Fields of Instruction

Accounting and Business Law
(College of Business Administration)

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

Keith G. Stanga, Head

Professors:
Dittrich, Norman E. (Emeritus), CPA,
Ph.D. ........................................ Ohio State
Fisher, Bruce D., L.L.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
Stanga, 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
Izard, C. Douglass, CPA, Ph.D. ...... Mississippi
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:
Behn, Bruce K., CPA, Ph.D. .......... Arizona State
Carcello, Joseph V., CPA, Ph.D. ... Georgia State
Gatian, Amy W., Ph.D. .............. VPI
Hethcox, 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. .......... VPI
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, September 1. Application deadlines for U.S. citizens and permanent residents are: Fall and Summer, January 15. Application deadlines for international students are: Fall and Summer, March 1. The program is designed both for 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 accounting degree, the requirements are:
Accounting Core (6 hours): 511, 513, Business Law 511.
Accounting Concentration (9 hours): Three concentrations are available:
1. Financial/Auditing: 512, 514, 518, 519.
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, 541, 543, 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:
1. Financial/Auditing: 512, 514, 518, 519.
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 414, 411, 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 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 CONCENTRATIONS
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 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 part-time students and the next two semesters' coursework as established by the degree program for part-time students.

Accounting

GRADUATE COURSES


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

511 Seminar in Accounting Theory (3) Analysis of conceptual framework; general-purpose external financial reporting by business enterprises. Frame of reference for evaluation of generally accepted accounting principles and alternative principles. Prereq: Advanced Accounting and admission to M.Acc. program or consent of instructor.

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

513 Seminar in Advanced Auditing (3) Theory and concepts underlying application of philosophy of auditing to 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. Relationships among design of internal control, internal control effectiveness, and assessment of control risk. Problems in variety of auditing contexts, highly automated situations. Prereq: 513 and admission to M.Acc. program.

516 Seminar in Professional Accounting 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, cost 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, discrete and process cost 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 resources through available technologies. Advanced study of tax accounting methods, periods, procedures, and review of fundamental tax concepts to provide foundation for tax practice. Prereq: 431 and admission to M.Acc. program.

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

533 Taxation of Partnerships and S Corporations (3) Formation, operation, termination, and other special problems of partnerships. Election for S Corporations, and comparison of partnerships and S Corporations. Prereq: Admission to M.Acc. program or consent of instructor. Prereq: 532.

534 Family Tax Planning (3) Review and analysis of laws pertaining to inter vivos and post-mortem property transfers and taxation of estates. Financial planning techniques and strategies 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 topics in management systems and knowledge-based systems. Prereq: 541 and admission to a graduate program or consent of instructor. Prereq or coreq: 542.

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

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

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

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

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

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

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

Business Law

GRADUATE COURSES

511 Business Law and Professional Responsibility (3) Legal framework and ethical implications of business transactions. Principles and practices in law of contracts, commercial transactions, real property, 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

Communications................................. M.S., Ph.D.
Ronald E. Taylor, Head
Professor:
Stankey, Michael J., Ph.D. ...................... Illinois
Taylor, Ronald E., Ph.D. ....................... Illinois
Graduate Program in Agricultural and Extension Education

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 credit 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

Graduate courses are divided into two categories: major courses and minor courses. Major courses are those that are numbered at or above the 500 level and are required for the master's degree. Minor courses are those that are numbered below the 500 level.

Aerospace Engineering

See Mechanical and Aerospace Engineering

Agricultural and Extension Education

College of Agricultural Sciences and Natural Resources

Major

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

Roy R. Lessly, Head

Professors:


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 credit 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

Graduate courses are divided into two categories: major courses and minor courses. Major courses are those that are numbered at or above the 500 level and are required for the master's degree. Minor courses are those that are numbered below the 500 level.
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. (Liaison), Ph.D. ............... Florida
Cleland, C. L., Ph.D. ........................ Wisconsin
Eastwood, D. B., Ph.D. ........................ Tufts
English, B. C. Ph.D. ........................... Iowa State
Keller, L. H. (Emeritus), Ph.D. ............... Kentucky
Klint, T. H., Ph.D. ............................. Kentucky
Leuthold, F. O., Ph.D. ........................ Wisconsin
McLemore, D. L., Ph.D. ....................... Clemson
McManus, B. R. (Emeritus), Ph.D. .......... Purdue
Martin, J. A. (Emeritus), Ph.D. .............. Minnesota
Mundy, S. D., Ph.D. ........................... Tennessee
Or, R. H., Ph.D. ................................ Illinois
Park, W. M., Ph.D. ............................ Virginia Tech
Pentecost, B. H., J.D. ......................... Tennessee
Ray, Daryl E. (Distinguished Prof.), Ph.D. .... Iowa State
Roberts, R. K., Ph.D. ........................... Iowa State
Sappington, C. B. (Emeritus), Ph.D. ........ Illinois
Whitely, 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: Davis, George C., Ph.D. ........ NC State
Jakus, Paul M., Ph.D. ........................ NC State
Larson, J. A., Ph.D. ............................ Oklahoma State
Siegel, Paul B., Ph.D. ........................ Virginia Tech

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 major 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 600 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, 6 hours of economic theory, and 6 hours of quantitative methods. 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 courses numbered at or above the 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 given 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- level courses.

MINOR IN ENVIRONMENTAL POLICY

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

Agricultural Economics

GRADUATE COURSES

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

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

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

450 Agricultural Price Analysis (3) Analysis of demand and supply mechanisms in agriculture; price determination; seasonal equilibrium; temporal price patterns; market institutions. Prereg: 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 non-farm sectors; models and tools for analyzing rural development. Prereg: 210 or consent of instructor. F

470 Natural Resource Economics (3) Nature of natural resources; economic efficiency as basis for natural resource use; evaluation of transferable natural resource use; factors influencing environmental policy; public policy tools for influencing natural resource use or improving environmental quality. Prereg: 210 or consent of instructor. Sp

500 Thesis (1-15) IPN only. E

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

505 Microeconomic Analysis (3) Theory of utility maximization and demand, production, cost, firm behavior, and supply; price in product and factor markets; efficiency and welfare. Prereg: 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. Prereg: Consent of instructor. F

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

524 Econometric Methods in Agricultural Economics (3) Application of statistical methods to agricultural economics analysis; estimation of supply and demand functions; microeconomic forecasting models; interpretation of results. Prereg: Statistics 461 or consent of instructor. F

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

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

550 Advanced Agricultural Economics (3) Analysis of structure, conduct and performance of agricultural mar-
Agricultural Engineering

(College of Agricultural Sciences and Natural Resources)

MAJORS

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

C. Roland Mote, Acting Head

Professors:
Bledsoe, B. L., PE, Ph.D. .......... Oklahoma State
Henry, Z. A., PE, Ph.D. .......... NC State
Luttrel, D. H. (Emeritus), Ph.D. .......... Iowa State
Mc Dow, J. J. (Emeritus), PE, Ph.D. .......... West Virginia
Mote, C. R., PE, Ph.D. .......... Ohio State
Sewell, J. I., PE, Ph.D. .......... NC State
Shelton, C. H. (Emeritus), M.S. .......... VPI
Tompkins, 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

Assistant Professors:
Baxter, D. O., M.S. .......... Missouri
Buchseimohle, Michael J., Ph.D. .......... Pennsylvania
Hart, W. E., Ph.D. .......... Purdue
Prather, T. G., M.S. .......... Georgia
Raman, D. R., Ph.D. .......... Cornell
Willkeron, J. B., Ph.D. .......... Purdue
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 in a recognized curriculum in agriculture or other related fields. Each applicant will be advised about any prerequisites courses before entering a program. The student's program of study must be approved by his/her advisory committee and must comply with the requirements of The Graduate School.

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

A significant aspect of graduate education beyond formal courses and thesis projects is active participation in the professional community which exists within academic departments at universities. Student/faculty seminars are one of the professionally rewarding activities of the community. Accordingly, all graduate students are encouraged to participate in 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 an ABET-accredited engineering program must submit scores from the GRE general and engineering subject examinations. Applicants accepted into the program must complete at least 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 33 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 33 semester hours, master's students must pass a final oral examination covering the thesis, related areas, and graduate coursework.

Agricultural Engineering Technology

Thesis Option: Applicants who have not previously earned a degree from a professionally accredited program within the U.S. must submit scores from the GRE general examination. Applicants accepted into the program must complete at least 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 33 hours are:

Agricultural Engineering Technology 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 33 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 within the U.S. must submit scores from the GRE general examination. Applicants accepted into the program must complete at least 33 semester hours to earn a degree. Of these 33 hours, 20 must be in courses numbered greater than 500. Other specific requirements for the 33 hours are:

Agricultural Engineering Technology 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 33 semester hours, master's students must pass a final oral examination covering the thesis, related areas, and graduate coursework.

Rural Sociology

GRADUATE COURSES

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

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

593 Special Topics in Rural Sociology (1-3) Current sociological issues involving application of sociological theory. Prereq: 580 or consent of instructor. May be repeated. Maximum 6 hrs. (Same as Sociology 555.)

Marketing system; application of price theory concepts to existing circumstances in agricultural industries; examination of methods used to evaluate conduct and performance; analysis of transportation issues and location theory. Prereq: Economics 311 or consent of instructor. Sp

560 Advanced Rural Economic Development (3) Theoretical and historical perspectives on process of economic development; analyze role of agriculture, sectoral interdependence and trade in development; application of theory to specific development issues. Prereq: 480 or consent of instructor. Sp

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

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

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

620 Advanced Quantitative Methods (3) Discussion and evaluation of advanced statistical and mathematical techniques in current agricultural economics research. Prereq: 522, 524, and Economics 561-52, or consent of instructor. Sp, A

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

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

680 Seminar in Rural Economic Development (2) Current topics in economic development of rural areas. Current literature; evaluation of issues in both international and domestic development. Prereq: 560 or consent of instructor. Sp, A

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

THE MASTER'S PROGRAMS

Agricultural Engineering

Applicants who have not previously earned a degree from an ABET-accredited engineering program must submit scores from the GRE general and engineering subject examinations. Applicants accepted into the program must complete at least 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 33 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 33 semester hours, master's students must pass a final oral examination covering the thesis, related areas, and graduate coursework.

Agricultural Engineering Technology

Thesis Option: Applicants who have not previously earned a degree from a professionally accredited program within the U.S. must submit scores from the GRE general examination. Applicants accepted into the program must complete at least 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 33 hours are:

Agricultural Engineering Technology 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 33 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 within the U.S. must submit scores from the GRE general examination. Applicants accepted into the program must complete at least 33 semester hours to earn a degree. Of these 33 hours, 20 must be in courses numbered greater than 500. Other specific requirements for the 33 hours are:

Agricultural Engineering Technology 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 33 semester hours, master's students must pass a final oral examination covering the thesis, related areas, and graduate coursework.
Agricultural Engineering

GRADUATE COURSES

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

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

430 Mobile Hydraulic Power System Design (2) Functional and operational characteristics of mobile hydraulic systems; components, valve specification, fluid analysis and synthesis of power transmission and control circuits. Prereq: Engineering Science and Mechanics 341. 1 hr and 1 lab. Sp

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 and human factors. Design content: 3 hrs. Prereq: Processing Food and Biological Materials. 1 hr and 2 labs. Sp

451 Electronic Systems (3) Basic electronics with biological applications. Analog and digital electronics; sensing and controlling physical and environmental parameters; sensor selection and interfacing; condition processing; control laboratory experiments and design projects. Prereq: Circuitry and Electrical Mechanical Components. 3 hrs and 1 lab. Sp

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

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

504 Professional Development Seminar (1) Planning and executing research program; ethics and professionalism in the department. (Same as Agricultural Engineering Technology 504.) S/NC only. F

506 Physical Phenomena (3) Properties of materials, fundamental characteristics of electrolytics, thermal phenomena, applications in biological systems. Prereq: Consent of instructor. F

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

509 On-Site Domestic Water Supply and Wastewater Rennovation (3) Basic: ground water hydraulics, selection and design of pumps and delivery systems, and point-of-use water treatment processes; soil-based wastewater renovation principles, and design and operating criteria
Animal Science

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

MAJOR

Animal Science

Veterinary Medicine

DEGREES

M.S., Ph.D.

D.V.M.

