A minimum of 72 hours beyond the Bachelor's degree, exclusive of credit for Thesis 593, is required. Of this number, 24 hours must be Doctoral Research and Dissertation 600. A minimum of 28 hours must be completed in courses numbered above 500 exclusive of doctoral research and dissertation, of which 6 must be in courses numbered above 600. A minimum of 9 hours of graduate course work taken during the doctoral program must be outside the department in one or more cognate areas.

The student and the major professor identify a doctoral committee composed of at least four faculty members holding the rank of assistant professor or above; three of whom, including the chair, must be approved by the Graduate Council to direct doctoral research. At least one member must be from outside the department. The committee must approve all course work if the student's progress or background indicates such need. Each student is required to take 1 hour of 501 and 2 hours of 502 of the student's advisory committee consists of the major professor, who acts as chairperson of the committee, and a minimum of two other faculty members. The advisory committee approves the student's coursework and the report on participation in a research program for 593. Students are required to take a comprehensive examination integrating the coursework.

Graduate Courses

411 Soil Microbiology (3) Soil microbial populations and role in soil ecosystem, microbial transformation of inorganic and organic compounds, decomposition of residues, dynamics of soil organic matter. Prereq: Introduction to Soil Science and Introduction to Organic and Biochemistry or Organic Chemistry or consent of instructor. 2 hrs and 1 lab. F.A.

412 Soil Genesis and Classification (3) Soil genesis and formation; observing and describing morphology of agricultural and forest soils, and physical properties, classification, 3 weekend field trips. Prereq: Introduction to Plant and Soil Science or consent of instructor. 2 hrs and 1 lab. F.

413 Soil Chemistry (3) Principles concerning structure and chemical properties of soil and soil materials; radioactivity and radioactivity as related to exchange, chemical equilibria, soil acidity, cation exchange, soil chemical, weathering, nutrient availability and waste disposal. Prereq: 311 or consent of instructor. F.

414 Soil, Land Use, and the Environment (3) Soil as environmental component and soil properties affecting land use. Soil as resource in development planning: consideration of non-availability of water as a soil resource in data collection and analysis; biological responses to climatic stress; climate variation and change and their effects on soil systems. Prereq: 210 or consent of instructor. Sp, A.

415 Soil Hydrology (3) Physical relationships among solid, liquid, and gaseous phases of soil system. Relationships of soil properties to processes governing water, and chemicals in soil. Prereq: Introduction to Soil Science. 2 hrs and 1 lab. F.


419 Agricultural Ecology (3) Regulation of insect and animal populations in agricultural ecosystems; population dynamics of macro- and microorganisms; interrelationships of plants and animals in crop ecosystems; effects of climate and environment on population dynamics. Prereq: 413 and consent of instructor. F.


421 Doctoral Program


512 Pedology (3) Physical and chemical weathering processes, factors of soil formation, soil forming processes. Prereq: 412 or consent of instructor. 2 hrs and 1 lab. F.A.

514 Advanced Soil Physics (3) Theory and mathematical modeling of flow and solute transport in saturated and unsaturated soil: theoretical analysis of soil heterogeneity; soil moisture properties and processes, soil physical properties, soil porosity processes, anisotropy. Analytical, and numerical solution of flow and transport equations for unsaturated zones. Prereq: Calculus III, 415, or consent of instructor. F.A.

530 Integrated Pest Management (3) (Same as Entomology and Plant Pathology 530.)

532 Advanced Crop Ecology (3) General and specific relationships among environmental factors, crop organisms, and agricultural systems; quantification of macro- and microclimatic influences on crop growth; world climates, crop distribution and productivity, human cultures, and their interaction. Prereq: 471 or equivalent; 431 or equivalent, or Agricultural Climatology or equivalent. 2 hrs and 1 lab. F.A.

551 Advanced Plant Genetics (3) Discovery of genetics: controlling elements, induced mutations, genome organization, polyplody, tetrasomic inheritance, extra-chromosomal inheritance, anoploidy, incompatibility systems, and genetic engineering of higher plants. Prereq: Biology 220. F.A.


571 Design and Analysis of Biological Research (3) (Same as Animal Science 571.)

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

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

601 Special Topics in Soil Science (1-3) Thermodynamics of 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. E.

603 Special Topics in Crop Physiology and Ecology (1-3) Principles of soil science and plant biology: soil moisture and energy relations, responses to stress, physiology of crop growth and reproduction. Interactions of physiology and genetics; crop production, theory and application of quantitative methods in crop physiology and ecology research. May be repeated. Maximum 6 hrs. E.

605 Special Topics in Plant Breeding and Genetics (1-3) Genotype by environment interactions, estimation of quantitative parameters, mutations, chromosome dynamics, polyplody, genetic engineering, interspecific hybridization, linkage, screening methods, genome organization. May be repeated. Maximum 6 hrs. E.

613 Advanced Soil Chemistry (3) Thermodynamics of soil solutions and surface chemistry of soils; soluble complex formation, mineral solubility, electrochemical equilibria, geochemical modeling, ion exchange equilibria, surface complexation theory, and surface complexation modeling. Prereq: 413 or equivalent and Chemistry 473 or consent of instructor. F.

631 Advanced Crop Physiology (3) Relationship of physiology and genotype to environmental stress: nitrogenfixation, synthesis and degradation processes in metabolism, ripening, and senescence. Control of growth and development of crops and the effects of environmental factors affecting the quality of stored plant products. Prereq: 431. 2 hrs and 1 lab. F.A.

633 Plant Growth Control and Herbicide Action (3) Principles of uptake, translocation, mode of action and use of herbicides and plant growth regulators and their effects on plant morphology, metabolic systems and enzymatic activities. Practical aspects and current commercial use of plant growth regulators. Prereq: Botany 521 and 522 or equivalent. F.A.
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). Six 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, an overall average of 3.0 and an average of 3.2 in the last two years of political science or social science courses is required. In addition, a composite score of at least 1100 on the verbal and quantitative parts of the GRE is normally required.

Students must demonstrate proficiency in the use of personal computers prior to the completion of 9 credit hours in the M.P.A. program. Students may fulfill this requirement by successful completion of a short course(s) offered by the UT Computing Center. The Coordinator of the M.P.A. program will provide a list of acceptable courses. Exceptions to this requirement will be considered on an individual basis.

The M.P.A. is a non-thesis program. Specific requirements include the following:

1. Core - 21 hours.
   b. Analytical skills (6 hours): 512 Quantitative Political Analysis; 514 Research and Methodology in Public Administration.
   c. Management skills (6 hours): 560 Public Budgeting; and either 562 Public Management of Human Resources Management in Public Administration.

2. Specialization - 9 hours.
   A specialization is designed by the student in consultation with the coordinator of the M.P.A. program. Possible specializations include general government, public health, budgeting and finance, planning, natural resources, program evaluation, criminal justice, public relations, personnel, and others.

3. Recommended internship with a public agency - 6 hours.

Internships are arranged in consultation with the coordinator of the M.P.A. program.

4. A written final examination, which may be followed by an oral examination, is required.

DUAL J.D.-M.P.A. PROGRAM

The College of Law and the Department of Political Science in the College of Arts and Sciences offer a coordinated dual degree program leading to the conferral of both the Juris Doctorate and Master of Public Administration degrees. In this program, a student may earn the M.P.A. and J.D. degrees in about four years rather than the five years that otherwise would be required. Students pursuing the dual degree program should plan to be enrolled in coursework or an internship for one summer term in addition to taking normal course loads for four academic years.

Admission

Applicants for the J.D.-M.P.A. program must make separate application to, and be independently accepted by, the College of Law for the J.D. degree and the Department of Political Science and The Graduate School for the M.P.A. degree. Applicants must also be accepted by the Dual Degree Committee. All applicants must submit a Law School Admission Test (LSAT) score. An applicant's LSAT score may be substituted for the Graduate Record Examination (GRE) score, which is normally required for admission to the M.P.A. program. Application may be made prior to or after matriculation in either the J.D. or the M.P.A. program, but application to the dual program must be made prior to entry into the last 23 semester hours required for the J.D. degree and prior to entry into the last 15 hours required for the M.P.A. degree.

Curriculum

A dual degree candidate must satisfy the requirements for both the J.D. and the M.P.A. degrees, as well as the requirements for the dual program. The College of Law will award a maximum of 9 semester hours of credit toward the J.D. degree for successful completion of approved graduate-level courses (500 or 600 level) offered in the Department of Political Science. The M.P.A. program will award a maximum of 9 semester hours of credit toward the M.P.A. degree for successful completion of approved courses offered in the College of Law. All courses for which cross-credit is awarded must be approved by the J.D.-M.P.A. coordinators in the College of Law and the Department of Political Science. All candidates for the dual degree must successfully complete Administrative Law (Law 821) and are encouraged to take Local Government (Law 824). An internship is strongly recommended for students in the dual degree program, as it is for all M.P.A. candidates, but an internship is not required.

During the first two years in the dual program, students will spend one academic year completing the required first year of the College of Law curriculum and one academic year taking courses solely in the M.P.A. program. During those first two years, students may not take courses in the opposite area, without the approval of the J.D.-M.P.A. coordinators in both academic units. In the third and fourth years,
students are strongly encouraged to take both law and political science courses each semester.

Dual degree students who withdraw from the program before completion of the requirements for both degrees will not receive credit toward either the J.D. or the M.P.A. degree for courses taken in the other program except as such courses qualify for credit without regard to the dual program.

Awarding of Grades

For grade recording purposes in the College of Law and the Department of Political Science, grades awarded in courses in the other unit will be converted to either Satisfactory or No Credit and will not be computed in determining a student's GPA or class standing. The College of Law will award a grade of Satisfactory for an approved M.P.A. course in which the student earns a grade of B or higher and a grade of No Credit for any lower grade. The Political Science Department will award a grade of Satisfactory for an approved law course in which the student earns a grade of 2.0 or higher and a grade of No Credit for any lower grade. The official academic record of the student maintained by the Registrar of the University shall show the actual grade assigned by the instructor without conversion.

THE DOCTORAL PROGRAM

The Ph.D. program prepares students for careers in college teaching, as well as careers in other occupations related to service in the public or private sectors. Applicants for admission to the program should normally have completed a bachelor's degree in political science or a related field with a 3.5 GPA and have earned a composite score of at least 1100 on the verbal and quantitative parts of the Graduate Record Examination.

Doctoral students admitted to the program must complete 69 hours beyond the bachelor's degree, including at least 24 hours of coursework beyond the master's degree, graded A-F, must successfully pass written and oral comprehensive examinations in three broad subfields of political science, and must pass a final oral examination on the dissertation. In addition, doctoral 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 three broad subfields in which the student takes examinations.
5. Completion of at least one course or seminar in each of six broad subfields available for graduate instruction in the department.
6. At least 6 hours must be earned in political science courses numbered above 500.

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 master's level 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 power of president and Congress, federalism, sources of regulatory authority, and constitutional protection of political and economic rights.

431 U.S. Constitutional Law: Civil Rights and Liberties (3) Analysis of current issues in civil rights and liberties including: first amendment freedoms, equal protection, privacy and rights of accused.

442 Administrative Law (3) Legal dimensions of administrative power and procedures, and constitutional controls over administrators.

452 Black African Politics (3) Recent evolution and current political environment of Black African nations. (Same as Afro-American Studies 452.)

456 Government and Politics of China and Japan (3) Examination of the political setting, structure and political processes in China and Japan.

455 Latin American Government and Politics II (3) Selected topics on Latin American political dynamics, consideration of Latin American political systems. (Same as Latin American Studies 455.)

457 Government and Politics of the Soviet Union (3) Origins and development of Soviet political system, and study of selected policy areas.

461 Policy Making in Democracies (3) Comparative approach to theory and process of making public policy.

463 Contemporary Middle East Politics (3) Government and movements in Middle East, their characteristics, bases, and interrelationships.

470 International Law (3) Nature and development of international law and compliance. Function of international law in international conflict.

475 Ancient and Medieval Political Thought (3) Survey of major political thinkers from Plato to Machiavelli.

476 Modern Political Thought (3) Survey of major western political thinkers from Machiavelli to Marx.

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

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

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 inference.

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 analysis: multivariate model building.

514 Research and Methodology in Political 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 public affairs, approaches to research and analysis, critical examination of major works in public affairs 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 these have evolved from the founding to the present.

533 Congress (3) Formal, empirical and theoretical approaches to 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, policy making and public administration at the state and local level.

540 Public Law (3) Selective examination of published research and current approaches in fields of constitutional law, judicial process, and judicial behavior. May be repeated with consent of department. Maximum 9 hrs.

546 Law and the Administrative Process (3) Constitutional position, decision making, regulation and management, limitations on governmental action, questions of structure, role and administrative choice. May be repeated with consent of department. Maximum 9 hrs.

548 Public Policy Process (3) Theoretical, formal and empirical analysis of the roles, functions and decision making processes of public policymakers, including legislative, executive and judicial actors.

550 Public Administration (3) Overview of public administration theory and practice.

552 Organization Theory (3) Appraisal of major theories of organization and their applicability to public sector.

553 Management of Information Systems (3) Theory, design, development, implementation and evaluation of information systems in public organizations. Database systems, computer applications related to management information technology.

556 Policy Analysis (3) Strategies and techniques for identification and analysis of public problems and policy solutions. May be repeated with consent of department. Maximum 9 hrs.

558 The Politics of Administration (3) 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.

559 Public Budgeting and Finance (3) Technical and political aspects of planning, preparing and adopting government budgets. Management implications of revenue collection, debt management, treasury function, accounting, internal auditing, purchasing risk management, post-auditing.

562 Public Management (3) Interpersonal and leadership skills, techniques and methods for planning, decision making, and implementation of management strategies in the 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/N only.
Polymer Engineering
See Materials Science and Engineering

Psychoeducational Studies
(College of Education)

MAJORS DEGREES
Education Ph.D.
Educational Psychology M.S., Ed.D.
Educational Psychology and Guidance Ed.S.

K. Greenberg, Leader

Professors:

Associate Professors:
Brockett, Ralph G., Ph.D. Syracuse Kindall, Luther M., Ed.D. Tennessee University Smollan, Donald C., Ph.D. Washington State University

Assistant Professor:
Whitaker, Dianne, Ph.D. Washington State University

The Psychoeducational Studies unit offers graduate programs leading to the following: Master of Science with a major in Educational Psychology, concentrations in adult education, educational psychology, and individual and collaborative learning; Educational Specialist with a major in Educational Psychology and Guidance, concentrations in educational psychology and school psychology; and Doctor of Education with a major in Educational Psychology, concentrations in adult education, educational psychology, and collaborative learning. The unit also participates in the college-wide Ph.D. program with a major in Education. See Education under Fields of Instruction for full description of all degree requirements.