Kelly Robbins, Head

Professors:

Barth, K. M. (Emeritus), Ph.D. ............ Rutgers
Bell, M. C. (Emeritus), Ph.D. ......... Oklahoma State
Bleiker, J. K. (Emeritus), Ph.D. ......... Ohio State
Chamberlain, C. C. (Emeritus), Ph.D. ... Iowa State
Erickson, B. H., Ph.D. ............ Kansas State
Godkin, J. D. (Liaison), Ph.D. ........... Massachusetts
Hall, O. G., Ph.D. ............. Iowa State
Hammond, S. L. (Emeritus), Ph.D. ....... Florida
Henry, R. W., D.V.M., Ph.D. ............ Ohio
Liddell, R. E. (Emeritus), M.S. ........... Tennessee
McDonald, T. P., Ph.D. ............ Tennessee
McLaren, J. B., Ph.D. (Emeritus) ....... Rutgers
Miller, J. K., Ph.D. ................. Georgia
Murphey, R. L. (Emeritus), Ph.D. ...... Wisconsin
Oliver, S. P., Ph.D. ............. Ohio State
Richardson, D. O., Ph.D. ............. Ohio State
Robbins, K. R., Ph.D. ........... Illinois
Saxton, A. P., Ph.D. ........... Illinois
Shirley, H. V., (Emeritus), Ph.D. ....... Illinois
Schultz, T. W., Ph.D. ............. Tennessee
Simms, M. H., Ph.D. ............ Auburn
Tugwell, R. L. (Emeritus), Ph.D. ....... Kansas State

Associate Professors:

Backus, W. R., Ph.D. .............. Tennessee
Bell, B. R., Ph.D. ............. NC State
Eller, H., D.V.M., Ph.D. ........... Illinois
Heitmann, R. N., Ph.D. ............ Maine
Hitchcock, J. P., Ph.D. ........... Michigan State
Kattes, H. G., Ph.D. ............ VPI
Maslin, A., 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:

Grizzle, J. M., Ph.D. ............ Florida
Hollingsworth-Jenkins, K., Ph.D. ...... Nebraska
Mathew, A. G., Ph.D. ........... Purdue
Mendis-Handagama, L. C., Ph.D. ...... VPI
Monash, F. D. V.M., Ph.D. ........ Texas A&M
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 degree and the 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 a part of the College of Veterinary Medicine, courses in anatomy, systemic physiology (blood, cardiovascular, and neural), and histology are also available. The Ph.D. program offers concentrations in animal nutrition, animal breeding, animal physiology, animal anatomy, and animal management. For specific information, contact the department head.

During the first fall term of matriculation in each degree program, all graduate students are required to enroll in 595. All first- and second-year students are required to enroll in 596 each fall and each spring term.

THE MASTER'S PROGRAM

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

The program requires the writing of a thesis based on original research; the completion of a minimum of 24 hours of graduate coursework, of which at least 12 hours must be taken in courses numbered at or above the 500 level; and 6 hours of thesis. Included in the course requirement are 1 hour of Agriculture 512 and a minimum of 6 hours in statistics. These statistics courses must be chosen from the 430, 500, or 520 level of courses approved for use in the Intercollegiate Graduate Statistical Program (ICGSP). The remainder of the coursework will be selected jointly by the student and the major professor, which requires the student's area of concentration and professional objectives. The student must complete Animal Science 581 and 9 hours in 500 or 600 level statistics courses approved for use in the ICGSP.

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

4. A minimum of 6 hours in 400-, 500-, or 600-level statistics courses approved for use in the ICGSP.

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 semen, spermatozoa, and embryos; application of methods of natural breeding and techniques of artificial insemination and embryo transfer; herd sire and dam evaluation; pregnancy determination; gestation and parturition; infertility; recent advances in theriogenology. Prereq: 320 or equivalent, 1 hr and 2 labs.

430 Advanced Ration Formulation (2) Advanced ration formulation for beef and dairy cattle, sheep, horses, swine, poultry, laboratory, zoo, and companion animals. Mathematical and computer solutions and applications to formulate nutritionally appropriate diets and ration balances. Prereq: 330 or equivalent and introductory computer science courses. 2 labs. Sp.

440 Advanced Animal Breeding (2) Computer simulation of genetic improvement for multiple traits in swine, poultry, sheep, beef, and dairy cattle; breed development, improvement, and evaluation. Prereq: 540 or equivalent, 1 hr and 1 lab.

481 Beef Cattle Production and Management (3) Integration of principles of nutrition, beef, dairy, 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, marketing and economic returns. Prereq: Completion of 300-level core courses or equivalent consent of instructor. 2 hrs and 1 lab.
482 Dairy Cattle Production and Management (3) Integration of principles of nutrition, breeding, physiology, and marketing into complete production and management programs. Structure of industry, enterprise establishment, economic productivity principles of animal husbandry, and improvement programs. Management evaluated in terms of production responses and economic returns. Prereq: Completion of 300-level core courses or equivalent or consent of instructor. 2 hrs and 1 lab. Sp.

483 Pork Production and Management (3) Integration of principles of nutrition, breeding, physiology, and marketing into complete production and management programs. Structure of industry, enterprise establishment, economic productivity principles of animal husbandry, and improvement programs. Management evaluated in terms of production responses and economic returns. Prereq: Completion of 300-level core courses or equivalent or consent of instructor. 2 hrs and 1 lab. Sp.

484 Poultry Production and Management (3) Integration of principles of nutrition, breeding, physiology, and marketing into complete production and management programs. Structure of industry, enterprise establishment, economic productivity principles of animal husbandry, and improvement programs. Management evaluated in terms of production responses and economic returns. Prereq: Completion of 300-level core courses or equivalent or consent of instructor. 2 hrs and 1 lab. Sp.

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

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

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

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

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

531 Analytical Techniques in Animal Science (3) Principles, concepts and methods applied to characterization and mechanistic study of cells, organisms and biological molecules. Demonstration of methodologies: nutrient analysis, histology and ultrastructural morphology, immunology, magnetic;臣 binds, protein biochemistry and molecular biology. Prereq: Organic Chemistry and Lab or equivalent. 1 hr and 2 labs. S/NC only. Sp

535 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.

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

542 Applied Animal Breeding (3) Procedures for estimating population parameters, determination of response to various selection methods and breeding systems, estimation of genetic and phenotypic interrelationships among management practices, estimation of breeding values, optimum methods of selection, utilization of genetic data from other sources, and management of genetic diversity. Prereq: 541 or equivalent. Sp,A

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

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

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

571 Design and Analysis of Biological Research (3) Experimental design and procedures; selection of experimental units; analysis and interpretation of data; statistical models and contrasts, analyses of variance, covariates, treatment arrangements, mean separation and regression. Prereq: Plant and Soil Science 571 or equivalent; knowledge of computer programming in R or mainframe (same as Plant and Soil Science 571.) Sp

572 Least Squares Analysis (3) Least squares estimation and hypothesis testing procedures for linear models; fixed model methodology, full rank and non-full rank situations; covariances 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 systems. Approaches to analysis and integration of reproductive management programs, genetic improvement policies, alternative feeding systems, and herd health programs. Consideration of time, risk, and uncertainty in livestock production. Tools, linear programming, as aids in decision making and resource allocation. Prereq: Management, economics, computer science, statistics. 2 hrs and 1 lab. Sp

596 Seminar (1) Advanced topics in animal science. Required of all first- and second-year graduate students. May be repeated. Maximum 6 hrs. S/NC only. F.

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

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

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

633 Advanced Mineral-Vitamin Nutrition (4) Chemical forms, digestion, absorption, transport, and metabolism, deficiencies, excesses and interaction of minerals and vitamins. Prereq: 533 or 534, and Biochemistry 410 or Nutrition 512. Maximum 6 hrs. (Same as Comparative and Experimental Medicine-Veterinary Medicine 633.) E

651 Advanced Topics in Animal Anatomy (1-4) Current and future research methodology, laboratory situation, recent advances in quantitative techniques for gross and microscopic anatomy. Prereq: Consent of instructor. 2 hrs and 1 lab. Maximum 6 hrs. (Same as Comparative and Experimental Medicine-Veterinary Medicine 651.) E

652 Disorders of the Endocrine System (2) Pathological and physiological aspects of diseases: endocrine glands of various species. Prereq: 521 or consent of instructor. (Same as Comparative and Experimental Medicine-Veterinary Medicine 652.) Sp,A

Animal Science-Veterinary Medicine

See College of Veterinary Medicine and Comparative and Experimental Medicine

Anthropology

(College of Arts and Sciences)

MAJOR

DEGREES

Anthropology

M.A., Ph.D.

Jan F. Simek, Head

Professors:

Bass, William M., Ph.D. Pennsylvania
Faulkner, Charles H., Ph.D. Indiana
Jantz, Richard L., Ph.D. Kansas
Parmalee, Paul W. (Emeritus), Ph.D. Texas A&M
Simek, Jan F., Ph.D. SUNY Binghamton
Wheeler, Margaret C. (Emeritus), Ph.D. Yale

Associate Professors:

Harrison, Faye V., Ph.D. Stanford
Harrison, Ira E., Ph.D. Syracuse
Howell, Benita J., Ph.D. Kentucky
Klippel, Walter E., Ph.D. Missouri
Logan, Michael H., Ph.D. Penn State
Schoedel, Gerard F., Ph.D. Washington State

Assistant Professor:

Marks, Murray K., Ph.D.

Research Associate Professor:

Chapman, Jefferson, Ph.D.

Research Assistant Professor:

Tardif, Suzette D., Ph.D.

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

THE MASTER'S PROGRAM

Students wishing to enter the Master of Arts degree program with a major in Anthropology should have an undergraduate GPA of 3.5 in the major, 3.3 overall, and hold a bachelor's degree from an accredited university with a major in Anthropology. Applicants with a major in a related field (biology, sociology, geology, classics or geography) will be considered only if they have a formal minor in anthropology or its equivalent (at least five upper division anthropological courses). All prospective M.A. students must make formal application to The University of Tennessee, Knoxville Graduate School. Copies of the application form, transcripts, and GRE scores that are sent to The Graduate School should also be sent directly to the Department of Anthropology at the same time. In addition, the
department requires a letter of intent from the applicant indicating career goals and reasons for selecting the University of Tennessee, three letters of recommendation, and a sample of the prospective student's written work (a class paper or research report); these materials should be sent directly to the Graduate Secretary, Department of Anthropology, SSH 250, University of Tennessee, Knoxville, TN 37996-0720.

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

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

1. Selection of an M.A. advisor. This should be done as soon as possible in the student's program but must be done no later than the end of the first semester in residence. The department graduate secretary must be informed in writing of each student's advisor.
2. A minimum of 30 credit hours in graduate courses. Twenty-four hours must be in coursework graded A-F. Coursework must include three core classes taken in the first year:
   a. 510 Method and Theory in Cultural Anthropology
   b. 560 Theory in Archaeology
   c. 590 Method and Theory in Biological Anthropology

   Additional coursework should be selected in consultation with the student's advisor and must include one additional course from two anthropology concentrations besides the student's primary concentration. At least 20 hours of coursework must be at the 500 level or higher.
3. During the first year, comprehensive Graduate Evaluation Examinations (GEEs) are required of all M.A. students and are based on the content of the core courses. These examinations are given as the final examination in each core class (during regularly-scheduled final periods) and are graded by all faculty within the appropriate sub-discipline 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 attend the graduate section of the visiting lecturer program. To ensure compliance with this requirement, each student is required to register for one credit hour of Anthropology 501 in the Fall semester of each year and fulfill all requirements for the course defined by the instructor.
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
An incoming student should possess an M.A. in Anthropology. Students with an M.A. in another discipline may be admitted after completing specific requirements outlined in the departmental brochure. In addition to the requirements prescribed by The Graduate School for the Ph.D., the Anthropology Department requires the following:

1. Formation of an advisory committee and establishment of a program of study in consultation with the committee.
2. Specific courses to be taken are determined by students and their advisory committees. Students should plan to devote a minimum of 4 years beyond the B.A. to attain the Ph.D.
3. Demonstration of competence in statistics by completing Statistics 531 and 532 with a grade of B or better.
4. Demonstration of 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:
   a. Successful performance on a language examination administered by the appropriate language department. Students electing this alternative should consult with their advisor.
   b. Completion of the intermediate level sequence of a language with a grade of B or better in the second semester.
   c. Completion of the second semester of specialized reading courses for graduate students with a grade of B or better.
   d. Written and oral comprehensive examinations in three areas of specialization to be determined by the committee.
5. Successful completion of a dissertation and defense examination.

ACADEMIC COMMON MARKET
An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.A. program in Anthropology is available to residents of the states of Louisiana or Mississippi (concentration in zoarchaeology only), Virginia (concentration in zoarchaeology or cultural anthropology), or West Virginia. The Ph.D. program is available to residents of Alabama, Arkansas, Louisiana, Mississippi, or West Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE COURSES

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

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

412 Folklore in Anthropology (3) Introduction to anthropological study of folklore, using folklore and folklore 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 actors (individuals) 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 of cultural anthropologists used in fieldwork. Prereq: Cultural Anthropology or consent of instructor.

435 Historical Anthropology Laboratory (3) Laboratory procedures for processing, identification, and interpretation of artifacts from different time periods. Artifactual material from historic East Tennessee sites used for class projects. Recommended prereq: Historical Anthropology.

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.

461 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.)

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

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

464 Principles of Zoocomarchaeology (3) Basic osteological studies of major vertebrate groups; biological use of animals in subsistence and culture. Identification and interpretation of archaeologically-defined molluscan and vertebrate remains; introduction to use 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 research on urban sites in East Tennessee. Recommended prereq: Historical Archaeology.

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

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

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

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


494 Primate Behavior (3) Social organization and behavior of Primates. (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.)

494 Primate Behavior (3) Social 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.)

494 Primate Behavior (3) Social 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.)
veying, excavating, processing, and analysis of archaeological data. May be repeated. Maximum 12 hrs.

500 Graduate Research (1-15) Independent investigation of special problems in anthropology. May be repeated. Maximum 18 hrs.

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

510 Method and Theory in Cultural Anthropology (3) Development of primary theoretical orientations by cultural anthropologists; formulation of research problems and methods of 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 anthropological, 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 around the world. Prereq: Consent of instructor. 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 anthropological research, values, and ethics issues in selected case studies. Survey of anthropologists' work in non-academic settings.

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

516 Nutritional Anthropology (3) Anthropological contributions to study of food-related cultural and biological variability in past and present populations. Prereq: 110, 120, 120, or consent of instructor. Recommended prerequisite. Basic nutrition course.

517 Forms of Social Inequality (3) Anthropological perspectives on societies stratified along lines of rank, caste, race, gender, and class, and inequalities engendered by sex role structure. Construction of social distinctions before and after rise and development of men's and women's roles in society. Intersection of race and ethnicity with class and gender.

520 Seminar in Zoarchaeology (3) Approaches to analysis and interpretation of archaeological faunal material. Intensive reading, evaluation and discussion of major faunal studies, guides to identification, methods of presentation. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

521 Laboratory Studies in Zoarchaeology (3) Examination and comparison of skeletons of major vertebrate groups, shells of terrestrial and aquatic molluscs, in relation to understanding faunas from archaeological contexts. Basic osteology and shell characters of species encountered in archaeological sites. Use of comparative collections. May be repeated. Maximum 9 hrs.

522 Seminar in Archaeology (3) Theoretical and practical issues in contemporary archaeology: ethnoarchaeology, paleoethnobotany, ethnography, ceramic analysis, agricultural origins, and regional archaeological cultures. May be repeated. Maximum 6 hrs.

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

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

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

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

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

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

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

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


537 Paleoanthropology (4) Fossil record from origin of humans to appearance of anatomically modern humans. Functional morphology and phylogenetic relationships of fossil humans. Prereq: Consent of instructor.

538 Skeletal Biology (3) Practical and theoretical approaches to analysis of prehistoric human skeletal remains in relation to diet, morphology, vital statistics, paleoanthropology, nutrition, and measures of biological relationships as related to population as an adaptive unit. Prereq: 480.

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

540 Bone Anatomy and Physiology (3) Examination of bone microstructure, cellular anatomy, hormonal regulation and microanatomical response to loading. Prereq: Consent of instructor.

541 Laboratory in Forensic Anthropology (3) Discussion and lab experience with forensic anthropological techniques: radiograph analysis, dental examination, hair analysis, bone microstructure. Prereq: Human Origins 480, 511, or consent of instructor. 2 hrs and 1 lab.

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

543 Method and Theory in Biological Anthropology (3) Current methods in analysis of biological anthropological and past and current history of theoretical perspective. Paleoenvironment, human osteology, and human variation and population structure. Prereq: Consent of instructor.

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

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

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

601 Advanced Graduate Research (1-6) Independent investigation of special problems in anthropological. Prereq: Advanced graduate status. May be repeated. Maximum 12 hrs. Only 3 hrs may count toward 600-level requirement.

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

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

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

614 Selected Topics in Physical Anthropology (3) May be repeated. Maximum 6 hrs.

615 Selected Topics in Paleoenvironment (3) May be repeated. Maximum 6 hrs.

616 Gross Human Anatomy (9) Skeletal, muscular, and cardiovascular system. Dissection of cadavers. Prereq: 480 or Human Biology. 5 hrs and 5 labs.

Architecture

(College of Architecture and Planning)

MAJOR

DEGREE

Architecture ........................................ MArch.

Marleen K. Davis, Dean

William J. Lauer, Associate Dean

Jon P. Coddington, Graduate Program Head

Professors:

Anderson, G. I., M.Arch. ....................... Illinois

Cook, E., M.Arch. .............................. Harvard

Davis, M. C., M.Arch. .......................... Harvard

Grieger, F., M.Arch. ............................ Pennsylvania

Kelso, R. M., M.S. .............................. Tennessee

Kershavage, J. A., D.Sc. .......................... Southern Cal

Kinzie, S. A., Ph.D. ............................. SUNY (Buffalo)

Lauer, W. J. (Liaison), M.Arch. Engr. .............. Iowa State

LeSTER, A. J., M.Arch. ............................. Virginia

Lizon, P., Ph.D. ................................. Pennsylvania

Moffit, M. S., Ph.D. .............................. MIT

Robinson, M. A., M.Arch. ........................ Pennsylvania

Rudd, J. W., M.A. ............................... Northwestern

Shel, W. S., M.Arch. ............................. Columbia

Watson, J. S., M.Arch. ............................ Pennsylvania

Wodapehouse, L. M. (On leave), Ph.D. ............... St. Andrews

Associate Professors:

Coddington, J., M.Arch. ........................ Pennsylvania

Davis, T. K., M.Arch. ........................... Cornell

Herz, M. D., B.Arch. ............................. Columbia

Kaplan, M. D., M.Arch. ........................ Harvard

Martella, W. E., B.Arch. ........................ California

Rabun, J. S., M.A. ............................... Texas

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

Assistant Professors:

Fox, L. D., M.Arch. ........................... Cranbrook

French, R. C., B.Arch. ........................... Tennessee

Livingston, M., M.F.A. .......................... Wisconsin

Moir-McClean, T. W., M.Arch. ........................ Michigan

vonBeloow, P., M.S. ............................ Tennessee

Ware, S. M., M.F.A. ............................ Tennessee

MASTER OF ARCHITECTURE PROGRAM

The School of Architecture offers two tracks leading to the Master of Architecture degree. Track I is for students seeking the first-professional degree who already hold a Bachelor's degree or an advanced degree in
Admissions Requirements

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

For Track 1 applicants, a bachelor's degree with a 3.0 GPA from a regionally accredited college of university is required. International applicants must have an equivalent 4-year degree with a GPA less than 3.0 may be considered for conditional admission when evidence of exceptional promise is identified. Undergraduate work must include at least twelve semester hours of humanities, a basic understanding of physical principles, systems and analytical procedures, and an understanding of mathematical principles and analytical procedures, as well as a general understanding of the use of computers. The School requires a separate application for MArch 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. For those applicants from accredited 4+2 architecture programs, a portfolio is required in addition to the above requirements.

Degree Requirements

Track 1 requires a minimum of 42 semester hours of graduate coursework, taking approximately 3.5 years of full-time study. A minimum of 12 semester 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 selected 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 MArch 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, and legal aspects of architectural preservation and restoration.

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

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

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

409 Cultural Comparison of Housing Patterns (3) Patterns of spatial organization and concrete elements of design for specific cultures with emphasis on housing. Cultural, social, economic, climatic, and technical factors influence choice of form.

410 History and Theory of Urban Form (3) Patterns of community development. Selected historical and contemporary examples. Basic urban design issues and exemplary design approaches through lectures, readings, essays, and sketch 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. Pre-historic times to present throughout world. Fertile Crescent, Indus Valley, Hindu, Buddhist, and Mughal architecture of India, China, and Japan.

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

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

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

416 Forms of Utopia (3) Ideas and architectural expressions of utopian movements. Visionary and fantastic architecture, Concepts of future.

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


420 American Architecture II (3) Stylistic periods from Gothic Revival through twentieth century.

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

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

425 Special Topics in Architecture (1-4) Individual projects under faculty direction. Credit awarded to student for projects completed. May be repeated. Maximum 6 hrs. E

426 Special Topics in History, Theory and Criticism (1-4) Special topics for history-related subjects. May be repeated. Maximum 6 hrs.

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

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

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

456 Architectural Development (3) Principles and practice of architectural development. Impact of economics, climate, and building codes on design and development of real estate. Open to all students.

464 Project and Construction Management (3) Principles, methods, and application of project and construction management in building process. Project manager's and construction contractor's function, responsibilities, and activities investigated through case studies. Methods and techniques of estimating project cost and building cost in current practice, new techniques of cost analysis.


473 Architectural Photography (3) Photography as design, research, and presentation medium. Application of photographic techniques, printing and processing.

474 Advanced Lighting (3) Environmental control systems for large buildings. Energy conservation and sustainable design. Application of controlled lighting in specific architectural contexts.

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

502 Registration for Use of Facilities (3-15) Required of all students. Registration will be deleted when student enrolls in University facilities and/or faculty time before degree is rendered. May not be used toward degree requirements. May be repeated. SNC only. E

511 Graduate Seminar: Environmental Influences (3) Environmental factors which influence regional character of architecture. Nature's forest is associated with these factors, cultural interpretation and response regarding impact and importance.

512 Graduate Seminar: Technological Traditions (3) Technological and traditional influences on architectural form. Role of technical aspects of structural, environmental, and building infrastructure as integrated systems supporting access and expression of building.

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

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

525 Special Topics in Architecture (3) Student- or instructor-initiated course. May be repeated. Maximum 9 hrs.

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

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

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

572 Architectural Design Studio/Seminar II: Technological Traditions (6) Integrated approach to design: relationship between technological aspects of architectural form and space in response to both cultural and environmental focus.
in construction. Development of understanding of life safety and health requirements in building and needs of physically challenged user. Prereq: Design II. 1 hr and 5 labs.

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


591 Foreign Study (1-9)

592 Off-Campus Study (1-9)

593 Independent Study (1-9)

Art

(College of Arts and Sciences)

MAJOR

DEGREE

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

Norman Magden, Head
William C. Kendall, Associate Head

Professors:

Blain, Sandra J., M.F.A. ......................... Wisconsin
Brakka, P. M., M.F.A. ..................................... Yale
Clarke, R. A. (Emeritus), M.S. ......................... Wisconsin
Cleaver, Dale G. (Emeritus), Ph.D. ....... Chicago
Daehnert, R. H., M.F.A. ......................... Wisconsin
Falsetti, Joseph S., M.S. ......................... Ohio State
Goldenstein, M. B., M.F.A. ..................... Nebraska
Kennedy, William C., M.F.A. ...................... Wisconsin
Lee, B., M.F.A. ...................................... Yale
Leland, W. E., M.F.A. .............................. Tennessee
Livingston, P. R., M.F.A. ......................... Wisconsin
Magden, Norman, Ph.D. Case Western Reserve
Martinson, Fred, Ph.D. ......................... Chicago
Nichols, P. G., M.F.A. ............................... Michigan
Peacock, D., M.F.A. ..................................... Iowa
Riesing, T. J., M.F.A. .............................. Nebraska
Stewart, F.C., M.F.A. ............................. Claremont
Yates, S., M.F.A. ......................... North Carolina (Greensboro)

Associate Professors:

Darrow, J. F., Ed.D. ................................ Illinois State
Habel, Dorothy, Ph.D. ................................. Michigan
LeFevre, Richard, M.F.A. ......................... Rochester IT
Longobardi, Pam (Liaison), M.F.A. ................................ Montana State
Lyons, B., M.F.A. ......................................... Arizona State
Metros, Susan E., M.F.A. ......................... Michigan State
Moffatt, F., Ph.D. ...................................... Chicago
Neft, A., Ph.D. ........................................ Pennsylvania
Saucer, Ted C., M.F.A. ............................... Michigan State
Staples, Carolyn, M.F.A. ......................... Michigan State
Wilson, D., M.F.A. .............................. California (San Diego)

Assistant Professor:

Brodgan, Sally B., M.A. ..................................... Penn State

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

THE MASTER’S PROGRAM

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

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

M.F.A. Requirements

A minimum of 60 hours is required:

1. Successful completion of 20 hours of studio in a concentration area. An area program must be approved by the graduate faculty only after the second semester in residence. Ten hours of concentration must be in second year courses (512, 514, etc.)
2. A minimum of 9 hours of art history for graduate credit.
3. Eleven hours of electives which may consist of any combination of courses offered by the University for graduate credit.
4. Art 599, Project in Lieu of Thesis (20 hours). A third year of semi-independent study. Student must have completed all other coursework prior to registration.
5. A student with permission of the area faculty can petition to take 3 hours of outside academics as a substitute for 3 hours of art history or 3 hours of concentration area. The petition is to be presented to the graduate committee for final approval and should directly address the need and relevance of this substitution to the student’s concentration.

Four semesters (normally the first 40 hours) beyond the Bachelor’s degree are required in residence. An exception is made for working professional designers who may complete their first 20 hours, with the permission of the faculty, on a part-time basis. 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, if during 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/illustration 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.

GRADUATE COURSES

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

404 Computer Enhanced Design (3) Exploration of computer systems, software, and techniques. Prereq: Introduction to Computer Enhanced Design or consent of instructor. May be repeated. Maximum 6 hrs.

405 Advanced Computer Enhanced Design (3) Prereq: 404 or consent of instructor. May be repeated. Maximum 6 hrs.

411 Drawing IV (6) Individualized pursuit of personal drawing techniques and concepts; supplemented by individual and group critiques. 40 hours of outside academics as a substitute for 3 hours of art history or 3 hours of concentration area. The petition is to be presented to the graduate committee for final approval and should directly address the need and relevance of this substitution to the student's concentration.