The mission of the Psychoeducational Studies unit is to provide national leadership in creating learning environments that foster psychological health, address authentic educational needs, and promote lifelong learning. The unit will seek opportunities in a diversity of contexts for learners to apply data-based problem solving, engage in reflective and evaluative thinking, and implement the structures and processes necessary for effective collaboration.

The school psychology program is accredited by the American Psychological Association and the National Association for School Psychology. This program also has the approval of the National Council for Accreditation of Teacher Education. The program in Educational Psychology has been recognized as a "Designated Program" by the American Association of State Psychology Boards and the Council for the National Register of Health Service Providers in Psychology.

ADMISSION REQUIREMENTS

Admission requirements include up-to-date scores from the GRE, the unit admissions application form and letters of recommendation. For the doctoral programs a writing sample is also required. The application deadline for admission to the doctoral and Ed.S. programs is February 1, and to the M.S. program is November 1. For information about the various programs of study and admissions, write to the Graduate Center in the College of Education.

GRADUATE COURSES

432 The Disadvantaged Student: Psychoeducational Perspectives (3) Theory and research regarding psychology, psychoanalytic 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 helping professionals and their clientele. Prereq: Introductory course in psychology or consent of instructor. S/NC only.

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

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


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.

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 related to the practical applications of higher mental problem-solving. Prereq: 510 or consent of instructor.

511 Cognitive Development: Implications for Education (3) Applications of theory and research related to the practical applications of higher mental problem-solving. Prereq: 510 or consent of instructor.

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 social learning as systems 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 systems apply to education. Prereq: 515 or consent of instructor.

518 Educational Specialist Research and Thesis (3) May be repeated. P/NP only.
520 Survey of Adult Education (3) Historical development, philosophy of adult education agencies, associations, programs, issues, and literature illustrating process of adult education and diversity of continuing education. Prereq: Consent of instructor. F, Su

521 Program Development and Operation in Adult Education (3) Theories and methods from research to practice in planning and operating adult education programs. Prereq: Consent of instructor. F, Su

522 Adult Development (3) Changes in characteristics of adults over time and implications for adult education. Prereq: Consent of instructor. F, Su

523 Post-Secondary Education for Adults (3) History, evolution, philosophy, structure and functions of post-secondary, sub-university institutions, their programs and clientele. Prereq: Consent of instructor. Sp, Su

524 Continuing Professional Education (3) Theories and concepts supporting design and management of educational programs for adults in professions. Prereq: 520 or equivalent. Sp

525 Characteristics of Adult Learners (3) Key characteristics of adult learners, and applications to teaching and learning contexts. F


527 Controversies in Adult Education (3) Controversies confronting field of adult education; development of critical analysis skills by looking at controversies from different perspectives. Sp

540 Seminar in School Psychology (3) Essentials of theory and practice of school psychology as professional specialty. Consideration of history and current issues in school psychology. Sp

541 Psychoeducational Assessment (3) Direct, psychometric and naturalistic assessment methods in learning and intelligence. Prereq: Admission to school psychology program or consent of instructor, and Counselor Education and Counseling Psychology 525 or equivalent. May be repeated. Maximum 6 hrs. F, Sp

542 Practicum in Psychoeducational Assessment (3) Application of assessment skills to clients in learning environments. Coreq: 541 or consent of instructor. May be repeated. Maximum 6 hrs. S/NC only. F, Sp

543 Psychoeducational Consultation (3) Use of two and three-person models of consultation in educational and therapeutic settings. Prereq: Counselor Education and Counseling Psychology 525 or equivalent. May be repeated. Maximum 6 hrs. S/NC only. F, Sp

544 Practicum in Consultation (3) Application of consultation skills to educational settings. Prereq: 545. Sp

549 Internship in School Psychology (1-6) Supervised employment in unit approved school psychology internship sites. Prereq: Enrollment in school psychology program and consent of instructor. May be repeated. Maximum 12 hrs. S/NC only. E

560 Discipline and Conflict Resolution (3) Applications of major models of discipline and conflict resolution strategies in development of constructive atmosphere for classroom learning. F

571 Mediated Learning Theory (3) Feuerstein's theory of mediated learning experience and its connections to work of Piaget, Vygotsky and others. Implications for transformational learning and building of learning communities for learners of all ages. F

572 Cognitive Education: Models and Approaches (3) Models and approaches in field of cognitive education: research and theoretical support for various program components, critical variables of organizational learning that affect success of implementation. F


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

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

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

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

609 Advanced Seminar in Curriculum and Learning (3) Team-taught interdisciplinary seminar: trends, themes, and issues in curriculum and learning. Reading and discussions based on significant research and scholarly publications. Prereq: 520 or equivalent.

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. Sp

622 Advanced Seminar in Adult Development (3) Adult development research. Designing research for studies of life cycle. Prereq: 522 or equivalent. Sp, Su

626 Adult Problem Solving and Learning (3) Contemporary research and theories in adult problem-solving and learning. Prereq: 526 or equivalent. F, Su

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

649 Advanced Internship in School Psychology (1-9) Supervised experience as school psychologist in unit-approved internship site for doctoral level students. Prereq: Enrollment in doctoral level school psychology program and consent of instructor. May be repeated. Maximum 9 hrs. S/NC only. E

650 Professional Practice in School Psychology (1) Field setting to facilitate academic, social and interpersonal development of children and adults. School and mental health settings for intervention, consultation, prevention, and assessment services. May be repeated. Maximum 9 hrs. S/NC only. E

655 Research in Psychoeducational Studies (1) Data analyses, collection, and interpretation. May be repeated. Maximum 9 hrs. S/NC only. E

656 Scale Construction (3) Development, piloting, 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. A

665 Analysis of Research in Instructional Psychology (3) Research on human learning, design of learning environments. Analysis of teacher behavior, test development, computer software design and video presentations. A

666 Practicum in Instructional Planning (3) Development and management of course or program of instruction in educational psychology. Prereq: 665, or consent of instructor. E

669 Internship in Educational Psychology (1-6) Supervised employment in unit approved educational psychology internship sites. May be repeated. Maximum 12 hrs. S/NC only. E

685 Educational Leadership: Theory and Practice (3) Theories of leadership applied to variety of educational settings. Prereq: Consent of instructor. F, Su

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

Psychology

(College of Arts and Sciences)

MAJOR

Psychology ........................................ M.A., Ph.D.

WARREN H. JONES, HEAD

DEGREES

Prospective majors must complete 30 semester hours of graduate level courses in psychology. These hours must include 504-05, 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. Students must earn a grade of B or better in all courses that are to count toward the 33-hour total. Students must also propose, conduct and successfully defend an original piece of research in the form of a master’s thesis.

THE DOCTORAL PROGRAM

A student with a B.A. or B.S. may apply to the Department of Psychology for admission to the doctoral program with a concentration in experimental psychology or clinical psychology. The doctoral program with a concentration in ethology or physiology is offered through the Life Sciences program. Doctoral study in industrial and organizational psychology is offered through the Intercollegiate program in Industrial and Organizational Psychology, to which application is made through the Department of Management.

Experimental Psychology

The Ph.D. program in Psychology with a concentration in experimental psychology is designed to allow the student to select among a variety of specializations oriented toward careers in research, teaching, and application of psychology in academic, institutional, or industrial settings. The program is flexible, individualized, and emphasizes a professional apprenticeship model of training. A full description of the program is given in the "Handbook for Students in Experimental Psychology," available from the department. The basic requirements are:

1. Twelve semester hours of statistics and research (504-05 or Statistics 531-32 or equivalent and 6 additional hours 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 practice (509).
5. Two 600-level graduate seminars.
6. Six semester hours of graduate level courses outside the Psychology Department.
7. Predissertation research project involving the collection of original data or the original analysis of existing data, reported in publishable form and accepted by the student’s advisory committee.
8. An integrative review or theoretical paper, accepted by the student’s advisory committee.
9. Comprehensive examination, determined and evaluated by the student’s doctoral committee.
10. Twenty-four hours of dissertation research (600).

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 obtain a score of at least 630 on the GRE in psychology by the end of the first year and complete a predissertation research project by the end of the second year.

After forming the doctoral committee, students must then pass a comprehensive examination administered and evaluated by the committee. This examination is comprised of two papers, one addressing a topic of the student’s choice, and a second addressing an understanding of one individual’s personality and cognitive functions. All doctoral students must complete a minimum of 78 hours of graduate level courses, including courses required by their program; at least 6 hours in courses outside of psychology; and at least 24 hours of dissertation research (Psychology 600). Finally, students must complete an acceptable doctoral dissertation and conduct a satisfactory oral defense of the dissertation.

Requirements are as follows:
1. Apprenticeship with one faculty member during the first year, two days each week.
2. Predissertation research project completed before forming a doctoral supervisory committee, reported in written form acceptable to two members of the faculty or, if reviewed and accepted for publication or external presentation, by one member of the faculty.
3. Supervised clinical placement two days (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, Psychological, Perception, Learning, Thinking, Motivation (513).
   b. Interviewing and Observation (558) and Laboratory (556).
   c. Research Practicum (509) (4 hrs.).
   d. Life-Span Development (512) or Developmental Psychology (511).
   e. Personality: Theory and Research I and II (570-71).
   f. History and Systems of Psychology (565).
   g. Research Questions and Designs (590).
   h. Experimental Methods in Psychology (540) and Research Design (505).
   i. Social Psychology (550).
   j. Field Placement in Clinical Psychology (685) (18 hrs.).
   k. Dynamics of Psychopathology (573).
   l. Psychometrics (555) or Applied Psychological Measurement (557).
   m. Ethical, Legal and Professional Issues in Psychology (635).
   n. Psychodynamic Psychotherapy I and II (670-71) and Laboratory (673) (4 hrs.).
   o. Doctoral Research and Dissertations (600) 24 hrs.
5. Satisfactory completion of a one-year clinical internship at a site approved by the program.
6. Students who choose a teaching assistantship in the third or fourth year must have satisfactorily completed 528 College Teaching in Psychology.
7. Satisfactory completion of at least 3 additional graduate-level courses in non-clinical topics in psychology.
8. Satisfactory completion of a one-year clinical internship at a site approved by the program.

GRADUATE COURSES

409 Group Facilitation (3) Study of therapy and techniques through supervised experience in small groups. Prereq: 359 and consent of instructor. May be repeated. Maximum 6 hrs.
415 Psychology of Religion (3) History of psychology of religious views, philosophical and empirical orientations. Psychological function of religion for individuals and society. Prereq: Junior or senior standing.
424 Psychology and the Law (3) Psychological aspects of legal systems. Prereq: 110 or equivalent. Undergraduate standing and consent of instructor.
430 Health Psychology (3) Survey of psychological factors related to health and illness: stress, personality, and environment. Applications of psychological treatments to physical illness. Prereq: 110 or equivalent, 210.
434 Psychology of Gender (3) Biological, psychological, and social factors in gender. Importance of gender roles and stereotypes for behavior and experience. Prereq: 110 or equivalent, 210, 220. (Same as Women’s Studies 434.)
440 Organizational Psychology (3) Social-psychological analysis of organizations, role-theory and systems theory. Prereq: 360.
451 Comparative Animal Behavior (3) Same as Ecology and Evolutionary Biology 450.
459 Comparative Animal Behavior Laboratory (3) Coreq: 450. (Same as Ecology and Evolutionary Biology 459.)
461 Physiological Psychology (3) Nervous system and physiological correlates of behavior. Biological basis of emotion, learning, memory and stress. Prereq: 110 or equivalent, 210, and 1 yr of biology or zoology introductory sequences or equivalents.
468 Laboratory in Physiological Psychology (3) Laboratory studies of nervous system and physiological correlates of behavior. Coreq: 461.
470 Theories of Personality (3) Survey of major theories of human personality and their development. Prereq: 220 and 300 or 330.
475 Adolescent Development (3) Theoretical perspectives and empirical research findings pertaining to adolescent development. Prereq: 300. Coreq: 461.
480 Theories of Learning (3) Classical and current approaches to learning and cognition. Prereq: 310.
482 Topics in Psychology (3) Intensive analysis of special topics: Afro-American psychology or evaluation of programs in community. Prereq: 310. Biological Basis of Behavior and Experience: Humanistic Psychology and at least 9 hrs in 300-level courses. Recommended prereq: Statistics in Psychology, Methods of
Research in Psychology. May be repeated. Maximum 6 hrs.

489 Supervised Research (1-8) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs in 399, 489, 491, 492, and 493 combined may apply toward undergraduate major.

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

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


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. Sp

508 Readings and Special Issues in Psychology (1-3) Prereq: Consent of instructor. May be repeated. Maximum 15 hrs.

509 Research Practicum (1-3) Required of first-year graduate students in psychology. May be repeated. Maximum 9 hrs. S/NC only. E

510 Topics in Psychology (3) Intensive examination of selected issues in psychology. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

511 Developmental Psychology (3) Normal processes of human socialization, physical, cognitive, and emotional development from conception through infancy, childhood, and adolescence. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. F

512 Life-Span Development (3) Theories and research concerning normal human development throughout life, adulthood and old age. Prereq: Consent of instructor.

513 Foundations of Psychology: Biological Factors, Perception, Learning, Thinking, Motivation (4) Intensive survey. Prereq: Consent of instructor. E

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. F,Sp

516 Colloquium in Ethology (1) Current research and theory. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. (Same as Ecology and Evolutionary Biology 516.) S/NC only. E

517-18 Proseminar in Industrial and Organizational Psychology (3) (Same as Management 567-68.)

520 Interventions for Behavioral Change (3) Principles and techniques for planning, implementing, and evaluating interventions derived from social learning theory. Interventions by people in community; teachers or supervisors. Token economies and strategies for self-control. Prereq: Consent of instructor.

525 Laboratory Techniques and Instrumentation (3) Procedures for laboratory research involving humans and nonhuman animals; techniques for collecting, transforming, storing, and retrieving data using microcomputers. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

526 General Vertebrate Neuroanatomy (3) Lecture and laboratory. Structure and functioning of central and peripheral nervous system. Prereq: 461, 469, or equivalent and consent of instructor.

527 Behavioral Neurology (3) Disorders of nervous system, origin, and treatment. Pernicious neurological presentation, consent of instructor. 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.


531-36 Independent Study (1-15) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/NC only.

543 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.

547 Conceptual Foundations of Evolution and Behavior (3) Critical evaluation of seminal writings on theory and methodology. Evolutionary approaches to behavior. Prereq: Same as Ecology and Evolutionary Biology 547.