Four semesters (normally the first 40 hours) beyond the Bachelor's degree are required in residence. An exception is made for working professional designers who may complete their first 20 hours, with the permission of the faculty, on a part-time basis. 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.

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GRADUATE COURSES

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

404 Computer Enhanced Design (3) Exploration of computer systems, software, and techniques. Prereq: Introduction to Computer Enhanced Design or consent of instructor. May be repeated. Maximum 6 hrs.

405 Advanced Computer Enhanced Design (3) Prereq: 404 or consent of instructor. May be repeated. Maximum 6 hrs.

411 Drawing IV (6) Individualized pursuit of personal drawing techniques and concepts; supplemented by individual and group critiques. 40 hours of outside academics as a substitute for 3 hours of art history or 3 hours of concentration area. The petition is to be presented to the graduate committee for final approval and should directly address the need and relevance of this substitution to the student's concentration.

Four semesters (normally the first 40 hours) beyond the Bachelor's degree are required in residence. An exception is made for working professional designers who may complete their first 20 hours, with the permission of the faculty, on a part-time basis. 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, if during 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.
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.

481 Museology II: Museums, Purpose and Function (3) Development of museums of art, history, natural and applied science. (Same as Anthropology 481.)

482 Museology III: 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.)

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

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

488 Studies in Art History (3) Concentration in individually selected areas of art history and consent of instructor. May be repeated. Maximum 6 hrs.

494 Individual Problems (3) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

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/N only. E

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

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

521 Graduate Ceramics I (2-6) May be repeated. Maximum 10 hrs.

525 Graduate Ceramics II (2-6) May be repeated. Maximum 10 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.


551 Graduate Graphic Design/Illustration I (2-6) May be repeated. Maximum 10 hrs.

552 Graduate Graphic Design/Illustration II (2-6) May be repeated. Maximum 10 hrs.

553 Computer Enhanced Design (3) Prereq: Consent of instructor. May be repeated. Maximum 10 hrs.

561 Graduate Printmaking-Intaglio I (2-6) May be repeated. Maximum 10 hrs.

562 Graduate Printmaking-Intaglio II (2-6) May be repeated. Maximum 10 hrs.

564 Graduate Printmaking-Lithography I (2-6) May be repeated. Maximum 10 hrs.

564 Graduate Printmaking-Lithography II (2-6) May be repeated. Maximum 10 hrs.


571 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.

572 Studies in Italian Renaissance Art (3) Art and architecture of 14th and 15th centuries. 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 and 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 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.

579 Special Topics in Art History (3) Student- or instructor-initiated course offered at convenience of department. Prereq: M.F.A. candidate or consent of instructor. May be repeated with consent of department. 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.

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 coursework and successful second year evaluation by graduate faculty. May be repeated. Maximum 20 hrs. S/NC only. E

Courses listed below offered periodically only at the Pi Beta Phi Arrowmont School of Crafts, Gatlinburg, Tennessee. Courses may be repeated. Upon admission to the M.F.A. program at UT 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.

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

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

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

440 Painting/Watercolor (2-4) Intermediate to advanced. May be repeated.

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

460 Fiber (2-4) Intermediate to advanced. May be repeated.

470 Fabric (2-4) Intermediate to advanced. May be repeated.

480 Enameling (2-4) Intermediate to advanced. May be repeated.

490 Wood (2-4) Intermediate to advanced. May be repeated.
Astronomy
See Physics and Astronomy

Audiology and Speech Pathology (College of Arts and Sciences)

MAJORS

DEGREES

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

Patrick J. Carney, Head

Professors:

Asp, Carl W., Ph.D................................ Ohio State
Carney, Patrick J. (Liaison), Ph.D............. Iowa
Luper, Harold L. (Emeritus), Ph.D............. Ohio State
Nabelej, Igor V., Sc.D............................. Prague
Peterson, H. A., Ph.D................................... Illinois
Silverstein, B., Ph.D............................... Purdue

Associate Professors:

Burchfield, Samuel B., Ph.D.................... Michigan State
Ferrell, Charles J., M.A............................ Tennessee
Gordon, Pearl A., Ph.D............................. Tennessee
Krishnan, Ravi A., Ph.D............................ Texas
Thelin, J. W., Ph.D................................ Iowa
Wallace, Gloriajenn L., Ph.D................... Northwestern

Assistant Professor:

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 are expected to complete the academic requirements for clinical certification from the American Speech-Language-Hearing Association, including the required number of clock hours of clinical practicum (minimum 250 hours as a graduate student, 375 total). Each semester hour is the one hour devoted primarily to formal course work and the last year to full-time research culminating in the master's degree.

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 course work within the department of which:
   a. a minimum of 6 semester hours in the topic of major interest;
   b. a minimum of 6 semester hours in topic(s) of related interest;
   c. 2 semester hours in 611; and
   d. 3 semester hours in supervised teaching experience.

5. A comprehensive examination to demonstrate scholarly knowledge of audiology, speech and language pathology, and speech and hearing science, and advanced knowledge of the specific area of concentration.
6. A final oral examination.

ACADEMIC COMMON MARKET

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

GRADUATE COURSES

431 Stuttering (3) Nature, appraisal and treatment. Prereq: 304 or consent of instructor.

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

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


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

461 Introduction to Language Pathology in Childhood (3) Language, perception, and treatment of language disorders. Prereq: 304 or Consent of Instructor.

465 Speech and Language of the Culturally Different Child (3) Speech and language differences of children of various minor ethnic and class memberships. Prereq: Consent of Instructor.

473 Audiology II (3) Basic principles of clinical audiology, pure tone, speech, masking and overview of special auditory tests. Prereq: 371.

494 Aural Habilitation/Rehabilitation of the Hearing Impaired (3) Psychosocial aspects, amplification components, patterns of use, spectrum analysis, speech audiology, hearing aids, speech perception, speech reading, parent-infant, preschool school years of children, communication impairments/means of remediation of adults, effects of aging/remediation on the elderly, and case studies. Prereq: Audiology and Speech Pathology.

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 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

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

506 Neural Bases of Speech and Language (3) Structure and function of central and peripheral nervous systems, role in speech and language. Prereq: 305.

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 statistics, application of statistics, and completion of a proposal and the hypothesis pilot research project. Prereq: Consent of Instructor.

512 Clinical Practice in Audiology (1-4) Prereq: 473 and 494. May be repeated. Maximum 9 hrs.

513 Clinical Practice in Audiology: Off-Campus Sites. (1-4) Prereq: Consent of instructor.

514 Practicum in Verbal-Tonal Habilitation (1-4) Prereq: 494, 595, or consent of instructor. May be repeated. Maximum 6 hrs.

515 Practicum in Aural Rehabilitation (1-4) Prereq: 473 and 494. May be repeated. Maximum 6 hrs.

517 Instrumentation in Audiology and Speech Pathology (3) Principles of instrumentation in audiology and speech pathology; laboratory assignments for familiarization of students with instruments for measuring hearing and speech processes.

520 Aphasia (3) Historical review of aphasia literature, theories of brain functioning, aphasic classification and terminology, tests and rationale for testing, etiology, therapy considerations and prognosis for recovery. Prereq: 506 or equivalent or consent of instructor.

522 Seminar: Articulation and Voice Disorders (3) Current research in diagnosis and management of articulation and voice disorders. Prereq: Undergraduate courses in articulation and voice disorders or consent of instructor.
531 Seminar on Stuttering (3) Current significant research in stuttering. Prereq: 431 or consent of instructor.

532-33-34 Advanced Clinical Practice in Speech-Language Pathology (1-4, 1-4, 1-4) Prereq: 434 or equivalent and consent of instructor. May be repeated. Maximum 6 hrs. Enrollment for less than 2 semesters must have prior departmental approval.

535-36-37 Advanced Clinical Practice in Speech-Language Pathology: Off-Campus Sites (1-4, 1-4, 1-4) Prereq: prior experience, consent of instructor. May be repeated. Maximum 6 hrs each. Enrollment for less than 2 semesters must have prior departmental approval.

538 Advanced Clinical Practice in Speech-Language Pathology: Public Schools (1-4) May be repeated. Maximum 6 hrs. Enrollment for less than 2 semesters must have prior departmental approval.

539 Motor Speech Disorders (3) Neuromotor organization for speech production; types of motor speech disorders and related neuromotor symptomatology; diagnosis and management of motor speech disorders. Prereq: 506.

540 Structural Speech Disorders (3) Etiology, diagnosis and clinical management of craniosacral speech disorders and laryngeomoty. Prereq: 506, 331.

542 Hearing Disorders (3) Effects of heredity, development, aging, diseases, and neurological and psychological factors on hearing. Prereq: 473 or equivalent or consent of instructor.

543 Amplification Technology (3) Description of hearing aid components, circuits and performance characteristics. Psychoacoustic and real ear analysis of hearing aids. Coupler material and geometry effects. Practical experience in troubleshooting, repair, and construction of hearing aids. Prereq: 473 or 507 or equivalents or consent of instructor.

544 Amplification for the Hearing-Impaired (3) Speech auditory/psychoacoustic influence of noise, reverberation and auditory pathology on speech perception. Strategies for selecting amplification. Psychological considerations in amplification and counseling. Dispensing models. Prereq: 473, 507, and 543 or equivalents or consent of instructor.

545 Sound Measurement Techniques and Hearing Conservation (3) Techniques of measurement and analysis of sound; hearing conservation in schools and industry. Prereq: Consent of instructor.

546 Advanced Audiology (3) Theoretical bases for behavioral audiology and acoustic immittance measurement. Prereq: 473 or equivalent or consent of instructor.

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

548 Special Study in Audiology (1-3) Special readings, 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. Prereq: Consent of instructor. May be repeated. Maximum 10 hrs.

552 Seminar in Speech Pathology (2-3) Current significant research in speech pathology. Topics vary. Prereq: 473 or 9 hrs in speech pathology. May be repeated with consent of department. Maximum 9 hrs.

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

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

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

561 Tutorial in Child Language Pathology (2) Interactions with various staff members of Pediatric Language Programs; selected topics. Prereq: 461 or consent of instructor. May be repeated. Maximum 6 hrs.

562 Practical Applications of Language Habilitation Techniques (3) Various methods and procedures in treating delayed/disordered preschooolers. Alternative/ augmentative systems included. Prereq: 461 or equivalent 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 management of hearing impaired child: amplification, educational alternatives, and state and federal guidelines.

576 Electrophysiological Assessment of Auditory Function (3) Auditory-evoked potentials and their anatomical origins. Use of various evoked potentials in evaluation of auditory function and determination of size 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.

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

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

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

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

595 The Verbotomal System: Auditory/Speech Perception (3) Innovative therapy, therapy techniques, and SIVAG amplification filters for diagnosis/evaluation/remediation of spoken language/listening skills of hearing-impaired children/adults: use of rhythms, movements and suprasegmentals; special auditory tests, acoustic filters, correcting misarticulations through optimal listening; central auditory treatment; second language (language through instruction/spoken language); development of ideas; critical thinking. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

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

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

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

603 Language Science (3) Seminar of theories and paradigms and the role of language science in the study of language. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

607 Advanced Anatomy and Physiology of the Ear (3) Neurological function, neurophysiological response and theoretical considerations. Prereq: 507.

609 Seminar in Speech Science (2) Experimental areas: speech physiology, psychoacoustic measurement, perception, production, intelligibility of speech, communication, motivation, language, psychology of speech and language. Prereq: 601 or consent of instructor. May be repeated. Maximum 6 hrs.

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

611 Experimental Design in Hearing (2) Analysis of experimental design in theses and related journals. Generation of experimental designs. Prereq: Consent of instructor.

650 Advanced Seminar in Audiology (2) Topics vary. Prereq: Consent of instructor. May be repeated. Maximum 8 hrs.

652 Advanced Seminar in Speech and Language (2) Topics vary: abnormally of voice, articulation, speaking time and rhythm, language development of use, and language symbolism. Prereq: Consent of instructor. May be repeated. Maximum 8 hrs.

655 Practicum in College Teaching (1) Supervised experience in college teaching. Prereq: Consent of instructor. May be repeated. Maximum 8 hrs. S/C only.