549 Social Psychology (3) Survey of theory and research concerning interpersonal interaction and individual behavior in social context. Prereq: Consent of instructor.

555 Psychometrics (3) Basic concepts: factor analysis, scaling, test theory, probability models and their applications, computerized adaptive testing and other topics. Prereq: Statistics 537-538 or equivalent. May be repeated. Maximum 6 hrs.

557 Applied Psychological Measurement (3) Issues and techniques in applying psychological measurement in organizational, clinical, and community research. Prereq: Statistics 537-538 or equivalent or consent of instructor. May be repeated. Maximum 6 hrs.

558 Interviewing and Observation (3) Sensitizing students to own feelings and beliefs and to feelings of the interviewee, and analysis of language content, style, and body language. Exploration of various important aspects of an 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.


565 History and Systems of Psychology (3) History of psychology which emerged during 20th century. Prereq: Graduate standing. Sp

570 Personality: Theory and Research (3) Advanced survey of psychodynamic and neo-Freudian approaches to personality; related research. Prereq: Admission to clinical program or consent of instructor. F

571 Personality: Theory and Research II (3) Advanced survey of behavioral and humanistic approaches to personality; related research. Prereq: Admission to clinical program or consent of instructor. Sp

572 Descriptive Psychopathology (2) Diagnostic criteria of the DSM-III. Examples from written case-histories and recorded interviews. Prereq: Admission to doctoral program in clinical psychology or consent of instructor. Sp

573 Dynamics of Psychopathology (3) Psychodynamic view of the causes and symptoms of major psychoses, neuroses, and adjustment disorders. Prereq: Admission to doctoral program in clinical psychology or consent of instructor.

574 Atypical Development in Childhood (3) Research on etiologies of atypical patterns of development in infancy and childhood. Prereq: 511 and consent of instructor. May be repeated. Maximum 6 hrs.

575 Psychopharmacology (3) Connections between pharmacology and psychology. Prereq: Consent of instructor.

576 Object Relations (3) European and American conceptions of normal and psychopathological development of object relations. Significance for psychotherapy, psychoanalysis, and psychodynamic theory. Prereq: Admission to doctoral program in clinical psychology or consent of instructor.

578 Clinical Aspects of Human Sexuality (3) Variation in human sexual behavior. Theories of etiology, treatment. Prereq: 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. F

596 Laboratory in Psychological Assessment (1) Prereq: Admission to doctoral program in clinical psychology or consent of instructor. May be repeated. Maximum 6 hrs. S/NC only. Sp

597 Evaluation of Development in Childhood (3) Structured and projective tests and interview techniques for evaluation of intellectual, personality, and social development in childhood. Prereq: 511 and admission to doctoral program in clinical psychology or consent of instructor. May be repeated. Maximum 12 hrs.

600 Doctoral Research and Dissertation (1-15) P/NP only. E

601 Seminar in Psychology (3) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

610 Seminar in Applied Psychology (3) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

611 Seminar in Developmental Psychology (3) Prereq: 511 and 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.


622 Seminar in Comparative and Ethological Psychology (3) Prereq: 546 or 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 Seminar in Organizational Psychology (3) (Same as Management 625.)

626 Seminar in Industrial Psychology (3) (Same as Management 626.)

627 Seminar in Applied Industrial Psychology (3) (Same as Management 627.)

635 Ethical, Legal, and Professional Issues in Psychology (3) Research, human services, teaching and public policy. Prereq: Admission to doctoral program in clinical psychology or consent of instructor. (Same as Counseling and Psychological Studies 635.) S/NC only.

638 Current Topics in Industrial/organizational Psychology (3) (Same as Management 638.)

670 Psychodynamic Psychotherapy I (3) Theories and principles. Prereq: Admission to doctoral program in clinical psychology or consent of instructor. F

671 Psychodynamic Psychotherapy II (3) Theories and principles. Prereq: Admission to doctoral program in clinical psychology and 670 or consent of instructor. Sp

673 Laboratory in Psychotherapy (2) Prereq: Admission to doctoral program in clinical psychology or consent of instructor. Coreq: 670 or 671. May be repeated. Maximum 6 hrs. S/NC only.

676 Special Topics in Psychotherapy (3) Prereq: Admission to doctoral program in clinical psychology or consent of instructor. May be repeated. Maximum 12 hrs.

681 Seminar in Assessment (3) Prereq: Admission to doctoral program in clinical psychology or consent of instructor. May be repeated. Maximum 6 hrs.

683 Seminar in Behavioral Medicine (3) Current research and theory concerning relationships between...
Behavior and health. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

584 Neurophysiology (3) Investigation of brain-behavior relationships in adults and children. Introduction to administration of the EITAN neuropsychological screening battery, Luria battery, and other tests of brain dysfunction. Prereq: Consent of instructor.

589 Field Work in Industrial and Organizational Psychology (1-12) (Same as Management 689.)

595 Field Placement in Clinical Psychology (3) Prereq: Admission to doctoral program in clinical psychology and consent of instructor. May be repeated. Maximum 24 hrs. SNC only. E

596 Advanced Psychology Clinic Placement (1-3) Prereq: Admission to doctoral program in clinical psychology or consent of instructor. May be repeated. Maximum 24 hrs. SNC only. E

Graduate courses in Development of Hearing Impaired (3) Language problems of hearing-impaired children; comprehension and production differences, idiomatic and figurative structures. Prereq: Consent of instructor.

416 Language Development of Hearing Impaired II (3) Developmental and remedial programs of teaching language to hearing-impaired children. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

423 Communication Processes for the Hearing Impaired (3) Expressive and receptive vocabulary development in sign communication. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

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

425 Introduction to the Psychology and Education of the Hearing Impaired (3) Primarily for those planning to teach hearing-impaired children. Overview of research related to psychology, social adjustment, communication methods, language development, and education of hearing-impaired students. Survey of literature. Visits to programs.

426 Speech and Language Services in Schools (3) Organization and implementation of speech and language programs in schools. Emphasis on the role of the speech-language pathologist in the development of programs and procedures to facilitate the adjustment of students with hearing impairments. Prereq: Consent of instructor.

432 Clinical Practice in Communication Disorders in Schools (3) Supervised practice with children with communication disorders. Prereq: Consent of instructor.


438 Curriculum Development Applied to Programs for the Hearing Impaired (3) Current curriculum trends adapted to the needs of hearing-impaired students. Prereq: Consent of instructor.

439 Transition from School to Work (3) Development of an individualized education program for graduation or transition to independent living. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/NC only. E

442 Communication Processes for the Hearing Impaired (3) Expressive and receptive vocabulary development in sign communication. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

456 Introduction to Rehabilitation Counseling (3) Rehabilitation counseling as a profession. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

472 Teaching Reading to the Hearing Impaired (3) Specific methods necessary to teach the prelingually hearing-impaired student. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.


478 Curriculum Development and Application to Programs for the Hearing Impaired (3) Current curriculum trends adapted to the needs of hearing-impaired students. Prereq: Consent of instructor.

482 Speech and Language Services in the Schools (3) Organization and implementation of speech and language programs in schools. Emphasis on the role of the speech-language pathologist in the development of programs and procedures to facilitate the adjustment of students with hearing impairments. Prereq: Consent of instructor.

483 Clinical Practice in Communication Disorders in Schools (3) Supervised practice with children with communication disorders. Prereq: Consent of instructor.

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

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

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

504 Clinical Experience in Teaching an Exceptional Child (3) (Same as Inclusive Early Childhood Education 504.)

507 Vocational Counselling: Clinical Methods (3) Process, principles, and techniques used to determine vocational assets and liabilities of individuals with disabilities. Functional analysis of educational and vocational data; selection of relevant educational and vocational options and current educational theories. Prereq: Consent of instructor.

510 Clinical Experience in Teaching an Exceptional Child (3) (Same as Inclusive Early Childhood Education 504.)

515 Vocational Counselling: Clinical Methods (3) Process, principles, and techniques used to determine vocational assets and liabilities of individuals with disabilities. Functional analysis of educational and vocational data; selection of relevant educational and vocational options and current educational theories. Prereq: Consent of instructor.

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

523 Practicum in Hearing Impairment (3) Receptive and expressive language capabilities of hearing-impaired students. Designing, teaching, and post-testing of instruction for remediation of specific language errors.

526 Advanced Sign Language (3) Intermediate ASL stressing fluency of expression and receptive communication with deaf people and structure and history of language. Prereq: 525 or equivalent.

528 Curriculum Development Applied to Programs for the Hearing Impaired (3) Current curriculum trends adopted for hearing-impaired individuals. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

529 Teaching Reading to the Hearing Impaired (3) Specific methods necessary to teach the prelingually hearing-impaired student. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

530 Orientation to Rehabilitation (3) History, philosophy, legal and economic bases, current issues, and practices of public and private rehabilitation programs. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

532 Case Study in Rehabilitation (3) Techniques and procedures involved in case management. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.


536 Vocational Evaluation: Statistical Methods (3) Process, principles, and techniques used to determine vocational assets and liabilities of individuals with disabilities. Functional analysis of educational and vocational data; selection of relevant educational and vocational options and current educational theories. Prereq: Consent of instructor.

537 Vocational Evaluation: Clinical Methods (3) Process, principles, and techniques used to determine vocational assets and liabilities of individuals with disabilities. Functional analysis of educational and vocational data; selection of relevant educational and vocational options and current educational theories. Prereq: Consent of instructor.

538 Vocational Evaluation: Clinical Methods (3) Process, principles, and techniques used to determine vocational assets and liabilities of individuals with disabilities. Functional analysis of educational and vocational data; selection of relevant educational and vocational options and current educational theories. Prereq: Consent of instructor.

539 Transition from School to Work (3) Development of programs and procedures to facilitate adjustment of exceptional persons to independent living. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

540 Psychosocial Aspects of Exceptionalities (3) Psychosocial impact of exceptionality on people and families. Reactions to loss, coping with disability, and social rehabilitation.

541 Medical Aspects of Disability (3) Etiology and clinical symptoms related to disabling condition served by special education and rehabilitation personnel. Prereq: Consent of instructor.

542 Medical Aspects of Disability (3) Etiology and clinical symptoms related to disabling condition served by special education and rehabilitation personnel. Prereq: Consent of instructor.

543 Medical Aspects of Disability (3) Etiology and clinical symptoms related to disabling condition served by special education and rehabilitation personnel. Prereq: Consent of instructor.

544 Medical Aspects of Disability (3) Etiology and clinical symptoms related to disabling condition served by special education and rehabilitation personnel. Prereq: Consent of instructor.

545 The Rehabilitation Interview (3) Interview as used in assessment and planning with people who have disabilities and vocational handicaps.
Religious Studies

(College of Arts and Sciences)

Charles H. Reynolds, Head

Professors:
Dungan, David L., Th.D. ....... Harvard
Humphreys, W. Lee, Ph.D. ....... Union
Linge, David E., Liaison, Ph.D. ....... Vanderbilt
Lusby, F. Stanley (Emeritus).
M.Div. .................. Colgate Rochester
Norman, Ralph V., Jr., Ph.D. ....... Yale
Reynolds, Charles H., Ph.D. ....... Harvard

Associate Professors:
Fitzgerald, James L., Ph.D. .......... Chicago
Gwynne, Rosalind W., Ph.D. .......... Washington
Hackett, Rosalind I., Ph.D. .......... Aberdeen
Hodges, John O., Ph.D. .......... Chicago
Leverying, Muriel L., Ph.D. .......... Harvard
Schmidt, G. Garde, Ph.D. .......... Pittsburgh

Assistant Professors:
Hulsether, Mark, Ph.D. .......... Minnesota

A master's degree in Philosophy with a concentration in religious studies is available. (Details of this program are described under Philosophy.) Graduate courses in religious studies provide opportunity for students in a variety of disciplines to pursue work in religious studies as a graduate concentration.

GRADUATE COURSES

411 Modern Religious Philosophies (3) Religious implications of major Western thinkers and movements from Nicolas of Cusa to sixteenth-century German Idealists. (Same as Philosophy 411.)

412 Classical Indian Systems of Philosophy: The Moksha Tradition (3) Investigation of selected writings and philosophic problems of traditions of Samkhya, Yoga, Vedanta, Buddhism, or Jainism. Prereq: 374 or 376 or consent of instructor. (Same as Philosophy 412.)

416 Jesus and Paul Compared (3) Central ideas and concepts of each person compared with equivalent concepts in the other. Advanced study of Gospels and Epistles of Paul, involving extensive independent research.

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.

431 Seminar in Asian 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.

446 Theoretical Issues in Medical Ethics (3) (Same as Philosophy 446.)

490 Readings and Research in Religious Studies (3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

499 Seminars 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.

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) May be repeated. S/N or letter grade.

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

601 Seminar in Educational Theories in Special Education and Rehabilitation (3) Education theories: education and rehabilitation of exceptional persons. Theory applications in educational settings. Prereq: Admission to doctoral program or consent of instructor.

602 Seminar in Social Processes in Special Education and Rehabilitation (3) Social phenomena which influence impact of disability on person and significant others. Implications for habilitation. Prereq: Admission to doctoral program or consent of instructor.

603 Seminar in Research in Special Education and Rehabilitation (3) Development and implementation of research. Independent research studies. Research proposals. Prereq: 9 hrs of research core and consent of instructor.

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 or letter grade.

620 Internship 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 and satisfactory research and methodology courses. May be repeated. Maximum 9 hrs. S/N or letter grade.

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 or letter grade.

679 Special Topics (1-3) Prereq: Admission to doctoral program. May be repeated. Maximum 9 hrs. S/N or letter grade.

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

Romance and Asian Languages

(Majors in Arts and Sciences)

MAJORS

DEGREES

French .............................................. M.A.
Spanish .............................................. M.A.
Modern Foreign Languages .................. Ph.D.