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

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

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

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

660 Directed Study in Hearing Science (1-3) Prereq: 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

Harison, A. A., Ph.D. ............. Tennessee

Wu, J. M., Ph.D. ............... Cal Tech

Young, R. L. (Emeritus), Ph.D. .... Northwestern

Associate Professors:

Kimberlin, R. D. (Liaison), Ph.D. ............... RWTH (Germany)

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

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

**NON-THESIS OPTION**

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

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

**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.**

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

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

**503 Air Vehicles (3) Current capabilities and future requirements for civilian and military air vehicles. Parameters significant for air vehicle type selection. Integration of air vehicle into aviation systems. Prereq: 501.**

**504 Airports and the Community (3) Structure of airports and their communities. Technology and economics of cargo, baggage, ticket and passenger handling. Airport management, economics and logistics. Interfaces with community, plans, programs and developments for collecting and distributing passengers and freight from various airlines. Types of airport developments and their projections. Prereq: 501.**

**505 Governmental Policies for Aviation (3) Theoretical and legal basis for governmental regulation of aviation. Historical and legislative developments 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 process.**

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

**521-22 Experimental Flight Mechanics (3,3) Experimental techniques for flight mechanics. Specialized equipment for airborne laboratory: student participation in series of experiments demonstrating acquisition of flight test data. Necessary theoretics support basic experiments. Tests cover broad range of aircraft performance, stability and control characteristics in addition to instrumentation and data reduction methods. 521-1 performance; 522-2 stability and control. Prereq: Aerospace Engineering 422.**


**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.**

**588 Measurement Science I (3) (Same as Nuclear Engineering 588, Civil Engineering 588, Engineering Science and Mechanics 586, Mechanical Engineering 588 and Aerospace Engineering 588.)**

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

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**Biochemistry**

(College of Arts and Sciences)

**MAJOR DEGREES**

Biochemistry ....................., M.S., Ph.D.

John W. Koontz, Head

Professors:
Churchill, Jorge E., Ph.D. .......... Sheffield
Josli, J. G., Ph.D. .............., Poona
Monty, Kenneth J., Ph.D. ....... Rochester
Sallo, T. P. (Emeritus), Ph.D. ..... , Michigan
Wicks, Wesley D., Ph.D. ....... Harvard

Associate Professor:
Howell, Elizabeth E., Ph.D. ......... Lehigh
Koontz, John W. (Liaison), Ph.D. ....... Kentucky
Roberts, Daniel M., Ph.D. ........ California (Davis)

Serpus, Engin H., Ph.D. .... Hatecappe

Assistant Professors:
Bruce, Barry, Ph.D. .............. California (Berkeley)
Feinberg, R. H. (Emeritus), Ph.D. ..... California
Peterson, Cynthia B., Ph.D. .... LSU

THE MASTER'S PROGRAM

1. At least one year each of Introductory Organic Chemistry with laboratory* and approved physical chemistry.
2. A minimum of 8 semester hours of approved biology courses beyond the introductory level and including the subject areas of genetics and physiology.
3. Biochemistry 511-12 and 515-16.
4. At least 8 hours of advanced seminar courses from the following: 601, 603, 604, 605, 606.
5. Six hours of master's research and a thesis.
6. A final examination that covers both the thesis endeavor and the subject matter of the course requirements.

THE DOCTORAL PROGRAM

1. Introductory Organic Chemistry*, Introductory Physics*, Differential and Integral Calculus*, approved physical chemistry, and at least 12 hours of biology beyond the introductory level and including the subject areas of genetics and physiology.
2. Biochemistry 511-12 and 515-16.
3. At least two approved graduate courses in chemistry, physics, or other physical science; for example, Chemistry 550, 551, 552, Physics 521, 522, 551.
4. No survey courses will be accepted.
5. At least 8 hours of topics offered in 521 and 621.
6. Participation in 601 and 603 during the entire period of residence.
7. Comprehensive examination, taken before the end of the third year of study.
8. A final oral examination which will be concerned primarily with the student's dissertation.

*Though completion of these courses or their equivalent is required, they may not be taken for graduate credit.

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 biochemical journal as senior author.

ACADEMIC COMMON MARKET

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

GRADUATE COURSES

410 Cellular and Comparative Biochemistry (4) Electrophoretic behavior, chemistry and structure of proteins; enzyme behavior and biochemical function; caloric and energy capture; synthetic metabolism; nucleic acid function, protein synthesis, and biochemical genetics; regulation of biological processes. Prereq: Chemistry 350-60-69 and Biology 110-20. 3 hrs and 1 discussion. F, Sp


471-81 Biophysical Chemistry (3,3) Physicochemical principles with applications to biological systems. 471-Thermodynamics; chemical equilibrium; solution chemistry; transport; electrochemistry; kinetics; enzyme-catalyzed reactions. 481-Elementary quantum chemistry; interactions of light with biological molecules; optical and magnetic spectroscopy; protein folding and protein structure in solution; case studies of selected macromolecules. Prereq: Calculus, Organic Chemistry, General Biology or consent of instructor. (Same as Chemistry 471-481.) 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. E, F, Sp

511 Advanced Concepts in Protein Structure, Protein Function and Intermediary Metabolism (4) Protein structure and dynamics; regulation of enzyme activity; intermediary metabolism; membrane structure and function. Originalliterature and review articles; contemporary experimental approaches. Prereq: 410, 420 or consent of instructor. 3 hrs and 1 discussion. F

512 Advanced Molecular Biology (4) Replication, repair, transcription, translation and control mechanisms. Prior knowledge of fundamentals of gene expression. Prereq: 511 or Life Sciences 511, 3 lectures and discussion. (Same as Life Sciences 512.) Sp

515 Experimental Techniques I (3) Modern experimental methodology and instrumentation in lab. Primarily for departmental graduate students. Prereq: Consent of instructor.

516 Experimental Techniques II (3) Laboratory rotations. Students work in laboratories of faculty members on clearly defined projects. Proposals and oral reports are prepared. Primarily for departmental graduate students. Prereq: 515. Sp

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

561 Environmental Toxicology (3) Basic concepts in toxicology, molecular toxicity, and detoxification, reproductive toxicology, mutagenesis, teratogenesis, carcinogenesis; pathologic changes and environmental impact. Prereq: Chemistry 350-60-69 or consent of instructor. (Same as Ecology 561.) F

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

601 Advanced Biochemistry Seminar (1) Invited speakers. Topics posted in advance. Required every semester in residence. S/NC only. F, Sp

603 Current Topics in Biochemistry (1) Seminars and lectures dealing with new advances in field of chemical biology. Required every semester in residence. S/NC only. F, Sp

604 Current Topics in Environmental Toxicology (1) Critical reviews of research problems and methods in environmental toxicology, behavioral biology, biochemical and ecological effects, biostatistics and epidemiology. Presentations by students, faculty and guest lecturers from academia and industry. May be repeated with consent of department. Maximum 4 hrs. (Same as Ecology 604.) S/NC only. F, Sp

605 Current Topics in Regulation of Protein Function (1) Covalent modifications of proteins by phosphorylation-dephosphorylation allosteric interactions. Prereq: 410 or equivalent. May be repeated. Maximum 6 hrs. S/NC only. F, Sp

606 Current Topics in Biological Membrane Research (1) Prereq: 410 or equivalent. May be repeated. Maximum 9 hrs. S/NC only. F, Sp

621 Advanced Topics (1-3) Biochemical and biophysical methods, mechanism of enzyme function, gene expression, membrane structure and function, metabolic regulation, physical biochemistry. Prereq: 511-12 or consent of instructor. May be repeated. Maximum 9 hrs. F, Sp

Biomedical Sciences

(Major of the Vice Chancellor for Academic Affairs)

MAJOR

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

Raymond A. Popp, Director

Professor:

Olin, Donald E., Ph.D. ......................................... Rockefeller

Research Professor:

Olin, 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, nuclear acid chemistry, cytology, radiation and environmental biology, virology, development, experimental pathiology, 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 support, and housing should be sent to the Director, University of Tennessee-Oak Ridge Graduate School of Biomedical Sciences, Biology Division, ORNL, P.O. Box 2009, Oak Ridge, Tennessee 37831-8077.

THE DOCTORAL PROGRAM

1. Satisfactory (B grade or better) completion of the following core courses or their equivalent: Biochemistry (511); Biophysical Biochemistry (514); Genetics (515); Cell Biology (518); Computing for 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
Botany

(College of Arts and Sciences)

MAJOR

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

Edward E. Schilling, Head

Professors:

Caponetti, J. D., Ph.D. ....................... Harvard
Clebsch, E. E. C. (Emeritus), Ph.D........ Duke
DeSelm, H. R. (Emeritus), Ph.D. .... Ohio State
Evans, A. M. (Emeritus), Ph.D. .... Michigan
Herndon, W. R. (Emeritus), Ph.D. .... Vanderbilt
Hickok, L. G., Ph.D. ........................ Massachusetts
Holton, R. W., Ph.D. ........................ Michigan
Hughes, K. W., Ph.D. ....................... Utah
Jones, L. W., Ph.D. .......................... Texas
Mullin, B., Ph.D. ............................. NC State
Norris, F. H. (Emeritus), Ph.D. ........ Ohio State
Petersen, R. H. (Distinguished Prof.), Ph.D. ... Columbia
Schilling, E. E. (Liaison), Ph.D .......... Indiana
Sharp, A. J. (Emeritus), (Distinguished Prof.), Ph.D. .... Ohio State
Smith, W. O., Ph.D. ....................... Duke
Walpe, P. L. (Distinguished Prof.), Ph.D. ... Texas

Associate Professors:

Amundsen, C. G., Ph.D. .................... Colorado
Haltman, A. S., Ph.D. ........................ Ohio State
Schwarz, O. J., Ph.D. ........................ NC State
Smith, D. K., Ph.D. .......................... Tennessee
Wofford, B. E. (Curator), Ph.D. ......... Tennessee

Assistant Professor:

Cruzan, M. B. C., Ph.D. ... SUNY (Stony Brook)

Lecturer:

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

The Department of Botany offers the Master of Science and Doctor of Philosophy degrees with concentrations in anatomy, astrobiology, cytology, cytogenetics, ecology, genetics, lichenology, morphology, mycology, phytobiology, physiology, phytochemistry, pteridology, and tanninology. 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 much more important than the particular courses taken as an undergraduate. Accordingly, students lacking specific prerequisite courses but otherwise qualified may be admitted to graduate studies in botany. In such cases, the deficiencies should be removed as soon as possible, typically during the first year of the student's graduate program. The determination of deficiencies and the manner in which they will be removed will be decided upon by the student's pro-temp committee during the first meeting with the student.

THE MASTER'S PROGRAM

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

Thesis Option

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

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

Non-Thesis Option
1. Satisfactory completion of 34 semester hours of approved graduate courses of which 30 semester hours must be in Botany 503. At least two-thirds of the hours must be at the 500 level or higher.
2. Satisfactory completion of two hours at the 600 level.
3. Educational service in the form of teaching and/or ancillary services; consult major professor and department head.
4. Satisfactory performance on a final written examination on all work offered for the degree.

The student's committee may also require that an oral examination follow the written examination.

THE DOCTORAL PROGRAM

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

Requirements for successful completion of the Ph.D. are as follows:
1. Satisfactory presentation of a research problem by means of a written proposal and an oral defense to the student's committee. This must be completed before enrollment in Botany 600.
2. Satisfactory performance on a written comprehensive examination.
3. Presentation of one or more cognate areas outside of the department totaling 6 hours of graduate credit with at least a B average.
4. Satisfactory performance on an examination in one modern foreign language (see Graduate Coordinator) or an A or B in French 302 or German 332.
5. Satisfactory completion of 6 hours at the 600 level (excluding dissertation).
7. Presentation of a departmental seminar near the end of the doctoral program.

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

GRADUATE COURSES

401-02 Field Studies in Botany (1-3, 1-3) Field experience and taxonomy of specific plant groups. Topics vary: bryology, lichenology, phytogeography, mycology, physiology, aquatic vascular plants, spermatophytes, woody plants, and botanical photography. May be repeated under different topic. Maximum 9 hrs.


404 Plant Molecular Biology (4) Current research in plant molecular biology: techniques and procedures. Genome structure, gene expression and regulation, transposable elements, plant development, lab isolation of DNA and RNA, molecular hybridization, isolation and preparation of plasmids, PCR amplification of specific sequences, DNA sequencing and transformation. Prereq: General genetics with grade of B or better and consent of instructor. 2 hrs and 4 labs.

412 Plant Anatomy (3) Cells, tissues and organs: development in vegetative and reproductive structures of vascular plants—seed plants. Prereq: 110-20 or Biology 110-20.

431 Plant Ecology (3) Interactions between individuals, species, communities, and their environments. Circulation of energy and matter in ecosystems. Weekly field trips or laboratory periods, and at least two weekend field trips. Prereq: 330 or equivalent. Su.

451 Plant Tissue Culture (3) Methods for culture of cells, tissues, and organs: media preparation and maintenance of cultures. Prereq: 110-20 or Biology 110-20 or equivalent and consent of instructor. 310-20 or equivalent. Recommended prereq: 310-20, 521, 412, Microbiology 310 or 319; Ornamental Horticulture and Landscape Design 330; and Plant and Soil Science 331.

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

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

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. Maximum 4 hrs. E

506 Physiology (4) Comparative study of major animal phyla, both freshwater and marine: morphological, developmental, ecological, taxonomic and phylogenetic aspects. Field and laboratory studies, identification, classification, experimentation. Prereq: 310 or consent of instructor. 3 hrs and 1 lab. F or A.

507 Biological Illustration (3) Principles and applications of photography (B/W and Color) photo-micrography, drawing, graphic 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 Zoology 510.)


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

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 recent research in botanical research. May be repeated. Maximum 8 hrs. S/NC only.

573 Population Biology (3) (Same as Zoology and Ecology 573.)

580 Bryophytes and Pteridophytes (4) Taxonomy, phylegony, 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, data processing and analysis, experiments. Prereq: Statistics 350, 360; Physics 121, 122. May be repeated. Maximum 5 hrs. S/NC only.

585 Methods and Instrumentation in Field Investigation (1) Appropriate methods and instrumentation.

Topics vary. May be repeated with consent of instructor. Maximum 5 hrs. S/NC only.

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

607-08 Advanced Topics in Botanical Sciences (1-3, 1-3) Experimental botany: nomenclature, morphology and statistics of vascular plants, cryptogamic botany, cytology and cell biology, genetics, plant physiology, taxonomy and ecology. May be repeated. Maximum 12 hrs.

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

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

GRADUATE COURSES

410 Television News (3) Writing, reporting, performing, and producing newscasts for television. Requirement for majors in Communications and participants in the interdisciplinary doctoral program. See Communications for additional information.

410 Television News (3) Writing, reporting, performing, and producing newscasts for television. Requirement for majors in Communications and participants in the interdisciplinary doctoral program. See Communications for additional information.

411 Television Production (3) Principles of video production: writing and producing newscasts, special projects, and newscast for cable and A/V production. May be repeated. Maximum 9 hrs.


413 Digital Audio Production (3) Principles of digital audio production: writing and producing newscasts, special projects, and newscast for cable and A/V production. May be repeated. Maximum 9 hrs.

414 Digital Video Recording and Editing (3) Principles of digital video recording and editing: writing and producing newscasts, special projects, and newscast for cable and A/V production. May be repeated. Maximum 9 hrs.

415 Digital Audio Recording and Editing (3) Principles of digital audio recording and editing: writing and producing newscasts, special projects, and newscast for cable and A/V production. May be repeated. Maximum 9 hrs.

440 Corporate Video (3) Special requirements of business, industrial, educational, and medical uses of video: scriptwriting, shooting, editing, and production. Prereq: Audio/Video Production 100 or consent of instructor. E

444 Corporate Video (3) Special requirements of business, industrial, educational, and medical uses of video: scriptwriting, shooting, editing, and production. Prereq: Audio/Video Production 100 or consent of instructor. E

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 technologies: direct broadcast satellite, fiber optics, high definition television, and others. Prereq: Introduction to Radio and Television or consent of instructor.
Business Administration
(Graduate School 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 major in Business Administration. Two tracks are available for the MBA: the regular, full-time program and the executive program. A dual degree program is also available with the College of Law leading to the J.D.-MBA.

To obtain application materials, write or call:
Office of Graduate Business Programs, Suite 527, Stokely Management Center, College of Business Administration, The University of Tennessee, Knoxville, TN 37996-0552, Telephone: (615) 974-5033. For the executive program, telephone (615) 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 Arkansas, Louisiana (concentration in forest industries management or logistics and transportation), 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/her cumulative graduate grade-point average is 3.0 or higher at the end of the probationary period. The probationary period is defined as the next semester's coursework as established by the degree program.

THE MBA PROGRAM

The MBA program is designed for students with undergraduate degrees in the social and natural sciences, the humanities, and professional fields such as engineering, business, agriculture, and architecture. The MBA program is a two-year program with students beginning in the fall of each year and graduating in the spring of the following year. 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.

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 is required for the MBA Program. Students may choose from the following concentrations: finance, management, marketing, or quantitative methods. Additional information is available from the Office of Graduate Business Programs.

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

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

MBA Core
The MBA core consists of two 15-hour courses, one taken each semester. The courses are taught by the MBA core faculty in an integrated fashion and through a year-long simulation requiring students to learn the fundamental functionalities (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.
approval to the Office of Graduate Business Programs.

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

Economics
Environmental Management
Finance
Forest Industries Management
Global Business
Logistics and Transportation
Management
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 permission, as approved by the Director of Graduate Business Programs.

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

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

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

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

To qualify for the degree, the student must achieve a B average (3.0) or above in MBA core courses required in this program, plus 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.


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, as well as 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. Directed 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 fourth year (minimum of 30 semester hours of graduate credit), the student receives the MBA degree.

DUAL J.D.-MBA PROGRAM

The College of Business Administration and the College of Law offer a coordinated dual program leading to the conferment 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 recognizes the interests of students who (a) contemplate a career in public service and want to acquire the skills and perspective of a lawyer and the business-oriented manager, (b) contemplate a career in business management and want to acquire the skills and perspective of a lawyer, or (c) contemplate a career as a lawyer specializing in business-related law and want to acquire the skills and perspective of the business-oriented manager.

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

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

Upon receipt of the application, the Dual Program Committee will determine the interests of students who (a) contemplate a career in public service and want to acquire the skills and perspective of a 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.

Curriculum
A dual program candidate must satisfy the graduation requirements of both 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
Admission 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 course work accepted by the College of Law and grades for law courses accepted by the College of Business Administration are converted to either Satisfactory or No Credit and will not be included in the computation of the student’s grade average or class standing in the college in which such grades are so converted. The College of Law will award a grade of Satisfactory for a graduate business course in which the student has earned a B grade or higher and a No Credit for any lower grade. The College of Business Administration will award a grade of Satisfactory for a law course in which the student has earned a 2.3 grade or higher and a No Credit for any lower grade. Grades earned in courses of MBA coursework shall be used on a regular basis for any applicable purpose in the college offering the course. The official academic record of the student maintained by the Registrar of the University shall show the actual grade assigned by the instructor without conversion.

Approved Dual Credit

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

EXECUTIVE MBA PROGRAM

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

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

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

Admission Requirements

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

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

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

Curriculum

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

The MBA program has three terms and requires registration for 15 hours in each term. The first term is comprised of Executive Core I and Management Project 1; it includes two residence sessions. The second term is comprised of Executive Core II and Management Project II; it includes two residence sessions the first of which will be in some international venue. The third term is comprised of Executive Core III and Management Project III. It includes two residence sessions.

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

The management project is carried out as an independent project with faculty advisor. It involves the diagnosis and analysis of some significant aspect of the sponsoring organization and is based on applying major themes in the core courses. The written project and presentation to senior management and faculty serves as the comprehensive examination.

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

Transfer Credits

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

THE DOCTORAL PROGRAM

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

Admission Requirements

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

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

Program of Study

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

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

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

There are five concentrations offered in the Ph.D. program:
Degree Requirements

Doctoral students must file a program of study that has been approved by their temporary doctoral advisory committee and the Associate Dean by the end of the first semester of coursework. After entry into the program, the Graduate Council’s policies and procedures for doctoral students are subject to the Graduate Council’s policies and procedures. Following is a specific degree requirement:

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 must complete appropriate courses at the graduate level, or other approved concentrations of coursework, in the following areas:
   - Accounting
   - Finance
   - Logistics and Transportation Management
   - Operations Management
   - Strategic Management
   - Marketing

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.

Comprehensive Examinations

Comprehensive written examinations over the concentration and cognate areas are required of each person seeking candidacy for the Ph.D. The concentration area examination is administered in two sessions of approximately four hours each and the cognate area examination in one session of approximately four hours. Written examinations may be supplemented by oral examinations. For a doctoral student having a cognate area in the College of Law, the results of only an oral examination may be deemed acceptable. Scheduling of comprehensive examinations is coordinated through the Office of Graduate Business Programs. 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 Council.

Dissertation

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

Graduate Courses

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

505 Core II (15) Integration of 504. Functional fundamentals through year-long case. Case-study work on organizational reality, global competition, managing technology, ethics and social responsibility, and strategic planning. Capstone 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, database design principles, views and diagrams and ICASE (Computer-Aided Software Engineering).

510 Management of Responsive Service Organizations (3) Management of organizations which respond to customer requests rather than to produce inventory: non-product economics, relationships and management of people, production, engineering, monitoring, and controlling processes. Prereq: Core 510 or consent of Associate Dean.

531 Executive Core I (12) Integrated semester course: two 11-day periods in residence with substantial reading, study and analysis during off-campus periods; integration of major business functions through strategic perspective; application of functional knowledge to tactical and strategic issues. Role of firm in society (with attention to the ethical and legal environment of firm) and the environment of firm as it relates to delivering value to customers and other stakeholders. Ethical Issues for Business Leaders. Personal development for career leaders: personal and professional development, leadership, individual and interpersonal skills, communication, negotiation, leadership and motivation. Customer value and systems management: determination and delivery of customer value. Prereq: Core 510.

552 Executive Core II (12) Continuation of 531. Role of firm in residential and non-residential environments for leadership. Customer value determination and delivery, systems management, strategic management in business and corporate level. Prereq: Core 531.

553 Executive Core III (12) Continuation of 552. One 11-day period and one two-week period of residence at international sites. Reading and study, analyses and applications in sponsoring organization. Role of firm in environment; global economic, political, and cultural issues. Strategic management/policy deployment topics and organizational culture, design and change management for global competition and international issues. Prereq: Core 552.

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

562 Management Project II (3) Company project. Continuation of 561. Diagnosis and analysis of strategic issue. Work within firm under guidance of faculty member. Prereq: 561 Core 552.

563 Management Project III (3) Company project. Continuation of 562. Completion of analysis and presentation of report to senior management in sponsoring organization. Work within firm under guidance of faculty member. Prereq: 562 Core 553.

593 Directed Independent Study (3) Cross-disciplinary topic of mutual interest to student and faculty. Available only by prearrangement with supervising faculty member. May require approval of Director of Graduate Business Programs.
Culberson, Oran L. (Emeritus), Ph.D. ........................................ Texas
Counce, Robert M., Ph.D. ............................................. Tennessee

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

Chemical Engineering (College of Engineering)

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

Charles F. Moore, Head

Professors:
Bienkowski, Paul R., Ph.D. ........................................ Purdue
Bogue, Donald C., Ph.D. ......................................... Delaware
Counce, Robert M., Ph.D. ..................................... Tennessee
Crawford, Lloyd W. (UTSI), Ph.D. .............. Cincinnati
Colburn, Oran L. (Emeritus), Ph.D. .............. Texas
Cummings, Peter T. (Distinguished Scientist), Ph.D. ........................................ Melbourne
Frazier, George C., Jr. (Condra Prof.), D.Eng. ........................................ Johns Hopkins
Hansen, Marion G., Ph.D. ......................................... Wisconsin
Holmes, John M. (Emeritus), Ph.D. .......... Tennessee
Hu, Haifei-Wen (Emeritus), Ph.D. .............. Wisconsin
Moore, Charles F. (Alumni Prof.) (Laison), Ph.D. ........................................ Louisiana State
Perona, Joseph J., Ph.D. ............................................ Northwestern
Prados, John W. (University Prof.), Ph.D. .......... Tennessee
Sheth, Atul C. (UTSI), Ph.D. ....................... Northwestern
Thomas, Carl O., Ph.D. ........................................ Tennessee

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 24 hours in graduate coursework in chemical engineering and related areas with thesis. The minimum requirements are 15 hours in chemical engineering; 6 hours in other engineering, scientific, or business areas (as approved by the departmental faculty); and 9 hours chosen from either of these two categories.
3. Active participation in graduate seminars in the department. Resident students must register for CHE 501 every semester it is offered.

4. A final oral examination covering the thesis, related fields and graduate coursework. Non-Thesis Option: Under certain conditions, a candidate may apply for a non-thesis program. To be eligible, a candidate must show evidence of significant professional experience after the baccalaureate degree; at least five years of industrial experience or research publications would be examples of such evidence. The departmental faculty will consider each application individually. Upon acceptance, the requirements for completion of the non-thesis option are as follows:
1. A total of at least 36 hours in graduate courses in chemical engineering and related areas. The minimum requirements are 18 hours in chemical engineering; 8 hours in other engineering, scientific, or business areas (as approved by the departmental faculty); and 9 hours chosen from either of these two categories.
2. Completion of a critical review of the literature and other sources in an area related to chemical engineering (CHE 580).
3. Written comprehensive examination over the major field and an oral examination covering the review paper and related areas.

THE DOCTORAL PROGRAM

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

Department requirements consist of the following:
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 modern reactor analysis, and transport phenomena and separations.
4. Active participation in graduate seminars conducted by the department. Resident students must register for CHE 501 every semester it is offered.