John B. Romeiser, Head

Professors:
Barrette, Paul E., Ph.D. .......... California
Brady, Patrick (Shumway Chair of Excellence), D.U.P. .......... Sorbonne
Campion, Edmund J., Ph.D. .......... Yale
Cobb, Carl W., Ph.D. .......... Tulane
Elliott, Jacqueline C. (Emeritus), M.A. .......... Illinois
Handley, Michael H. (Liaison), Ph.D. .......... Florida State
Heffin, William H., Ph.D. .......... Florida State
Irving, Thomas B. (Emeritus), Ph.D. .......... Princeton
Levy, Karen D., Ph.D. .......... Kentucky
Maurino, Ferdinando D. (Emeritus), Ph.D. .......... Minnesota
Wallace, Albert H. (Emeritus), Ph.D. .......... North Carolina
Washburn, Yulian M., Ph.D. .......... North Carolina

Associate Professors:
Birzio, Flavia, Ph.D. .......... Washington
Cazeneve, Odile, Ph.D. .......... Penn State
Creel, Bryant, Ph.D. .......... California
DiMaria, Salvatore, Ph.D. .......... Wisconsin
Dias, Denise M., Ph.D. .......... Kansas
Duncan, Cynthia K., Ph.D. .......... Illinois
Ehrlich, Linda, Ph.D. .......... Hawaii
Holmlund, Christine (Liaison), Ph.D. .......... Wisconsin
Young, Dolly, Ph.D. .......... Texas

Assistant Professors:
Beauvills, Margaret, Ph.D. .......... Texas
Essif, Lea, Ph.D. .......... Brown
Kaplan, Gregory, Ph.D. .......... Pennsylvania
LaCure, Jon, Ph.D. .......... Indiana
Lewis, Elizabeth F., Ph.D. .......... Virginia
Nakuma, Constanco, Ph.D. .......... Sorbonne
Silvafilho, Euridice, Ph.D. .......... North Carolina
Wilkinson, Douglas, Ph.D. .......... Yale

The Department of Romance and Asian Languages offers two advanced degrees: the Master of Arts in French and in Spanish and the Doctor of Philosophy in Modern Foreign Languages.

Inquiries should be addressed to the head of the department. The head, through the coordinators of Spanish and French, will make available further departmental requirements, regulations, and materials not listed below.

THE MASTER'S PROGRAM

Thesis Option

1. Completion of a minimum of 24 semester hours in coursework plus at least 6 hours in
course 500 Thesis. In French, 501 is required; in Spanish, 550. A maximum of 6 hours may be taken at the 400 level, the rest at the 500 level, and under certain conditions the student may take 600-level seminars. If the student chooses to have a minor (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. An oral final examination covering the thesis.

Non-Thesis Option

1. Completion of at least 30 semester hours, with a maximum of 9 at the 400 level, the rest at the 500 level, including 501 (French) or 550 (Spanish). Under certain conditions, the student may take 600-level seminars. If the student chooses to have a minor (such as Italian or Portuguese), at least 24 hours must be taken in the major, 6 in the minor.

2. Three term papers that have been accepted by the student’s advisory committee.

3. A written examination covering the coursework and selected items from a master reading list.

4. A final oral examination to discuss the papers (French M.A. only).

THE DOCTORAL PROGRAM

The Ph.D. in Modern Foreign Languages is offered jointly by the Department of Germanic and Slavic Languages and the Department of Romance and Asian Languages. Students who choose a concentration in Germanic and Slavic Languages must take a minimum of 63 semester hours of coursework and selected items from a master reading list.

Admission Requirements

Applicants must have completed a B.A. in either French, German, or Spanish to be accepted into this program. Both graduates of institutions in the United States and those with undergraduate degrees from institutions outside the United States must have a grade point average of at least 3.0. Consideration will also be given to applicants who do not have an undergraduate degree in one of the three foreign languages but do have the equivalent of an undergraduate major in one of them.

Degree Requirements

Candidates with German as a first concentration must complete a minimum of 63 semester hours of coursework beyond the bachelor’s degree in addition to 24 hours of doctoral research and dissertation. Two tracks are available: 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. The coursework for Track II must be distributed in this way: at least 45 hours in the first concentration; at least 12 hours in the second concentration; and at least 6 hours in a cognate field. Because Track II students will have taken 12 graduate hours instead of 18 hours in the second concentration, they will normally not be eligible to teach that field at institutions which follow SACCS guidelines for college foreign language teaching.

1. First Concentration: French or Spanish. A minimum of either 39 (Track I) or 45 (Track II) hours of French or Spanish courses beyond the bachelor’s degree, distributed as follows:
   - 400 level: A maximum of 6 hours of 400-level classes taken for the M.A. may be applied.
   - 500 level: A minimum of 21 (Track I) or 27 (Track II) hours must be taken. These must include French 512, 516, 504 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.

2. Second Concentration, A minimum of 18 (Track I) or 12 (Track II) hours beyond the bachelor’s degree, taken in the field of applied linguistics or in a second language, either French, German, Italian, Portuguese (Track II only), Russian or Spanish. For Track I, 12 of these must be at the 500 level or above. For Track II, 3 of these must be at the 500 level or above.

   French students choosing applied linguistics must take French 421 or 429, 425, 512; and 9 (Track I) or 3 (Track II) hours of appropriate electives in English or French. Spanish students must take Spanish 421 or 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.

3. Cognate Field. Six hours in graduate courses numbered 400 and above in a field outside the department of the first concentration but related to the student’s principal area of research. Students choosing applied linguistics as a second concentration are strongly urged to take their cognate work in a second language.

4. Additional requirements: For any languages taken as a first or second concentration, a student must demonstrate competence by taking a test. The test will include reading, writing, listening, and speaking, and should be completed by the time the student reaches 40 hours of study beyond the bachelor’s degree. Standardized examinations that may be used for this purpose include applicable portions of either the National Teachers Examination, the MLA Examination for Teachers and Advanced Students, or the proficiency standards of the United States Foreign Service Institute (FSI).

   If a student has not chosen a third language as his or her cognate area, basic competence (determined by a reading examination with translation into English administered by the department concerned) in a third language is required. If the student’s first and second languages are Romance languages, the third language should be chosen from another language family.

   For students choosing applied linguistics as an area of second concentration, reading competence in a second language is required. Competence will be determined by translation of a text from the foreign language into English. The test to be administered by the department offering the language.

   A comprehensive examination on the language and literature of the first and second concentrations must be passed before the student may be admitted to candidacy. The candidate is required to defend his/her dissertation in an oral examination. Central emphasis is put on the doctoral dissertation as a final test of the candidate’s scholarly qualifications.

Graduate Teaching Assistants with a second concentration in another language should have the opportunity and will be strongly encouraged to instruct in the languages of both their first and second concentration, subject to staffing needs. Doctoral students are strongly encouraged to reside and study abroad and will be assisted in identifying potential sources of financial support (e.g., Fulbright, McCarthy, Rotary fellowships).

For additional courses, see Germanic and Slavic Languages.

ACADEMIC COMMON MARKET

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

Asian Languages

GRADUATE COURSES

431 Readings in Chinese Literature (3) 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.

471 Selected Topics in Asian Studies (3) Content varies. 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 of French authors written from Lyon and members of Pèlerade. Prerequisite: 300-level literature course.

412 French Literature of the 17th Century (3) Masterpieces 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 (3.5) French Romanticism and its counter movements: Realism, 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.

416 Survey of Francophone Literature (3) Examination of French literature outside metropolitan France, particularly, Africa and Caribbean. Prerequisite: 300-level literature course.

420 French Cinema (3) French cinema from earliest days through New Wave directors. Prerequisite: 300-level literature course. May apply toward major.

421 Phonetics (3) Foundation in science of phonetics. Practical exercises and individual performance. Laboratory training highly recommended. Graduate credit not available.
allowed for departmental majors. Prereq: Intermediate Composition and equivalent.

422 Advanced Grammar (3) Improving one's written French by studying basic and more refined structures of French language. Writing creative free-style compositions. Prereq: Intermediate Composition and Conversation or French for Business. 2 hrs weekly.

423-24 Advanced Conversation (1,1) Informal conversation with native speaker on contemporary topics. Stresses in-class contact rather than outside preparation. Prereq: Intermediate Conversation 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 related research and teaching of foreign languages and to study of literary texts. Recommended prereq: Language, Linguistics and Society. (Same as German 425, Linguistics 425, Russian 425, and Spanish 425.)

426 Methods of Historical Linguistics (3) (Same as German 426, Russian 426, Spanish 426 and Linguistics 426.)

429 Romance Linguistics (3) Development of Classical Latin through Vulgar Latin into major Romance languages. (Same as French 429 and Linguistics 425.)

430 Theatrical French (2-3) Performance in one or more French plays. Prereq: 300-level literature course. May apply toward major.

431 Highlights of French Civilization (3) Survey of French civilization from the Gauls to World War II. Historical events, daily life, all forms of art. Prereq: 300-level literature course.

432 Contemporary French Culture (3) French contemporary civilization and culture since World War II. Problems, trends, and organization of French society today. Prereq: 300-level literature course.

433-434 Literature of Quebec (3) Survey of literature of Quebec as well as literature connected with North America. Readings include explorer and missionary works, such as Voyages of Champlain and Journals of Jesuits, and literature of contemporary Quebec. Prereq: 300-level literature course.

445 Advanced French for Business (3) Advanced contemporary French language and culture as relates to business transactions. Comparative approach to explore differences and similarities between francophone business culture(s) and those of North America and Japan. Building knowledge of business terminology while being sensitized to cultural differences and dangers of simplistic stereotyping. Prereq: French for Business or consent of instructor.

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

501 Techniques in Literary Analysis (3) Required for M.A. program. Intensive course in explication de texte, a close stylistic analysis of texts representative of different eras and of different genres.

502 Registration for Use of Facilities (3-15) Required semester when student uses University facilities and/or for the student not otherwise registered during any semester. Maximum 6 hrs each.

541 Lyric Poetry of the 19th Century (3) Reading and interpreting great French romantic poets, "Tart pour Tart" movement, Parnassians, Charles Baudelaire and Symbolists.

541-42 Literature of the 16th Century (3,3) Literature of first half of 16th century, Rabelais and other prose writers, humanists, and poetry of Marot, Lyonnais group, and young Pléiade poets.

542 French Literature of the 17th Century II (3) Classical French theatre of 17th century.

551-52 French Literature of the 18th Century (3,3) Reading and interpreting works of Voltaire, Diderot, Rousseau, Beaumarchais, and others.

561 Lyric Poetry of the 19th Century (3) Reading and interpreting French romantic poets, "Tart pour Tart" movement, Parnassians, Charles Baudelaire and Symbolists.

561-62 French Literature of the 19th Century (3,3) Reading and interpreting works of Hugo, Vigny, Stendhal, Balzac, Baudelaire, Flaubert, Zola, Verlaine, and others. 562-Reading and interpreting works of pre-Romantic and post-Romantic periods.

571-72 Trends in Modern French Literature (3,3) In-depth study of some of the most revolutionary, challenging poets, novelists, dramatists of 20th century.

581-82 The French Novel (3,3) French Novel from 17th through 20th centuries.

583 Problems in Stylistics (3) Survey of comparative English-French stylistics. Development and improvement of one's written French.

584 Modern Theory and Criticism (3) Survey of twentieth-century critical theory, including 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.

Portuguese

GRADUATE COURSES

431-32 Topics in the Literature & Language of Portuguese Speaking World (3,3) Outstanding works of literature and culture from Portuguese countries. Topics may vary. Prereq: At least one course at the 300 level or the equivalent. May be repeated. Maximum 12 hrs.

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

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

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

Spanish

GRADUATE COURSES

421 Phonetics (3) Prereq: Intermediate Conversation and Composition or consent of instructor.

422 Advanced Grammar (3) Finer points of grammatical structures. Required of all majors. Available to non-native speakers only. Prereq: Intermediate Conversation and Composition or consent of instructor.

423 Advanced Conversation (3) Develops speaking skills to advanced level through a wide range of activities. Available to non-native speakers only. Prereq: Intermediate Conversation and Composition, or Spanish for Business or consent of instructor.

424 Advanced Composition (3) Develops writing skills to advanced level through the writing of compositions on assigned topics. Available to non-native speakers only. Prereq: 422 or consent of instructor.

425 Introduction to Descriptive Linguistics (3) (Same as German 425, German 425, Russian 425, and Linguistics 425.)

426 Methods of Historical Linguistics (3) (Same as German 426, French 426, Russian 426, and Linguistics 426.)

429 Romance Linguistics (3) (Same as French 429 and Linguistics 429.)

430-431 Topics in Spanish Literature (3,3) Topics vary. Prereq: Aspects of Spanish and Spanish-American Literature or consent of instructor. May be repeated with consent of department. Maximum 6 hrs.

450 Hispanic Drama (3) Close reading and analysis of representative works by selected dramatists of each period, either Spanish or Spanish American. Topics vary. Prereq: Aspects of Spanish and Spanish-American Literature or consent of instructor. May be repeated with consent of department. Maximum 6 hrs.
166 Social Work

451 Hispanic Prose (3) Close reading and analysis of representative works by selected novelists, essayists, short story writers of Spain or Spanish America. Topics vary. Prereq: Aspects of Spanish and Spanish American Literature or equivalent. May be repeated with consent of department. Maximum 6 hrs.

452 Hispanic Poetry (3) Major poets of each period, either Spanish or Spanish-American. Topics vary. Prereq: Aspects of Spanish and Spanish-American Literature or equivalent. May be repeated with consent of department. Maximum 6 hrs.

459 Capstone Colloquium in Spanish (3) Integrative experience. Broad range of issues and topics that affect much of Spanish-speaking world and also involve those who specialize in Hispanic studies. Prereq: Aspects of Spanish and Spanish American Literature or equivalent.

461 Special Topics (3) Aspect of Hispanic literature, culture, linguistics, or foreign language pedagogy. Topics vary. May be repeated with consent of department. Maximum 6 hrs.

471 Latin American Civilization (3) Latin America's diverse heritage and major social and political institutions. Prereq: Aspects of Spanish and Spanish American Literature or equivalent.


479 Social Protest Literature of Latin American (3) Analysis of literature as means of unmasking social ills, with emphasis on specific themes; selected works. Prereq: Aspects of Spanish and Spanish American Literature or equivalent.

482 Advanced Communication Skills for Teachers and Other Professionals (3) Advanced oral and written proficiency in Spanish through extensive use of authentic contemporary materials. Practical application of methods of teaching and evaluation of Spanish language skills. Prereq: Aspects of Spanish and Spanish American Literature or equivalent. May be repeated with consent of department. Maximum 6 hrs.

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

502 Registration for Use of Facilities (3-16) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

512 Teaching a Foreign Language (3) Practical application of methods for teaching and evaluating basic language skills and cultural aspects through seminars, presentations, peer teaching, and observation of foreign language classes. Required of all M.A. and Ph.D. students holding Graduate Teaching Assistantships, except those whose previous training or experience warrants their being excused by department.

522 Advanced Communication Skills for Teachers and Other Professionals (3) Advanced oral and written proficiency in Spanish through extensive use of authentic contemporary materials. Class lectures and discussions; oral and written presentations and reports. Especially recommended for graduate students. May be repeated with consent of department. May be repeated with consent of department. Maximum 6 hrs.