GRADUATE COURSES

403 Introduction to Optimization (3) Principles and applications of optimization techniques to chemical process design, constrained and equality constrained optimization, linear programming, dynamic programming, and geometric programming. Prereq: Mathematics 241.
447 Honors: Transport Phenomena (3) Momentum, heat and mass transfer processes, analogies, differential and similarity transform solutions, applications involving molecular diffusion, simultaneous mass transfer and chemical reaction. Prereq: Mass Transfer and Separation Processes and consent of instructor.
485 Hydrocarbon Processing (3) Chemical and physical properties of selected petroleums and processes utilized in conversion of raw materials into various fuels and selected chemical feedstocks. Prereq: Mass Transfer and Separation Processes, Organic Chemistry.
500 Thesis (1-15) P/NP only. E
501 Graduate Seminar (1) Prereq: Admission to graduate program. May be repeated. S/NC only. F, Sp
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when the 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 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, QL, and SVD decompositions of matrix, eigenvalue problems and similarity transformations in solving difference and differential equations. Numerical computational aspects of various algorithms. Application of linear algebra concepts in optimization studies. Introduction to linear programming, matrix projects. Prereq: Graduate standing or consent of instructor. (Same as Electrical and Computer Engineering 507 and Mechanical Engineering 507.)
531 Advanced Chemical Engineering Thermodynamics (3) Phase equilibrium in ideal and nonideal systems; composition relationship between phases; solution behavior and application to macromolecules; introduction to microscopic approach to thermodynamics.
541 Fluid Mechanics and Polymer Processing (3) (Same as Materials Science and Engineering 541.)
542 Diffusive and Stagewise Mass Transfer Operations (3) Analysis of mass transfer phenomena, coupled mass, heat and reaction, mass transfer operations in packed towers and aggregated vessels, membrane separations. Equilibrium stage concepts applied to mass transfer systems, emphasizing nonequilibrium and multicomponent systems.
561 Chemical Reactor Analysis (3) Rate models for heterogeneous reactions, properties of porous catalysts, catalyst deactivation, fluid-fluid and fluid-solid reactions.
561 Process Modeling and Simulation (3) Theories and structures of models and art of simulation. Model development from basic principles. Model development from plant test, use of models in operation, optimization and control. Prereq: Consent of instructor.
575 Applied Microbiology and Bioengineering (3) Cross-disciplinary course combining basic concepts in microbiology, biochemistry, reaction kinetics, and biochemical engineering. Prereq: Design and Control Processes, biodegradations/wastewater treatment, analysis of basic bioreactor systems, biensors, and
immobilization methods. Fundamental laboratory techniques during a 6-week laboratory period. (Same as Environmental Engineering 575, Agricultural Engineering 575.)

590 Technical Review and Assessment (3) Preparation of critical review of literature in area related to chemical engineering. Limited to candidates in nonthesis option. Prereq: Consent of advisor.

581 Industrial Pollution Prevention (3) Principles and practical aspects of industrial waste minimization, regulatory environment, waste minimization strategies, economic analysis, process safety. Case study: analysis of alternative waste minimization/management technologies. Prereq: Graduate standing in engineering or consent of instructor. (Same as Environmental Engineering 581 and Engineering Science and Mechanics 585.)

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

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

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

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


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


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

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

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

Chemistry
(College of Arts and Sciences)

MAJOR

DEGREES

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

Gleb Mamantov, 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
Bloos, J. E. (Emeritus), Ph.D. ....... Manchester
Bull, William E., Ph.D. ............ Illinois
Chambers, J. D., 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. .... California
Fletcher, W. H. (Emeritus), Ph.D. .... Minnesota
Grimm, F. A., Ph.D. ............. Cornell
Guiochon, G. (Distinguished Scientist), Ph.D. ....... Ecole Polytechnique and Paris VI
Kabalka, G. W. (Distinguished Prof.), Ph.D. ..... Purdue
Kleinfeiter, D. C., Ph.D. ............ Princeton
Kovac, J. D., Ph.D. ................ New Jersey
Lietzke, M. H. (Emeritus), Ph.D. .... Wisconsin
Magid, L. J., Ph.D. ............... Tennessee
Magid, L. J., Ph.D. ............... Yale
Mamantov, Gleb (Distinguished Prof.), Ph.D. .... Louisiana State
Pagni, R. M., Ph.D. ............. Wisconsin
Peterkin, J. R., Ph.D. .............. California
Schweitzer, George K. (Distinguished Prof.), Ph.D. .... Illinois
Sepaniak, M. J., Ph.D. ........ Iowa State
Smith, W. T. (Emeritus), Ph.D. ...... Ohio State
Van Hook, W. A., Ph.D. .......... Johns Hopkins
Wheat, E. L., Ph.D. .............. Purdue
Williams, T. F. (Distinguished Prof.), Ph.D. .... London
Woods, C., Ph.D. .................. NC State
Wunderlich, B. (Distinguished Scientist), Ph.D. .... Northwestern

Associate Professors:

Barnes, C. E., Ph.D. ............... Stanford
Felgerle, C. S. (Liaison), Ph.D. ..... Colorado
Lane, C. A., Ph.D. .............. California
Schell, F. M., Ph.D. .............. Indiana

Assistant Professor:

Dadum, Mark, Ph.D. ..... Stanford
Hinde, Robert J., Ph.D. ........... Illinois
Tuinman, Albert, Ph.D. .......... Princeton
Xue, Z. B., Ph.D. ............... California

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

THE MASTER'S PROGRAM

The department offers concentrations in six areas for the M.S.: analytical chemistry, environmental chemistry, inorganic chemistry, organic chemistry, polymer chemistry, and physical chemistry. The requirements for the M.S. in Chemistry consist of the satisfactory completion of:

1. Research and a thesis to give 6 to 12 hours of graduate credit in Chemistry 600.
2. Participation in seminar (Chemistry 601) during the entire 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: 400-41-42-43, 500-51-52, 510-52-53, 520-53-54, 540-55-56, 560-57-58, 580-59-60, or 600-61-62.
5. A final oral examination.

THE DOCTORAL PROGRAM

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

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

1. Research and a dissertation to give at least 24 hours of graduate credit in Chemistry 600. Registration must be continuous from the beginning of research.
2. Participation in seminar (Chemistry 501) during the entire period of graduate study, including the presentation of at least one seminar.
3. Prescribed remedial courses based on performance on entrance examinations.
4. Completion of the comprehensive examination series and defense of an original research proposal to give 2 hours of credit in Chemistry 601.
5. Eighteen additional hours in courses at the 500 level or above including at least one course above 601 and one of the following sequences: 510-51-52, 530-53-54, 570-71-72-73, and 590-94-95.
6. A final oral examination.

The Ph.D. program with concentration in chemical physics is conducted jointly with the Department of Physics. Requirements depend on the choice of the major department. Chemistry departmental requirements include passing the above degree requirements in chemistry with concentration in physical chemistry plus 6 additional hours in physics at the 500 level or above. Three of the additional physics hours can be used to satisfy the 18 hours requirement in item 5.

GRADUATE COURSES

430 Advanced Inorganic Chemistry (3) Atomic and molecular structure, bonding theories, descriptive chemistry of elements, kinetics and mechanism of inorganic reactions, applications of modern techniques for characterization, coordination and organometallic chemistry. Prereq: 220, Ph.D. or senior. 390 or 391, Sp.

431 Radioactivity and Its Applications (2) Radioactive materials in tracer and therapeutic applications. Radioactive decay, detection apparatus and techniques, tracer procedures, safety precautions in agriculture, biology, medicine, nutrition. Not for credit by chemistry or physics majors or minors. Prereq: Mathematics 122 or equivalent and 1 yr of general chemistry. Sp.


471-81 Biophysical Chemistry (3.3) (Same as Biochemistry 471-81).

473-83 Physical Chemistry (3.3) Students may not receive credit for both 473 and 473 nor for both 481 and 483. 473—Properties of gases; first, second, and third laws of thermodynamics, chemical equilibria, simple phase equilibria; properties of solutions; introduction to statistical thermodynamics. 483—Kinetic of chemical reactions; introduction to quantum mechanics and applications to electronic structure of atoms and molecules; molecular spectroscopy. 483—General Chemistry, Fundamentals of Physics, and Calculus III. E.

479-89 Physical Chemistry Laboratory (2,2) Experiments on topics discussed in 471-81 or 473-85.
548 Advanced Physical Chemistry (3) Chemical dynamics, statistical thermodynamics, quantum mechanics of atomic and molecular systems, crystal structure and solid state. Prereq: 481 or 483. Sp.

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

501 Chemistry Seminar (1) Lectures and discussion on current research. May be repeated. Continuous registration required for resident graduate students. S/NC only. F,Sp.

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

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

510 Analytical Spectroscopy (3) Principles and practice of optical and mass spectrometric techniques in qualitative chemical analysis. Prereq: 1 yr of physical chemistry.

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

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

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

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


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

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

550 Structure and Reactivity in Organic Chemistry (3) Structure and bonding in organic compounds: molecular orbital theory, stereochemistry, conformational analysis, and molecular mechanics; substituent effects on acidity and reactivity; introduction to reaction mechanisms. Prereq: 360. F


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

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

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

571 Advanced Quantum Chemistry and Spectroscopy (3) Prereq: 570 or consent of instructor. Prereq: 1 yr of physical chemistry. F

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

573 Chemical Kinetics and Transport (3) Time-dependent phenomena in chemistry: chemical kinetics, chemical dynamics, transport theory. Prereq: 1 yr of physical chemistry. Sp.

580 Fundamental Topics in Physical Chemistry (3) Quantum chemistry, spectroscopy, chemical kinetics, transport properties, thermodynamics, and statistical thermodynamics. Prereq: 1 yr of physical chemistry. F

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


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

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

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

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

630 Selected Topics in Inorganic Chemistry (3) Topics of current significance. Prereq: 360-31-32 or consent of instructor. May be repeated. Maximum 12 hrs.

650 Selected Topics in Organic Chemistry (3) Topics of current significance. Prereq: Two of 595-51-52 or consent of instructor. May be repeated. Maximum 12 hrs.


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

690 Selected Topics in Polymer Chemistry (3) Topics of current significance. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

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**Child and Family Studies**

(College of Human Ecology)

**MAJORS**

- Child and Family Studies ................. M.S. Human Ecology
- Ph.D.

**Professors:**

Blanton, Priscilla, Ed.D. ................... Tennessee

Cunningham, Jo Lynn, Ph.D. ............... Michigan State

Fox, Great L., Ph.D. ......................... Michigan

Moran, James D., Ph.D. ..................... Oklahoma State

Northfield, N. Mick, Ph.D. .................. Tennessee

Tew McCormick, Ed.D. ..................... Texas Tech

Twardosz, Sandra (Liaison), Ph.D. ....... Kansas

**Associate Professors:**

Allen, Jan, Ph.D. ....................... Purdue

Buehler, Cheryl, Ph.D. ..................... Minnesota

McInnis, Jackie H., Ph.D. ................. Florida State

Tegano, Deborah, Ph.D. .................... Virginia Tech

**Assistant Professors:**

Groves, Melissa, Ph.D. ..................... Virginia Tech

Malia, Julia, Ph.D. ......................... Iowa State

Morris, Lane, Ph.D. ......................... Tennessee

Smith, Delores, Ph.D. ....................... Oklahoma State

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The Department of Child and Family Studies encompasses two primary concentrations: child development and family studies. Integration of these areas creates a unique perspective for the study of individuals and families. Each graduate student's program of study is carefully planned in conjunction with a faculty committee to establish a program consistent with individual goals. All programs are characterized by a broad array of coursework, varied research experiences, and opportunities for experiences in real settings.

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

**ADMISSION REQUIREMENTS**

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

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

**THE MASTER'S PROGRAM**

- An individual program of study may be designed by the student in collaboration with his or her major professor and committee. The program provides for a concentration in either child development or family studies. 

- The M.S. with a concentration in child development offers two tracks. Track 1 is designed to meet the needs of professionals who work in programs encompassing a variety of early childhood programs. Specializations in Track 1 consist of early childhood education, early childhood special education, and early childhood administration and child development. Track 2 is designed for students seeking initial teacher licensure in early childhood education (pre-K through grade 3). 

- Thesis and non-thesis options are available for both tracks.

- Track 1 - All students in the child development concentration must enroll in CFS 510, 540,
The doctoral program in Human Ecology prepares scholars in the concentration areas of child development and of family studies. The strength of the doctoral program is based on three major components: the integration of child development and family studies within the context of human ecology and related areas, concentration in child development and family studies, and an emphasis on becoming proficient producers and consumers of research. A doctoral program that is concurrently specialized and integrative in nature reflects the complexity of the disciplinary subject matter, provides a broader context to formulate theoretical questions, and broadens the empirical literature addressing those questions.

Requirements include:
1. Minimum 10 credits in child and family studies required foundation courses 510, 550, 570, 571. 510 is also required for family studies area students.
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;
5. Minimum 3 credits of specialized research methods;
6. Pre-doctoral research project approved by student's committee;
7. College Professional Seminar, Human Ecology 610;
8. Minimum 8 credits of electives;

ACADEMIC COMMON MARKET

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

GRADUATE COURSES

500 Thesis (1-15) P/NP only. E
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E
507 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, relational building, and negotiation. F
510 Survey of Theory and Research in Child Development (3) Theoretical and research literature in child development (conception through adolescence); application to research intervention and education. Prereq: 9 hrs of either upper division undergraduate or graduate social science or consent of instructor. F
512 Survey of Research in Early Childhood Education (3) Current literature and issues in early childhood education. Prereq: 510 or equivalent or consent of instructor. F
515 Children in Contemporary Society (3) Theory and research on environmental and developmental issues in contemporary family situation and educational environments for children from infancy through early childhood. Implications for programs and policy. E
520 Curriculum and Program Development in Early Childhood Education (3) Current programming issues in early childhood education: description, analysis and evaluation of curriculum models, teaching methods, administrative styles, and supervision of personnel; experience in designing and evaluating early childhood programs for young children; special needs, infancy-age 8. Prereq: 3 credits in early childhood education. E
521 Organizational Management in Early Childhood Education (3) Designing, implementing, and evaluating physical and human resources in educational environments. Development of skills in environmental organization, interpersonal leadership, and supervision of staff. Prereq: 512 or equivalent or consent of instructor. E
consent of instructor. May be repeated with different topics. Maximum 6 hrs. E

590 Assessment of Development and Learning in Young Children (3) Theory, empirical research and practices related to measurement of development and learning in young children.