531 Old Spanish (3) Old Spanish language and medieval Spanish literature through 13th century.

532 Medieval Spanish Literature (3) Spanish literature of 14th and 15th centuries.

533 Golden Age Prose (3) Wide range of prose fiction in Spain during 16th and 17th centuries: Moorish, picaresque, devotional, pastoral and exemplary novels, and dialogues.

534 Don Quixote (3)

535 Golden Age Poetry (3) Garciaseco, Fray Luis de León, San Juan de la Cruz, Lope de Vega, Quevedo, and Góngora.

537 Golden Age Drama (3) Major dramatists of period: Lope de Vega, Tirso de Molina, Ruiz de Alarcón, Guillén de Castro, Calderón de la Barca, Moreto, and Rojas Zorrilla.


543 The 20th-Century Spanish Novel (3) Baroja, Azorín, Valle-Inclán, Pérez de Ayala, Cela, Delibes, Goytisolo, Matute, and at least one present-day novelist.

454 Modern Spanish Poetry (3) From Bécquer, Unamuno, A. Machado, Jiménez, Lorca, Guillén, Aleixandre, and a contemporary, Calayá.

457 Modern Spanish Drama (3) Major playwrights of 20th-century Spain.

458 Techniques of Literary Analysis and Research Methods (3) Theoretical and critical essays on various techniques of literary analysis. Exploration of bibliographical and research materials.

461 Special Topics in Spanish or Spanish American Literature (3) May be repeated. Maximum 6 hrs.

562 Directed Readings (3)

563 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.

562 Nineteenth-Century Spanish American Literature (3) From early nineteenth century to 1890. Content varies with regard to genre, theme, literary movements, or other aspects contributing toward definition of Spanish American literature.

564 Spanish American Novel: Mexico and the Caribbean (3) Study of major novels from Mexico, Central America, Caribbean and Venezuela. Modern period.


567 T. Spanish American Novel: Chile and the River Plate Nations (3) Novels from Chile, Argentina, Uruguay and Paraguay. Modern world.

568 Spanish American Modernismo (3) Various facets of Spanish American Modernismo in poetry and prose, 1890-1925.

569 Contemporary Spanish American Poetry (3) Major poets in Spanish American from post-modernismo to present day.

571 Spanish American Drama (3) Major playwrights of 20th-century Spanish America.


574 The Spanish American Short Story (3) Short story by major writers in Spanish America from Romanismo to present day, theory and criticism of genre.

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

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


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

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

581 Seminar in Spanish American Literature (3) Topics vary in field of Peninsular literature. May be repeated with consent of department. Maximum 9 hrs.

582 Seminar in Spanish American Literature (3) Topics vary. May be repeated with consent of department. Maximum 9 hrs.

Social Work (College of Social Work)

MAJOR

DEGREES

Social Work ........................................ M.S.S.W., Ph.D.

Eunice Shatz, Dean

Professors:

Bleich, M. H. (Emeritus), M.S. .............. Ohio State

Cetegok, M., Ph.D. ............................. Washington (St. Louis)

Faver, C., Ph.D. ................................. Michigan

Fryer, Gideon W. (Emeritus), Ed.D. .... Columbia

Glisson, C. A., Ph.D. .............................. Washington (St. Louis)

Granger, Ben P. (Emeritus), Ph.D.  .... Brandeis

Hirayama, H., D.S.W. ......................... Pennsylvania

McLarman, G. (Emeritus), M.S.S.W. ..... Tennessee

Mullins, M. Kate (Emeritus), Ph.D. ........ Chicago

Noe, Roger M., D.S.W. ........................ Tulane

Oken, J. D. (Emeritus), D.S.W. ............... Alabama

Rubenstein, H., Ph.D. ............................ Chicago

Shatz, Eunice, Ph.D. ............................. Tulane

Spencer, Terri, M. S.S.W. ........................... Texas

Thompson, J. P., Ph.D. .......................... Western Michigan

Vaughn, H. H., Ed.D. ............................. Memphis State

Assistant Professors:

Alsop, Ruth L., Ph.D. ............................ Washington (St. Louis)

Campbell, P. M., D.S.W. .......................... Alabama

Collier, J. C., M.S.W. ............................. Tulane

Crawford, S., M.S.W. ............................. Texas

Davey, Timothy L., Ph.D. ...................... Florida State

Denby, Ramona, Ph.D. ............................ Ohio State

Egan, Marcia, Ph.D. ............................... Maryland

Jones, J., Ph.D. ................................. Bryn Mawr

Marley, Martha, D.S.W. .......................... Tulane

Page, Timothy F., M.S.W. ..........................

Patterson, D., Ph.D. ............................... Utah

Rocha, Cynthia, Ph.D. ............................ Washington (St. Louis)

Rogge, Mary, M.S.S.W. .......................... Washington (St. Louis)

Spaulding, E., Ph.D. ............................. Smith

Vickerstaff, Susan, Ph.D. ........................ Alabama

Field Practice Coordinators:

Betz, Phyllis (Knoxville), M.S.S.W. ...... Tennessee

Harris, Joyce (Nashville), M.S.S.W. ... Tennessee

Pomerantz, Edward (Memphis), M.S.S.W. ... Barry

THE MASTER'S PROGRAM

The Master of Science in Social Work program prepares social workers to provide professional leadership in: 1) clinical social work practice and 2) social work management and community practice. These objectives are met through a curriculum requiring of all students a professional foundation and a concentration in either clinical social work practice or management and community practice.

Russian

See Germanic and Slavic Languages

Small Animal Clinical Sciences

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

Admission to the master’s program is based on the following requirements:

1. A Bachelor’s degree from an accredited college or university with appropriate preparation in the social sciences. At least three-fourths of the applicant’s undergraduate work should be in the social sciences, humanities, physical sciences, and other Arts and Sciences subjects. Applicants must have at least one course in each of the following: economics, government or political science, human biology, sociology or anthropology, psychology, philosophy or the arts, or literature, or history. Applicants with other academic backgrounds may request consultation to discuss ways that they can meet the requirements.

2. A grade point of 2.7 or higher on a 4.0 scale. Applicants falling below this average may be considered for probationary admission on the basis of supplemental evidence of the ability to perform at a satisfactory level. The University requires a minimum GPA of 2.7 for admission to the Graduate School.

3. Personal qualifications acceptable for entrance into the professional practice of social work.

4. All applicants must submit up-to-date scores from the Graduate Record Examination (general).

Preference is given to applicants with a GPA of 3.0 or above in their undergraduate work with substantial preparation in the social sciences.

Advanced Standing

The University of Tennessee College of Social Work has an advanced standing program. Admission to advanced standing requires: (1) a B.S.W. from an accredited program, (2) an overall undergraduate GPA of 3.0 or greater, and (3) personal qualifications acceptable for entrance into the professional practice of social work. Students admitted into advanced standing are required to complete a minimum of 42 hours of study in either of the college’s concentrations - clinical social work practice or management and community practice. These students will follow the curriculum plan and meet all requirements of the concentration during three semesters of study in the program.

Specific information about the advanced standing program is available from the college. Application for admission to the advanced standing program is through the regular admission process.

Extended Study

Planned part-time programs are available in all three branches of the college. Admission requirements are the same as for full-time study. Coursework can be completed over a three-year period. One year of the student’s period of study must be on a full-time basis.

Financial Aid

Students may apply directly to the University’s Financial Aid Office for assistance such as the National Direct Student Loan or the Work-Study Program. Other stipends are administered by the College and awarded on the basis of financial need. Applications for these funds must be made to the Branch of the College the student will attend. A student must first apply for University assistance, since College funds are considered supplementary to those of the University. Additional information about College

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 insure that students have quality field practice experiences, meeting the objectives of the core curriculum and the concentration.

The college uses a concurrent class and field plan. Students are in field two days per week during the first year and three days per week in the second year.

First-year agency placements are selected to provide practice experiences related to the foundation curriculum content. Within the placement, each student’s experiences are planned and designed according to educational objectives.

Second-year placements are selected according to the student’s area of concentration, individual career interests, and educational needs. The student actively participates with the field practice coordinator and the educational committee in selection of the second-year placement. The second-year field placement experience focuses on the integration of social work knowledge and values, and emphasizes the acquisition and development of practice skills.

Students are responsible for meeting the requirements of their placement agencies in terms of office hours and workload coverage. This responsibility takes precedence over scheduled University breaks and may result in variations in holidays and office hours for the student.

Transfer Credits

Coursework equivalent to the first year of the master’s program, completed in another accredited graduate social work program, is usually accepted toward degree requirements. Applicants must meet the admission requirements of The Graduate School and the College of Social Work. Transfer courses must be approved as equivalent to required and/or elective courses taken for graduate credit and passed with a grade of B or better. An S (earned on an S/N/C system) for the field practicum is also accepted. In addition, transfer courses must be of an otherwise satisfactory graduate program (B average) and be approved by the dean. This coursework must be completed within the six-year period prior to the receipt of the degree.

A maximum of 6 semester credits from work earned in disciplines other than social work may be transferred as elective credits. The student’s academic committee must approve the request and the transfer credit must meet Graduate School requirements.

Proficiency Examination

Students in the master’s program may earn a maximum of nine hours by proficiency examination, with the exception of field practice courses. Students interested in proficiency examinations are referred to The Graduate School statement describing the procedure for applying for examination.
THE DOCTORAL PROGRAM

The College of Social Work offers the Doctor of Philosophy with a major in Social Work. The focus of social work education at the doctoral level is to foster the development of an attitude of scientific inquiry, knowledge of the scientific method, ability to extend the knowledge base of social work practice, and effective participation in leadership roles in social work education, research, and practice.

The emphasis of the doctoral program is upon:
- The analysis of direct intervention and social administration and of the interrelationships among each of them and their social policy, organizational, and community contexts.
- Research-based knowledge to inform and guide social work practice, social policy, and social welfare program development.

The program consists of foundation courses, elective courses, and dissertation research. The courses are available only in Knoxville. Students and their committees can develop a plan for completing their research in Nashville and Memphis based on the availability of dissertation resources.

Students have the opportunity to work in the Children’s Mental Health Services Research Center, a National Institute of Mental Health research center, as part of their training. The Center is one of only three such centers nationwide and focuses on services to children who have experienced mental health problems associated with abuse, neglect, violence and a variety of psychosocial problems.

Admission Requirements

The Ph.D. program is designed for students who have completed a master’s degree in an accredited school of social work and have post-master’s social work/social welfare experience. Applicants who do not meet these requirements, but believe they have equivalent credentials should contact the Chair of the Ph.D. program for further information regarding admissions criteria.

General Requirements

1. A minimum of 36 hours beyond the master’s degree completion of 24 hours of required coursework, b) completion of 15 credits of advanced electives, at least 12 of which are taken outside the department, and c) completion of at least 24 credit hours of dissertation research.
2. Successful completion of qualifying and comprehensive examinations.
3. Completion and defense of the dissertation.

Curriculum

The curriculum of the Ph.D. program consists of foundation course work, electives, and dissertation research. The foundation curriculum consists of 21 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 foundation curriculum is completed and elective coursework begun during the first year of study, the elective requirement is completed and dissertation research begun in the second year of study, and dissertation research is continued in the third year of study. While it is generally expected that the coursework will be completed on a full-time basis, dissertation research can be completed on a planned part-time basis.

Specific courses required are 601, 602, 612, 613, 540, 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 comprehensive examination. The qualifying examination covers the foundation curriculum. The comprehensive examination is administered by members of the doctoral committee and is designed for the student to demonstrate comprehensive knowledge of the major and cognate areas and the dissertation topic. In case of failure of either examination, the student may request a retake. The result of the second examination is final.

Financial Aid

Financial aid is available to qualified students in the form of fellowships, scholarships, and teaching and research assistantships. Graduate assistantships and other forms of assistance are awarded on the basis of merit and interest to applicants who are accepted into the Ph.D. program.

MINOR IN GERONTOLOGY

Graduate students in the College of Social Work may pursue a specialized minor in gerontology. This interdisciplinary minor gives the student an opportunity for combining the knowledge about aging in American society with his/her major concentration. Please refer to Human Ecology for specific requirements.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in graduate programs at UT Knoxville on an in-state tuition basis. The M.S.S.W. and Ph.D. programs in Social Work are available to residents of the state of Arkansas; the Ph.D. to residents of Kentucky, Oklahoma, or West Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE COURSES

NOTE: Graduate students majoring in fields other than social work are admitted to certain social work courses with the approval of the College of Social Work and the student's major professor.

500 Thesis (1-15) P/NP only. E
501 Foundations of Social Work Practice I (3) Survey of history, mission, and identity of profession. Basic theory, values, and methods generic to social work practice at various systems levels. Assessment, planning, communication, intervention, and evaluation skills. Prereq: Admission to College or consent of instructor. F
502 Registration for Use of Facilities (3-15) Required for the student not previously registered during any semester when the student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N/C only. E
503 Foundations of Social Work Practice II (3) Generalist practice with individual, family, and small groups. Ecological theory to frame understanding of such systems and their adaptation to environments. Various social work roles in intervention, strategies pertaining to each client system. Prereq: 501 or consent of instructor. Sp
504 Foundations of Social Work Practice III (3) Basic theory, methods, problems, and strategies in implementing planned change within and among larger social systems: task groups, human service organizations, and community systems. Various practice roles: plannner, program developer, supervisor, administrator, advocate and task group leader. Prereq: Completion of first semester of foundation or consent of instructor. Sp
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. Prereq: Admission to college or consent of instructor. Sp
508 Practicum in Social Work Research (3-6) Supervised practice in application of research methods to social work practice. Prereq: 504 and consent of faculty conducting investigation. May be repeated. Maximum 6 hrs. S/NC only. E
509 Graduate Seminar in Public Health (1) (Same as Public Health 508, Exercise Science 506, Nutrition 509, and Nursing 509.)
514 Human Behavior in the Social Environment I (3) Theories examining the interaction of individual, family, and group development while emphasizing relationships among biological, social psychological, and cultural systems. Dynamics of behavior in context of social structures, ethnicity, social class, gender roles. Prereq: Admission to College or consent of instructor. F
515 Human Behavior and Social Environment II (3) Patterns of adaptive and maladaptive behavior, recognizing theoretical models, models and criteria. Interactions among individuals, families, organizations, communities and maladaptive behavior: mental illness and abusive behavior. Prereq: 514 or consent of instructor. F
516 Social Welfare Policy and Services (3) Development of contemporary social policy at the local, state, national, and international levels. Contribution of social work professionals to formal policy-making processes through which macrosocial change is effected and through which aggregate social welfare services are proposed, authorized, financed, and programmed. Theories of complex organizations applied to social welfare service delivery settings. Prereq: Admission to college or consent of instructor. F
518 Social Work and Oppression (3) Sources, dynamics, and effect of oppression in the U.S. system as manifested in both social/ecological systems and personal experience. Connections among various forms of oppression: racism, sexism, classism, and heterosexism. Forces which perpetuate such conditions. Prereq: Admission to College or consent of instructor. F
521 Clinical Social Work Practice with Individuals (3) Theories, knowledge, and skills for clinical practice with individuals from ecological perspective. Therapeutic process and treatment strategies, incorporating content from psychodynamic and cognitive practice models. Specific client problems. Prereq: Completion of foundations or consent of Instructor.
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 treatment in terms of application to families with varied system and individual problems and to families from varied social and cultural backgrounds. Prereq: Completion of foundation or consent of instructor. F
525 Clinical Social Work Practice with Groups (3) Theoretical and historical approaches to social work with groups and clinical principles supporting specific types of group work used in clinical practice and associated leader interventions. Prereq: Completion of foundation or consent of instructor. Sp
526 Research for Assessment of Social Work Treatment (3) History and philosophies, conceptual ap-
Sociology (College of Arts and Sciences)

MAJOR

Sociology ........................................... M.A., Ph.D.

Michael L. Benson, Head

Professors:

Betz, D. Michael, Ph.D. ...................... Michigan State
Black, James A., Ph.D. ...................... Iowa
Gaventa, John P., Ph.D. ...................... Oxford
Hastings, Donald W., Ph.D. ............... Massachusetts
Hood, Thomas C., Ph.D. ...................... Duke
Ploch, Donald R., Ph.D. ....................... North Carolina
Shover, Neal, Ph.D. ......................... Illinois
Wallace, Samuel E., Ph.D. .................. Minnesota

Associate Professors:

Benson, Michael L., Ph.D. ................ Illinois
Cable, Sherry, Ph.D. ......................... Penn State
Kurth, Suzanna B., Ph.D. .................... Illinois (Chicago)
Perrin, Robert G. (Liaison), Ph.D. .......... British Columbia

Assistant Professor:

Jalata, Asafa, Ph.D. ......................... SUNY (Binghamton)
Jones, Robert E., Ph.D. ...................... Washington State

The Sociology Department offers graduate study leading to the Master of Arts and the Doctor of Philosophy. The M.A. program includes a thesis and non-thesis option. The graduate program has concentrations in criminology; energy, environment, and resource policy; and political economy. The criminology concentration includes 505, 551, 653, and 655. The energy, environment and resource policy concentration includes 560, 563, 661, 662, and 665. The political economy concentration includes 504, 540, 541, 643, 644, and 645. Both the master’s and the doctoral program allow for the construction of individualized programs of study. Detailed information may be obtained from the Director of Graduate Studies in Sociology. All incoming students will be advised by the Director of Graduate Studies. New students are admitted in fall semesters only and applications must be received by the Graduate Admissions and Records Office by February 1.

ADMISSION REQUIREMENTS

1. Acceptable scores on the general Graduate Record Examination (verbal, quantitative, and analytical) are required. GRE scores in the subject area (Sociology) are requested but not required.

2. Three letters of recommendation (forms may be obtained from the department).

3. Completion of the appropriate previous degree (baccalaureate, preferably with a major in one of the social sciences, for the M.A. program; master’s degree in one of the social sciences for the doctoral program).

THE MASTER’S PROGRAM

Thesis Option

A minimum of 30 hours beyond the baccalaureate degree, including 24 hours of coursework and 6 hours of Thesis 500, is required. Students must complete Sociology 521, 531, Statistics 531, and one foundation
course (504, 505, or 560). At or near the end of all coursework, the student must take an oral examination on course material and thesis. The examination will be administered by the student's committee.

Non-Thesis Option
A minimum of 30 hours of coursework is required, including Sociology 521, 531, Statistics 531, and one of the following: 504, 505, or 560. Sociology 534, 622, and Statistics 532 are recommended. Sociology courses at the 400 level may be taken with the approval of the student's committee. A student's plan of study should follow one of the following approaches: Plan 1, 6 hours in one of the department's concentrations and 6 hours in a second area, including areas outside the department, subject to the approval of the student's committee; Plan 2, 12 hours in a special area of study approved by the student's committee and the department's Graduate Program Committee. A student is encouraged to prepare a paper synthesizing their knowledge of the concentration(s). Students who incorporate supervised field experience in their programs are encouraged to prepare a report based on those experiences that demonstrates their understanding of research, theory, and report writing. All students must take final written and oral examinations that include questions on their general coursework in theory and methods and on their special areas of study.

Subject to approval by the student's committee, up to 12 hours may be taken in courses outside the department for either program.

THE DOCTORAL PROGRAM

Coursework
Twenty-four hours of coursework beyond the master's degree are required (exclusive of S/NC credits). Twelve hours of course credit in Sociology at the 600 level are required. Students who enter the program without the courses required for the M.A. degree (521, 531, Sociology 531) or their equivalents must take them as remedial work which does not apply to their program of study. Students must complete Sociology 522, 534, 563, 633, or 636; and Statistics 532 or another advanced course in statistics. Completion of 9 hours in each of two concentrations is encouraged. A student who cannot achieve his/her educational goals within the department's concentrations may construct an individual program of study subject to the approval of the student's doctoral committee and the Graduate Program Committee. Sociology courses at the 400 level may not be taken without the consent of the student's advisor and the Graduate Program Committee. Six hours may be taken in related fields without petitioning the Graduate Program Committee for approval. The student's program may include a minor or cognate field.

Comprehensive Examinations
Written examinations in four areas are required (sociological theory, research methodology, and two substantive areas). Doctoral students are eligible to take the theory and methodology examinations whenever offered. Substantive examinations may be taken upon completion of theory and methodology examinations. Detailed information on examinations and examination options (generalist, specialist, and colateralist) may be obtained from the department.

Dissertation and Final Examination
A dissertation based on original research must be completed (24 hours). The candidate must pass an oral defense of the dissertation, including the theory and methodology related to the research, in accordance with the deadlines specified by The Graduate School.

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

MINOR IN GERONTOLOGY
Graduate students in the Department of Sociology may pursue a specialized minor in gerontology. This interdisciplinary minor gives the student an opportunity for combining the knowledge about aging American society with his/her major concentration. Please refer to human ecology for specific requirements.

ACADEMIC COMMON MARKET
An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.A. program in Sociology is available to residents of the state of Virginia (concentration in criminology only); the Ph.D. to residents of West Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE COURSES
405 Sociology of Sport (3) Social meaning, organization, and process of sport. Prereq: 261 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.
448 The Modern World System (3) Critical examination of capitalist world-system as social system, its coherence, boundaries, regions, member groups, cleavages, and patterns of conflict. Analysis of who gets what, why, and how in global political economy.
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.
459 Organizational and Corporate Crime (3) Analysis of crime and deviance committed by organizations. Case studies of corporate and organizational crime, organizational dynamics of crime, theories of corporate crime, and organized responses to this type of crime by governmental regulatory agencies.
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.)
471 Sociolinguistics (3) (Same as English 471 and Linguistics 471.)
480 Diffusion of Agricultural Technology (3) (Same as Rural Sociology 480.)
500 Thesis (1-15) P/NP only. E
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E
504 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.
540 Occupations (3) Occupations in relation to individuals and society, technology, economic stratification, and social organizations.
541 Collective Behavior, Social Movements, Social Change (3) Basic theory and research on conditions of social unrest in human collectivities and efforts of collectives to change existing society.
542 Sociological Aspects of Sport (3) (Same as Sport Studies 542.)
543 Sociology of Development (3) Sociological theories and studies of development: modernization, colonialism, dependency; comparative impact of various development paths upon selected aspects of social structure and change.
551 Delinquency and the Social Structure (3) How study of delinquency and juvenile justice is affected by changing structures of childhood and adolescence, changing demographic, and institutional influences, and changing views about responsibility and punishment.
560 Environmental Sociology (3) Systematic treatment of current research in environmental sociology. Social impact analysis and conflicts and over environmental issues.
563 Demographic Techniques (3) Standard rates and measures of demographic variables, life table analysis, increment-decrement models, and survey techniques of population analysis.
580 Advanced Rural Sociology (3) (Same as Rural Sociology 580.)
585 Seminar in Gerontology (1-3) (Same as Human Ecology 585, Counseling Education and Counseling Psychology 585, Exercise Science 585, Nursing 585, Public Health 585, Psychosocial Education 585, and Social Work 585.)
591 Foreign Study (1-15) See College of Arts and Sciences.
592 Off-Campus Study (1-15) See College of Arts and Sciences.
Special Programs

(College of Arts and Sciences)

GRADUATE COURSES

510 Humanities Perspectives in the Arts and Sciences (2) Seminar on nature of inquiry in humanities. Emphasis on nature and special forms of human experience and its interpretation through study of formative texts and critical figures.

520 Natural Science Perspectives in the Arts and Sciences (2) Seminar on nature of inquiry in physical and biological sciences drawing on history of science, critical figures in shaping of scientific thought, and methodology for observation and experimentation in natural sciences.

530 Social Science Perspectives in the Arts and Sciences (2) Seminar on nature of inquiry in social sciences. Emphasis on methodology for observation and research in study of human beings, their social environments and their behavior.

Speech Communication

(College of Arts and Sciences)

John Haas, Head

Professors:
Julian, Faye D. (Liaison), Ph.D. Tennessee
Lester, Lorayne W., Ed.D. Tennessee
Yemans, G. Allan (Emeritus).
Ph.D. Louisiana State

Associate Professors:
Ambrester, M. L., Ph.D. Ohio
Cook, N. C., M.A. Alabama
Glenn, Robert W., Ph.D. Northwestern
Haas, John W., Ph.D. Kentucky

Assistant Professors:
Ambler, R. S., Ph.D. Ohio State
Arnold, Christiana, Ph.D. Florida

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

GRADUATE COURSES

420 Communication and Conflict (3) Communication as significant factor in development, management, and resolution of conflict at interpersonal, small group, organizational or societal levels.

425 Interpersonal Health Communication (3) Interpersonal communication in health care settings: provider-client interactions, social support groups, stigma and disease, and contemporary models explaining use of health-related information.

440 Organizational Communication (3) Organizational setting and variables of communication process that affect quality of human interaction both within and outside organization.

465 Studies in Rhetorical History and Criticism (3) May be repeated. Maximum 6 hrs.

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 1920's. (Same as Women's Studies 465.)

475 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 475.)

480 Ensemble Interpretation (3) Study and presentation of literacy texts through group performance.

570 Legal and Ethical Issues of Communication (3) Communication rights and responsibilities. Prereq: Consent of instructor.

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

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

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

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

Spanish

See Romance and Asian Languages

Sport and Physical Activity

(College of Education)

MAJORS

Human Performance and Sport

Studies........................................ M.S.

D. Kelley, Leader

Professors:
Lay, Nancy E. (Emeritus), Ph.D. ... Florida State
Watson, Helen B. (Emeritus), Ph.D. ... Michigan

Associate Professor:
Jones, Ralph E., Ph.D. ............. Toledo
Kelley, Dennis R., Ph.D. .......... Georgia State

Assistant Professors:
Boroviski, Patricia C., M.S. ...... Tennessee
McCutchen, M. G., Ed.D. ........... North Carolina (Greensboro)

The Sport and Physical Activity unit offers a master's degree with a major in Human Performance and Sport Studies, concentration in sport administration/management (an interdisciplinary concentration with Health, Leisure and Safety Sciences). See Education under Fields of Instruction for full description of degree requirements.

Specific questions about the program should be directed to the unit leader.

ADMISSION REQUIREMENTS

Applicants are required to complete the unit application which will be sent to all persons upon their initial inquiry about the program. Preference will be given to students with an overall undergraduate GPA of 3.0 or higher. Students with a GPA between 2.7 and 2.99 are encouraged to submit GRE scores.

The following retention policy applies to all graduate students seeking a degree in this unit:
511 Administration/Superintendence in Sport (3) Development of knowledge and analytical 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. Sp

522 Evaluation Techniques in Sports Business (3) Develop a working knowledge of the various statistical approaches to leadership styles in sport administration with cultural context, research, and field experiences. Sp

533 Ethics in Sport Administration (3) Development of ethical and professional skills of middle and upper level managers in administration of sport business/organization. Social issues and ethics in sport administration. F

541 Management and Operation of Recreation and Sport Facilities (3) Same as Recreation and Leisure Studies 541.

544 Theories of Leadership and Leader Behavior in Sport (3) Integration of various theoretical approaches to leadership styles in sport administration with cultural context, research, and field experiences. Sp

553 Case Studies in Sport Administration (3) Current issues and problems in sport administration at all levels of amateur and professional sport. F

554 Readings in Sport Administration (3) Survey of pertinent literature in refereed and applied journals and texts. E
Curriculum

A minimum of 33 credit hours must be completed for the master’s degree. Required of all students are 6 hours in statistical methods, 6 hours in statistical theory, 1 hour in statistical computing, and 3 hours in either supervised consulting or internship. Students must complete a minimum of 21 hours in approved statistics courses, exclusive of consulting, internship, independent study, or thesis.

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 program of courses with the IGSP. The program is administered by an Executive Committee, consisting of college representatives from all colleges with approved programs, with advisory input from the program faculty.

Degree Program

Hours in Approved IGSP Courses

Master’s in home department, minor in Statistics 9
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 includes as part of the comprehensive examination for the master’s degree.

General Admissions and Degree Requirements

1. The student’s home department must have an approved program of courses with the Executive Committee. That program will specify the sequences of statistics courses, chosen from the IGSP approved list, that are considered appropriate by the home department. Students who wish to participate in this program should contact their college representative or the Chair of IGSP in the Department of Statistics.

2. The student’s graduate committee must include a faculty member of the Department of Statistics at the rank of Assistant Professor or above.

3. The student’s Admission to Candidacy form must contain all courses required for the chosen degree program set off in a group and labeled “Statistics Courses Required for the Minor or M.S. in Statistics.” Should the student not decide to apply for admission to the program until after completion of some of the courses, the student’s major professor should file a program change with the cooperating departments and assist the student in obtaining a Department of Statistics faculty member to serve on the student’s graduate committee.

Successful completion of the Statistics M.S. or minor is recognized on the official transcript of the student’s transcript. Students who do not complete the requirements of the minor or M.S. will still receive academic credit for the statistics courses they have successfully completed.

BUSINESS ADMINISTRATION CONCENTRATION

For complete listing of MBA program requirements, see Business Administration.

MBA Concentration: Statistics

Minimum course requirements are 571, 586, 572 with prereq or coreq of 561.

Ph.D. Concentration: Statistics

This degree provides students with a broad knowledge of the field of statistics, the ability to apply statistics in practical situations to problems of business and industry and the ability to develop new statistical methods; all of which takes place while students are exposed to coursework in the basic functional areas of business.

Minimum course requirements are: 673, 666, 691, and 592.

ACADEMIC STANDARDS

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

(College of Human Ecology)

MAJORS

Interior Design

Textiles, Retailing and Consumer Sciences

M.S. Textiles, Retailing and Consumer Sciences

M.S. Human Ecology

Ph.D.

Nancy B. Fair, Head

Professors:

Blakeimore, R. G. (Emeritus), Ph.D. Florida State
DeJonge, Jacquelyn C., Ph.D. ......... Iowa State
DeLong, A. J. (Liaison), Ph.D. ......... Penn State
Drake, Mary Fran, Ph.D. .......... Pennsylvania State
Duckett, Kermit E., Ph.D. .......... Tennessee State
Wadsworth, Larry C., Ph.D. ...... NC State

Associate Professors:

Brose, Randall R. (Liaison), Ph.D. Florida State
Dyer, C. L. (Liaison), Ph.D. ............ North Carolina
Fair, Nancy B., Ph.D. ................. NC State
Fairhurst, Ann E., Ph.D. .......... Oklahoma State
Jabon, Josette, Ph.D. .......... Tennessee State

Assistant Professors:

Bhat, Gajanan, Ph.D. .......... Georgia Tech
Gupta, Millend, Ph.D. ......... Missouri
Kupritz, Virginia, Ph.D. .......... VPI
Lee, Jinkook, Ph.D. .......... Ohio State
Reardon, James, Ph.D. .......... North Texas

Research Assistant Professors:

Dover, Molly, Ph.D. ........ Kansas State
Hassenboehler, Charles, Ph.D. .......... Tennessee
Khan, Ahamad, Ph.D. .......... Tennessee
Kupritz, Virginia, Ph.D. .......... VPI
Tsai, Peter, Ph.D. .......... Tennessee

The Department of Textiles, Retailing, and Interior Design offers master's degrees in Interior Design and in Textiles, Retailing, and Consumer Sciences. The program in Textiles, Retailing, and Consumer Sciences offers concentrations in textile science and in retail and consumer sciences. An interdepartmental/interdisciplinary minor in gerontology gives the graduate student an opportunity for combining the knowledge and experience about aging in American society with his/her own major concentration.

The master's program in Interior Design provides a balance between creative and theoretical foundations of the field: emphasis is placed on the dissemination of knowledge. The goal of the graduate program in interior design is to provide the student with scholarly and professional experiences through seminars, studio work, and research. Interdisciplinary thrusts increase the depth of understanding of the field of interior design essential to function as educators or as independent professionals. Areas of emphasis within interior design include: historic preservation/adaptive use and environment behavior.

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

Interested students should contact the department head for more information.

ADMISSION REQUIREMENTS

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

Admission to the master's degree program with a major in Textiles, Retailing and Consumer Sciences is dependent on completion of undergraduate coursework that gives the necessary background for success in the graduate program. For the concentration in Retail and Consumer Science, students should have an adequate background in retailing and/or consumer science supported by coursework in economics, marketing, mathematics, and statistics. For the concentration in textile science, students should have a basic technical background in textile science or materials science supported by mathematics through differential equations, organic chemistry, and general physics.

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

THE MASTER'S PROGRAMS

Interior Design

The M.S. in Interior Design requires the completion of 36 hours of graduate credit. The requirements for the degree include the following: in the major, 18 hours (including 510, 564, 573, and 590 - students must enroll in 590 the first two semesters in the program); a cognate area, 6 hours; research methods, 3 hours; statistics, 3 hours; a comprehensive design/research project with acceptable documentation, a publishable paper with outside review, or a thesis, 6 hours; a comprehensive examination by the student's committee on the project/research conducted. Based on interest and prior background, each student has a choice of the areas of emphasis within the interior design program. Emphasis may include historic preservation and/or adaptive use and/or environment-behavior, or any acceptable combination (e.g., an adaptive use project with an emphasis on behavioral aspects). Areas within the environment-behavior emphasis considered appropriate are proxemics, environments for the elderly or children, or professional design.

Each student is required to demonstrate competence in individual research either through the thesis or non-thesis option (a comprehensive design/research project). A non-thesis option is not available.

Non-Thesis Option: Complete a comprehensive design project with acceptable documentation or publishable paper. To be eligible, the student must have completed 12 hours of graduate credit in interior design with at least a 3.0 GPA. Having met this criteria, the student must present a proposal to the supervisory committee that will include 6 hours of subsequent coursework. This proposal must outline the nature of the project and its appropriate methodology. A comprehensive oral and written examination, administered by the committee, will occur upon completion of the program.

Textiles, Retailing and Consumer Sciences

The major in Textiles, Retailing and Consumer Sciences has concentrations in Retail and Consumer Sciences and in Textile Science. Requirements are listed below.

A comprehensive oral examination, administered by the thesis committee, will be given upon completion of the thesis research. A non-thesis option is not available.

The Ph.D. Concentrations

Consumer Environments

Students enrolled in the Ph.D. program with a concentration in consumer environments are provided with a foundation in management and retail and consumer sciences or in understanding the consumer in the designed environment and management of facilities. From this base, students focus on retail and consumer sciences or on areas of specialization including historic preservation and adaptive use, human environment interaction and facilities management to further theory and application in advanced study and research. See the consumer environments concentration under Human Ecology.

Textile Science

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

1. College Professional Seminar, HE 610 (3 hours)
2. RCS 552 (3 hours)
3. Research Methods which must include 6 hours of laboratory techniques in materials analysis and characterization.
GRADUATE COURSES

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

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

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


540 Socio-Psychological Aspects of Apparel (3) Apparel and human behavior in social situations. Prereq: 6 hrs or equivalent from sociology and psychology.


552 Economics of Textile Complex (3) Economics of U.S. textile complex. Quantitative approaches to industry structure and trends; production, marketing, distribution, and institutions within both global and domestic settings. Current and future international issues and implications. Prereq: Calculus III or equivalent; microeconomics. F, A

562 Research Methods (3) Fundamentals of research method, advanced science, methodology and method of research, issues and concepts of basic and applied research. Prereq: Statistics 531 or equivalent. Sp

590 Research Seminar (1) Research topics in retail and consumer sciences. May be repeated. S/NC only. F, Sp

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 and related special populations, special research methods. Prereq: 9 hrs graduate coursework. May be repeated. Maximum 9 hrs.

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


615 Retail and Consumer Sciences Literature and Thought (3) Evaluation of retail and consumer sciences literature with emphasis upon research literature, development of scholarly thought, and identification of potential areas of further study. Prereq: 562, Marketing 501, Economics 501. F, A

616 Research Methods, Models and Measurement in Retail and Consumer Sciences (3) Quantitative methods and analytical concepts in research process. Mathematical and statistical tools and concepts to consumer sciences phenomena, utilizing models, model building and measurement constructs. Prereq: 562, Statistics 536. Sp, A

641 Retail Consumer Behavior (3) Theories and concepts from social science in relation to ultimate consumer's behavior. Prereq: 6 hrs of sociology and/or psychology or consent of instructor.

651 The Consumer and Public Policy (3) Public policy issues within consumer environments. Analysis of past/present policies within economic, social, legal and business frameworks. Implications of consumer issues and policy alternatives. Literature and research focus. Prereq: 550 or consent of instructor.

695 Advanced Topics in Retail and Consumer Sciences (3) Lecture, group discussion, individual research on advanced topics and research areas of current significance with retail and consumer sciences. Prereq: 9 hrs graduate coursework or consent of instructor. May be repeated. Maximum 9 hrs.

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

510 Fiber Science (3) Physical properties, mechanical properties and microstructure of polymeric fibers; relation to end-use properties. Prereq: Organic Chemistry and Thermal Physics or equivalent.

520 Optical Microscopy (4) Basic approach and polarizing microscopy for imaging. Optical property measurements, and structure elucidation. Other methods of optical microscopy. Prereq: Fundamentals of Physics; Wave Motion, Optics and Modern Physics or equivalent. 3 hrs and 2 labs.

591 Nonwoven Science and Technology I (3) Nonwoven fabric technology; different web forming processes; and relationships among the chemical, morphological and mechanical properties of fibers and orientation in webs to final performance properties of bonded nonwoven fabrics. Prereq: Organic chemistry or consent of instructor.

593 Directed Study (1) Nonwoven fabric technology: different web forming processes; and relationships among the chemical, morphological and mechanical properties of fibers and orientation in webs to final performance properties of bonded nonwoven fabrics. Prereq: Organic chemistry or consent of instructor.

651 The Consumer and Public Policy (3) Public policy issues within consumer environments. Analysis of past/present policies within economic, social, legal and business frameworks. Implications of consumer issues and policy alternatives. Literature and research focus. Prereq: 550 or consent of instructor.

695 Advanced Topics in Textile Science (3) Lecture, group discussion, individual research on advanced topics and research areas of current significance with consumer sciences phenomena, utilizing models, model building and measurement constructs. Prereq: 562, Statistics 536. Sp, A

626 Physics of Fiber Structures (3) Morphology of polymeric structures; thermal and processing history on mechanical, electrical and chemical properties of fibers. Prereq: 510.


695 Advanced Topics in Textile Science (3) Lecture, group discussion, individual research on advanced topics and research areas of current significance with consumer sciences phenomena, utilizing models, model building and measurement constructs. Prereq: 562, Statistics 536. Sp, A

641 Retail Consumer Behavior (3) Theories and concepts from social science in relation to ultimate consumer's behavior. Prereq: 6 hrs of sociology and/or psychology or consent of instructor.

651 The Consumer and Public Policy (3) Public policy issues within consumer environments. Analysis of past/present policies within economic, social, legal and business frameworks. Implications of consumer issues and policy alternatives. Literature and research focus. Prereq: 550 or consent of instructor.

695 Advanced Topics in Retail and Consumer Sciences (3) Lecture, group discussion, individual research on advanced topics and research areas of current significance with retail and consumer sciences. Prereq: 9 hrs graduate coursework or consent of instructor. May be repeated. Maximum 9 hrs.
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. Students in the M.F.A. degree program are evaluated annually by juried performance or portfolio submission. Continuation in the program is with the approval of the faculty committee for the M.F.A. degree program. Theatre 599, Projects in Lieu of Thesis, and an oral defense of the project must be completed satisfactorily before the degree is conferred.

In addition to the core requirements listed above, each area of concentration has specific requirements:

Design/Technical Production

Required courses are at least 12 hours of Theatre 580, Design and Technical Production Seminar, and at least 6 hours in the projects courses. Theatre 401, Principles of Design is required in the first year of residence.

Acting

Theatre 500-21-22-23-24-25 Master Class are required, along with one course in directing and two hours each in voice and dance.

REQUIREMENTS FOR SECOND MASTER’S DEGREE

Students admitted to the M.F.A. program who have already earned a master's or a doctoral degree may apply up to 12 credit hours from the previous graduate program to the M.F.A. degree with approval of the student's committee, the Dean of the College of Arts and Sciences, and the Dean of The Graduate School.

Any such credits applied from a previous graduate program could be from courses that are directly relevant to the student's M.F.A. curriculum and must have been earned within the time limit (6 years) established for completion of the M.F.A. degree.

ACADEMIC COMMON MARKET

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

GRADUATE COURSES

401 Principles of Theatrical Design (3) Fundamental principles of design; visual and structural relationships. Projects assigned to develop understanding and perception.

409 Stage Make-up (2) Problems in make-up design and application, character analysis, physiognomy and chiaroscuro. Prereq: 100

420 Special Studies in Acting (3) Content varies. Exercises in selected concentrated areas such as styles, techniques, approaches, e.g., Shakespeare, movement, humor. Prereq: Advanced Acting and consent of Instructor. May be repeated. Maximum 3 hrs.

423 Period Movement and Dance (2) Movement styles and dances from Renaissance to 20th century. Prereq: Stage Movement or consent of instructor.

424 Theatre Dance II (2) Advanced dance technique incorporating elements of musical theatre. Prereq: Theatre Dance or consent of instructor. May be repeated. Maximum 6 hrs.

425 Selected Musical Theatre Techniques (2) Study and practice of musical theatre material: dance and vocal work. Prereq: Theatre Dance or consent of instructor. May be repeated. Maximum 4 hrs.

426 Applied Phonetics (3) Development of skills in transcription and reproduction of principal varieties of English language in North America and Great Britain and selected foreign dialects in North America. Prereq: Consent of instructor.


445 Advanced Costume Construction (3) Advanced studies in construction technique, tailoring, vacuum forming, plastic molding, and cobbling. Prereq: 345 or consent of instructor.

446 Costume Patternig (3) Draping patterns for period costumes. Construction and study of historic patterns. Prereq: 345 or consent of instructor.

450 Advanced Scenery Technology I (3) Study and practice of theatre woodworking; production participation required. Prereq: 250. Graduate credit to theatre M.F.A. students only.

451 Advanced Scenery Technology II (3) Study and practice of metalworking and plastics for theatrical productions; production participation required. Prereq: 250. Graduate credit to theatre M.F.A. students only.

452 Advanced Scenery Technology III (3) Study and practice of stage rigging for theatrical productions; production participation required. Prereq: 250. Graduate credit to theatre M.F.A. students only.

454 Scenery Painting (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.

457 Advanced Lighting Design (3) Advanced problems in lighting design and theory, lighting musical theatre, opera, and dance. Prereq: 362 or consent of instructor.

464 Computer Assisted Design for Stage Lighting (3) Advanced techniques in computer-assisted design for stage lighting. Work with CAD and other stage-lighting software for preparation of lighting plots and associated paperwork. Prereq: Introduction to Lighting Design or consent of instructor.

465 Aesthetics of Lighting Design (3) Theory and practice of stage lighting design, relationship between designers and non-practitioners: directors, actors, choreographers, architects, etc.

470-71 Playwriting (3,3) Advanced instruction in writing of plays. Prereq: Consent of instructor.

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

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

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

501 Introduction to Graduate Research in Theatre (3) Research tools and methods for theatre artist and scholar.

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

510 Studies in Theatre History (3) Intensive study of selected topics in theatre history. May be repeated. Maximum 9 hrs.

512 Dramatic Literature Analysis (3) Dramaturgical strategies of major playwrights, using a variety of analytical approaches from Aristotelian to Structuralist.

520-21-22-23-24-25 Master Classes in Acting (4,4,4,4,4) Master classes in acting techniques, voice, and movement. Theatre M.F.A. students only.

536 Projects in Play Directing (3) Practical work in play direction involving various styles and modes 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.


556 Millinery for the Stage (2) Pattern making and construction techniques for hats from antiquity to present. Prereq: Consent of instructor.

557 Advanced Costume Designing (3) Advanced studies in pattern making and construction techniques for hats from antiquity to present. Prereq: Consent of instructor.

558 Projects in COSTume Technology (1-3) Individualized studies in costume technology in theatre production. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

559 Projects in Technical Theatre (1-3) Problems of set design interpretation and execution. May be repeated. Maximum 9 hrs.
Transportation
See Marketing, Logistics and Transportation

Veterinary Medicine
(College of Veterinary Medicine)

MAJOR
DEGREE
Veterinary Medicine ... D.V.M.
Comparative and Experimental Medicine ... M.S., Ph.D.

THE PROFESSIONAL PROGRAM

Admission Requirements
To qualify for admission to the professional program of the College of Veterinary Medicine, a candidate must have completed at least the minimum pre-veterinary course requirements listed below. These may be completed at any accredited college or university that offers courses equivalent to those at The University of Tennessee, Knoxville. Pre-veterinary course requirements must be completed by the end of the spring term of the year in which the student intends to enroll. Biochemistry requirements must have been satisfactorily completed within five years of the time the student wishes to enter the program.

Subject Area | Semester Hours
---|---
English | 6
Humanities and Social Sciences* | 18
Physics | 8
General Chemistry | 8
Organic Chemistry | 8
Biochemistry* | 4
General Biology | 8
Genetics | 3
Cellular Biology*** | 3
TOTAL | 66

*May include, for example, courses in English literature, speech, music, art, philosophy, religion, language, history, economics, anthropology, political science, psychology, sociology and geography.

**Exclusive of laboratory.

***It is expected that this requirement will be fulfilled by a course in cellular or molecular biology.

Admission Procedures
Admission of new students is for the fall semester, with first priority given to residents of Tennessee.

The College of Veterinary Medicine utilizes the Veterinary Medical College Application Service (VMCAS) for all applicants. Forms and instructions for making application for admission may be obtained beginning July 1, 1996 from the Office of the Associate Dean, The University of Tennessee, College of Veterinary Medicine, P.O. Box 1071, Knoxville, TN 37901-1071.

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 consist of the traditional fall and spring semesters with the summer break following years one and two. The first year consists mostly of the preclinical subjects of anatomy, physiology, histology, and microbiology. Included in this first year are clinical subjects of physical diagnosis and anaesthesia. Considerable integration of subject matter is incorporated during this year.

Admission of new students is for the fall semester, with first priority given to residents of Tennessee.

The College of Veterinary Medicine utilizes the Veterinary Medical College Application Service (VMCAS) for all applicants. Forms and instructions for making application for admission may be obtained beginning July 1, 1996 from the Office of the Associate Dean, The University of Tennessee, College of Veterinary Medicine, P.O. Box 1071, Knoxville, TN 37901-1071.

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 consist of the traditional fall and spring semesters with the summer break following years one and two. The final year of the professional curriculum begins immediately following semester six and is a continuous clinical rotation experience extending over one calendar year.

The first year consists mostly of the preclinical subjects of anatomy, physiology, histology, and microbiology. Included in this first year are clinical subjects of physical diagnosis and anaesthesia. 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 diagnostic problems involving extensive clinical experience in the Veterinary Teaching Hospital. Each student will rotate through a series of clinical blocks.

An innovative feature of this curriculum is the designation of semester six as one in which the individual student may select his or her courses of study. This allows select students who have specific educational goals (such as advanced or dual degree programs) to enroll in all, some, or none of the regularly scheduled courses during that semester. Students enrolled in the D.V.M. program are required to complete at least 16 credit hours in the sixth semester and may register for up to 10 credit hours of graduate courses without enrolling in The Graduate School and these hours will be credited toward the D.V.M. degree. This semester of elective study offers a unique educational alternative for select students in the CV and is intended to enhance the 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 preclinical subjects such as animal behavior, medical communication, professional ethics, jurisprudence, economics, and practice management.

The curriculum requires successful completion of 152 semester credits.

THE GRADUATE PROGRAM

The College also administers a graduate program involving all departments which leads to the Master of Science and the Doctor of Philosophy degrees. Because of the interdisciplinary departmental administration of the College of Veterinary Medicine, the faculty have opportunities in the graduate programs of other institutional units, including Animal Science (nutrition, physiology, genetics and animal management), Microbiology (bacteriology, virology and immunology), Ecology and Evolutionary Biology (environmental toxicology), Public Health, and Comparative and Experimental Medicine. (Refer to other sections of this catalog for a full description of these programs.) The majority of the graduate students and graduate faculty of the College of Veterinary Medicine are involved in the Comparative and Experimental Medicine program. This program provides a wide spectrum of interdisciplinary training that prepares students for teaching and/or research careers in the health sciences.

PROFESSIONAL COURSES

811 Bacteriology and Mycology (4) Fundamental aspects of microbiology and cell biology relative to pathogenesis of bacterial and fungal diseases of animals: antimicrobial actions and mechanisms of bacterial resistance.


821-22 Anatomy I, II (4,4) Gross and applied anatomy: neural structures of common domestic animals; dog, cat, horse, cow. Dissection of embalmed specimens, prostheses, slides, models, and living animals.

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) Ex- 
mural and specially designed study for students inter-
ested in select topics in anatomy, histology, and physi- 
ology.

830 Art of Veterinary Medicine (1) Paramedical sub-
jects important to veterinary medicine: practice manage-
ment, interpersonal relations, communications, jurispru-
dence, ethics, careers, animal behavior and veterinary 
history. May be repeated. S/N/C only.

831 Physical Diagnosis (1) Basic care, feeding, re-
straint, 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/Public Health (4) Principles of epi-
demiology and public health. Host-agent relationships, 
public health aspects of veterinary medicine, and role of 
Veterinarian in ecology and food hygiene.

834 Hematopoietic System (3) Pathophysiology, spe-
cial pathology, and clinical management of diseases of 
the hematopoietic and lymphoid organs and tissues. 
Principles, methods of laboratory evaluation of diseases 
of other organ systems.

835 Medical Interaction (2) Multidisciplinary laborato-
ries and lectures of physiologic, pharmacologic and sur-
gical concepts. Applied techniques in animal handling 
to facilitate anesthesia, surgery, post-surgical recovery 
and wound healing. Demonstration of physiologic and 
pharmacologic principles at introduction to instrument 
action to measure physiological processes and drug 
effects.

836 Toxicology (2) Principles of toxicology, molecular 
mechanisms, pathologic processes and clinical features of 
animal diseases caused by common toxic agents.

840 Integumentary System (3) Pathophysiology, spe-
cial pathology, medicine and surgery of diseases of 
integumentary system. Laboratory examination, patho-
ology, diagnosis and treatment.

841 Reproductive System (4) Pathophysiology, spe-
cial pathology, medicine and surgery of diseases of male 
and female reproductive systems and mammary glands.

842 Allimentary System (5) Pathophysiology, special 
pathology, medicine and surgery of diseases of aliment-
ary systems.

843 Musculoskeletal System I (3) Pathophysiology, 
special pathology, medicine and surgery of diseases of 
muscular and skeletal systems. Basic principles, pathol-
ologic changes and radiographic interpretation.

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 Principles of Medical Science (2) Physiologic and 
pathologic principles underlying mechanisms of dis-
ese. Selected examples of human and animal dis-
eses: recent scientific advances in biomedical sci-
ces.

846 Multispecies Medicine (4) Anatomy, path-
ophysiology, medicine, and surgery of avian species, 
laboratory and zoo animals and reptiles. Species and 
diseases seen by practicing veterinarians. Current topics 
on foreign animal diseases.

848 Art of Veterinary Medicine II (1) Paramedical 
subjects important to veterinary practice: practice man-
agement, interpersonal relations, communication, juris-
prudence, ethics, careers, animal behavior and veteri-
ary history. May be repeated. S/N/C only.

850 Introduction to Clinics (1) Clinical veterinary prac-
tice with discussions and practical experience. Problem-
solving and integration of basic sciences with clinical 
applications. Problem-oriented veterinary medical rec-
ord.

851 Urinary System (3) Pathophysiology, special pa-
thology, medicine and surgery of diseases of urinary 
system. Urinary system in health and disease.

852 Cardiovascular System (2) Pathophysiology, spe-
cial pathology, medicine and surgery of diseases of cardio-
vascular system. Anatomic, physiologic and phar-
macologic principles which provide basis for treatment.

853 Endocrine System (2) Pathophysiology, medicine 
and surgery of diseases of endocrine system. Mecha-
nism, pharmacology and metabolic diseases: therapy 
and prevention.

854 Respiratory System (3) Pathophysiology, special 
pathology, medicine and surgery of diseases of respira-
tory system. Upper and lower respiratory system: infec-
tions and nonclinical application.

855 Radiology (3) Basic, advanced and special tech-
niques in radiology with interpretation and use of radi-
ologic and related techniques in diagnosis and treatment 
of animal diseases.

856 Special Senses (2) Pathophysiology, special pa-
thology, medicine and surgery of diseases of visual and 
surgical auditory systems.

857 Nervous System (3) Pathophysiology, special pa-
thology, medicine and surgery of diseases of nervous 
system: clinical neurology and neuropa..

858 Clinical Rotation in Specialties (2) Clinical training 
in specialty services: anesthesiology, ophthalmology or 
dermatology. Direct responsibility for diagnosis, patient 
care, and treatment of clinical cases in both urban and 
rural practice.

859 Clinical Clerkship (2) Advanced clinical training in 
urban practice, rural practice, environmental practice, 
and pathobiology. S/N/C only.

861 Pharmacology (4) Principles of pharmacokinetics 
and pharmacodynamic properties of veterinary drugs: 
mode of action, pharmacologic effects, chemical and 
physical properties, metabolism, toxici, important id-
teractions, side effects.

865 Clinical Rotation in Environmental Practice (2) 
Clinical training in avian medicine, laboratory animal 
and zoo medicine, epi..ology, public health, and 
other related disciplines.

867 Special Problems in Environmental Practice (1-
8) Extramural and specially designed study for students 
interested in select topics in avian medicine, laboratory 
animal medicine, zoo medicine, epidemiology, public 
health, pharmacology or toxicology.

871 General Pathology (4) Principles of pathobiology: 
causes of disease, disturbances of cell growth, inflam-
ination, and neoplasia.

873 Parasitology (3) Principles of parasitology: proto-
zoolgy, helminthology, and entomology and relation-
ship to diseases in animals.

875 Clinical Rotations in Pathobiology (2) Clinical 
training and demonstrations in laboratory diagnosis: 
post-mortem examination and clinical pathologic, para-
sitologic and microbiologic techniques.

876 Clinical Rotations in Pathobiology II (2) Clinical 
training and demonstrations in laboratory diagnosis: 
post-mortem examination and clinical pathologic para-
sitologic and microbiologic techniques.

877 Special Problems in Pathobiology (1-8) Extramu-
ral and specially designed study for students interested 
in select topics in morphologic pathology, clinical path-
ology, clinical microbiology and parasitology.

881 Clinical Rotations in Urban Practice I (4) Clinical 
training in medicine, surgery and specialty disciplines for 
companion animals. Direct responsibility for diagnosis, 
care, and treatment of clinical patients.

882 Clinical Rotations in Urban Practice II (4) Clinical 
training in medicine, surgery and specialty disciplines for 
companion animals. Direct responsibility for diagnosis, 
care, and treatment of clinical patients.

883 Clinical Rotations in Urban Practice III (4) Clinical 
training in medicine, surgery and specialty disciplines for 
companion animals. Direct responsibility for diagnosis, 
care, and treatment of clinical patients.

884 Clinical Rotations in Urban Practice IV (4) Clinical 
training in medicine, surgery and specialty disciplines for 
companion animals. Direct responsibility for diagnosis, 
care, and treatment of clinical patients.

885 Clinical Rotation in Radiology I (2) Clinical training 
in radiographic techniques and interpretation of radi-
ographs as part of diagnostic process.

887 Special Problems in Urban Practice (1-8) Extra-

ural and specially designed study for students inter-
ested in select topics in medicine, surgery, anesthesiol-
ygy, radiology and medical specialties of small (companion) 
animals.

891 Clinical Rotations in Rural Practice (4) Clinical 
training in medicine, surgery, specialty disciplines and 
herd health of food animals and horses. Direct responsi-
bility for diagnosis, care and treatment of clinical patients.

892 Clinical Rotations in Rural Practice II (4) Clinical 
training in medicine, surgery, specialty disciplines and 
herd health of food animals and horses. Direct responsi-
bility for diagnosis, care and treatment of clinical patients.

893 Clinical Rotations in Rural Practice III (4) Clinical 
training in medicine, surgery, specialty disciplines and 
herd health of food animals and horses. Direct responsi-
bility for diagnosis, care and treatment of clinical patients.

894 Clinical Rotations in Rural Practice IV (4) Clinical 
training in medicine, surgery, specialty disciplines and 
herd health of food animals and horses. Direct responsi-
bility for diagnosis, care and treatment of clinical patients.

895 Clinical Rotation in Radiology II (2) Clinical training 
in radiographic techniques and interpretation of radi-
ographs as part of diagnostic process.

897 Special Problems in Rural Practice (1-8) Extra-

ural and specially designed study for students inter-
ested in select topics in medicine, surgery, herd health, 
reproduction, radiology and medical specialties of large 
animals.

GRADUATE COURSES

536 Toxicology (2) Principles of toxicology, molecular 
mechanisms, pathologic processes and clinical features 
of animal diseases caused by common toxic agents. 
Prereq: Consent of instructor. (Same as Comparative and 
Experimental Medicine - Veterinary Medicine 536.) F.

537 Multispecies Medicine (4) Anatomy, path-
ophysiology, medicine and surgery of birds, reptiles 
and laboratory and zoo mammals. Common species and 
diseases. Prereq: Consent of instructor. (Same as Com-
parative and Experimental Medicine - Veterinary Medicine 537.) Sp.

545 Principles of Medical Science (2) Physiologic and 
pathologic principles underlying mechanisms of dis-
ese. Selected examples of human and animal dis-
eses: recent scientific advances in biomedical sci-
ces. Prereq: Consent of instructor. (Same as Com-
parative and Experimental Medicine - Veterinary Medicine 545.) Sp.

Zoology

See Biochemistry and Cellular and Molecular 
Biology and Ecology and Evolutionary Biology.