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

510 Advanced Special Topics in Human Development or Family Studies (1-3) Study of research and theory related to current issues. Prereq: 12 graduate hrs in major or consent of instructor. May be repeated with different topics. Maximum 6 hrs.

520 Advanced Directed Study in Human Development or Family Studies (1-3) Advanced, in-depth individualized learning experiences in specific topics in child development, early childhood education, or family studies. May be repeated with different topics. Maximum 6 hrs.

530 Advanced Developmental Processes (3) Sociocultural, cognitive/language development during infancy and childhood. Normative and nonnormative development. Prereq: 510 or equivalent or consent of instructor. May be repeated with different topics. Maximum 6 hrs.

531 Adolescent Development in Families (3) Normative and nonnormative adolescent development: physical, cognitive, role, social, familial, sexual, and personality. Prereq: 510 or equivalent or consent of instructor.

532 Advanced Study in Family Interaction (3) Human communication and conflict management within family context. Theoretical perspectives for familial processes, adjustment, decision making, and coping. Prereq: 550 or equivalent or consent of instructor.

533 Survey Design and Analysis (3) (Same as Sociology 633.)

534 Advanced Survey of Family Theory and Research (3) Conceptualization, analysis, and critical assessment of pertinent conceptual and empirical literatures at advanced level for variety of contemporary family issues. Prereq: 510, 550, 570 or equivalent research methods course. Sp, A

562 Men and Families (3) Contemporary American men: primary psychological processes in sociological context. Reciprocal influence of society, men, and their families in relation to marriage and parenting. Prereq: 9 hrs of graduate family studies coursework. F, A

563 Women and Families (3) Contemporary American women: primary psychological processes in sociological context. Reciprocal influence of society, women, and their families in relation to marriage and parenting. Prereq: 9 hrs of graduate family studies coursework. Sp, A

611 Assessment of Family Behavior (3) Analysis of methods and measures used in family science research. Prereq: 550, 571, 3 hrs graduate statistics, or consent of instructor.

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. Peebles Prof.), Ph.D. .......... Illinois
Chatterjee, A., Ph.D. ..................... NC State
Davis, W. T., 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., M.S. 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
Tschantz, B. A. (Condra Prof.), So.D. ........... New Mexico State
Walker, C. R. (Emeritus), M.S., Ph.D. .......... VPI
Wegmann, F. J., Ph.D. ................... Northwestern
Wegmann, F. J., Ph.D. ................... Northwestern

Associate Professors:
Chou, K. G., Ph.D. ....................... Northwestern
Deatherage, J. H., Ph.D. .......... Tennessee
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
Smool, L. L., 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
Maudson, M., Ph.D. ............... California
Robinson, K. G., Ph.D. ............... VPI

Environmental Engineering
For a Master of Science with a major in Environmental Engineering, normally a Bachelor's degree in a field of engineering is required. For a student who does not have an engineering background, the following minimum prerequisite courses will be required: Basic Engineering or Computer Science 101; Basic Engineering 121, 131; Engineering Science and Mechanics 231; Statistics 251; Civil Engineering 390, 395, 380; Mathematics 141, 142, 231, 241; Chemistry 120, 130. In general, these must be completed with a B average before courses for graduate credit can be taken.

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

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

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

Either option must be approved by the student's major professor. A student's program must include a minimum of 9 semester hours of advanced engineering design courses selected from a list provided by the student's committee. Normally, the graduate program of study will be adjusted by the 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 thesis or dissertation credit, at least 6 hours of which must be 600-level courses.

3. Supporting courses in related scientific and engineering fields, amounting to approximately 24 semester hours, subject to approval by the student's faculty committee. These fields will normally include such disciplines as mechanics, chemistry, mathematics, microbiology, physics, and other engineering fields. A minimum of 6 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.

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

The department participates in a program designed to give 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 Assistant 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; professional registration and ethics. Prereq: Senior standing.

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

451 Highway Engineering (3) Design, construction, operation, and maintenance of highway facilities; application of various engineering principles and techniques to process of planning, locating and design of highway facilities; both geometric and pavement design. Prereq: 210, 251, 352.

452 Traffic Engineering (3) Characteristics of driver, vehicle, and roadway and their interaction; 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. Runaway configuration, airfield capacity, geometric and terminal layout, and design; railroad geometric and system layout and design. Prereq: 210, 251, 352.

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

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

474 Reinforced Concrete Design (3) Reinforced concrete columns and slab; analysis of square columns and slabs; design of combined stresses; design of typical framed building connections. Prereq: 471.

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

490 Water Resources Project Design (3) Coherent development of multipurpose reservoir and dam project, data evaluation, spillway and outflow structures; engineering of major reservoirs; evaluation of land-water use on streamflow quantity and quality. Prereq: 390, 395.

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

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

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when the student uses University facilities and/or faculty times 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 under responsibility of city manager and/or city engineers: streets, lighting, water, sewerage, refuse collection. Parametric management, finance, planning and public relations. Prereq: Graduate standing or consent of instructor.

521 Pavement Design (3) Empirical and theoretical based methods of pavement design and analysis, strengthening, existing pavements, pavement distress and economical design alternatives. Prereq: 321 and 330.


531 Soil Stabilization (3) Mechanical stabilization of soil to change the behavior of clays and soils, including chemical stabilization of soils with admixtures, waterproofing and modifying soils and additives. Reinforced earth and stabilization with geosynthetics. Prereq: Introduction to Soil Behavior.


534 Geological Engineering (3) Influence of geologic origin and history on engineering characteristics of rocks and soils; applications of geology in planning, design and construction of civil engineering projects. Prereq: Introduction to Soils and Foundation Engineering.


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.

552 Wind and Combination Loads (3) Static and dynamic analysis of wind load on structures; earthquake design; wind load and earthquake load on structures; wind load on structures and earthquake load on structures; wind load and earthquake load on structures; wind load on structures and earthquake load on structures. Prereq: 361.


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

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

554 Urban Transportation Planning (3) Transportation problems in urban areas; systematic planning for existing and future problems; travel surveys and demand modeling; evaluation of transportation alternatives; transportation system management. Prereq: 352 or graduate standing.

555 Transportation Planning and Operations with Micro-Computer Applications (3) Transportation system management techniques and application of micro-computers to transportation analysis. Prereq: 551, 554.

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

560 Land Use Planning and Transportation (3) The study and design of transportation systems. Prereq: 551 or 554.

561 Airport Planning (3) The planning and design of airports. Prereq: 551.

563 Urban Structure and Design (3) The design and planning of urban areas. Prereq: 551.

565 Traffic Analysis (3) Traffic flow and traffic control. Prereq: 551 or 554.

571 Pavement Design (3) Empirical and theoretical based methods of pavement design and analysis, strengthening, existing pavements, pavement distress and economical design alternatives. Prereq: 321 and 330.


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

574 Reinforced Concrete Design (3) Reinforced concrete elements, slab and floor slabs, columns, beams and combined axial loads and bending, foundations and retaining walls. Prereq: 471.

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

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

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

585 Traffic Engineering—Characteristics (3) (Driver-vehicle-roadway system; traffic engineering elements of transportation-highway safety. Prereq: Graduate standing.

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

587 Geometric Design and Layout of Roadways and Community Facilities (3) Functional and geometric design and rural and urban roads of all classes; subdivision layout; configuration of urban roads of all classes; techniques for access control, freeway interchanges and street intersections; and parking. Prereq: 451 or consent of instructor.

588 Urban Transportation Planning (3) Transportation problems in urban areas; systematic planning for existing and future problems; travel surveys and demand modeling; evaluation of transportation alternatives; transportation system management. Prereq: 352 or graduate standing.

589 Transportation Planning and Operations with Micro-Computer Applications (3) Transportation system management techniques and application of micro-computers to transportation analysis. Prereq: 551, 554.
Environmental Engineering

GRADUATE COURSES

500 Thesis (1-15) PN/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. Prereq: Before degree completion. May be repeated. S/N/C only. E

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

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

520 Open Channel Hydraulics (3) Open channel flow principles, structures, and classifications. Uniform and gradually varied flow theory and applications. Open channel design; steady flow theory and analysis: dynamic routing; spatially varied flow; non-linear alignment; microcomputer applications, featuring HEC-2 model. Prereq: Civil Engineering 390.

522 Floodplain and Urban Flood Management (3) Review of national, regional, and local flood problems; state of the art flood control; methods, and classifications. Structural and non-structural institutional policies; programs, programs, regulations, and legal aspects; floodplain hydrology and hydraulics; HEC-1, HEC-2: floodway enroachment, flood hazard zone and damage potential determinations; case studies. Prereq: Civil Engineering 390 or consent of instructor for non-majors.

524 Sediment Transport (3) Sediment properties and measurements; principles of dynamics of suspended and bed sediment transport in erodible channels; erosion, transportation, and deposition of sediment by flowing water; erodible channel theory: common computer models. Prereq: Civil 390.

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

530 Stormwater Modeling (3) Systems approach to stormwater management. Hydrologic concepts and linear and nonlinear systems integrated into mathematical models of watershed response. Review and application of commonly used hydrologic and parametric computer models. Prereq: Civil Engineering 395.

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

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

541 Remote Sensing Data Acquisition and Analysis (3) Fundamentals of remote sensing: digital image analysis and interpretation systems; image enhancement and classification techniques for color aerial photographs; thermal infrared applications to environmental and pollution stress assessment. Prereq: Consent of instructor.

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

545 Monitoring Hydrologic Phenomena (3) (Same as Agricultural Engineering 454.)

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

675 Microbial Systems Analysis (3) (Same as Chemical Engineering 675.)

691 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:
Gessell, 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. E., 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 as model. PreReq: 351-52 or consent of instructor.

422 Seminar in Classical Studies (3) Field of classical studies today: recent achievements in areas of both philology and archaeology; impact of decipherment of Linear B; new understandings of culture and politics of "golden age" of Pericles and Augustus; classical studies and academic profession on both high school and college levels. 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: 351-362 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 8 hrs.

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

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

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

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

541-42 The Latin Epic: Lucretius, Vergil (3,3) Advanced study of epic masterpieces of Lucretius and Vergil; both Georgics and Aeneid of Vergil.

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

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

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 and be required by the College of Communications. Minimum requirements for admission to full time students status normally include a 3.0 (4.0 system) grade-point average in undergraduate studies and scores 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 15 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 some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S. program in Communications is available to residents of Arkansas or Kentucky (concentration in advertising only) or Louisiana. The Ph.D. program is available to residents of the states of Alabama, Arkansas, Louisiana, Maryland, Virginia, or West Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

ACADEMIC STANDARDS

A student in the College of Communications whose grade point average, not including incomplete grades, is below 3.0 at any time after the end of 12 hours of graduate credit will be placed on probation. A student on probation will be dropped from the program unless his or her cumulative graduate grade-point average is 3.0 or higher at the end of the probation period. The probation 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 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 areas 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 596, Broadcasting 596, or Journalism 596 on the basis of 3 hours of credit for the equivalent of 15 weeks of full-time professional experience. This credit is to be included in the hour requirements for the M.S. program. Previous professional experience will be evaluated by the student's committee.

Students interested in subsequent entry into a doctoral program may pursue the thesis option and 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, a student may take 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. 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.
Comparative and Experimental Medicine

(Office of the Vice Chancellor for Academic Affairs)

**MAJOR DEGREES**

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

L. N. D. Potgieter, Director

Joint Graduate Coordinating Committee:

Fuhr, J. E., Ph.D., Medical Biology
Lawler, J. E., Ph.D., Psychology
Lozzio, C., M.D., Medical Biology
Potgieter, L. N. D. (Liaison), B.V.Sc., Ph.D., Veterinary Teaching Hospital
Slauson, D. O., D.V.M., Ph.D., Veterinary Teaching Hospital

The Comparative and Experimental Medicine degree program (M.S. and Ph.D.) is a jointly-administered graduate program intended to prepare students for teaching and/or research careers in the health sciences. This program emphasizes the comparative approach to the study of experimental pathology, infectious diseases, immunopathology, hematology, and virology. 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 a broad background in the physical and biological sciences, 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 animalscience 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, Knoxivie Zoological Park, Hemophilia Clinic, Developmental and Genetic Center, Hematology and Oncology services, and departments of life sciences. For additional information, write to the Office of Research and Graduate Programs, 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 include no formal training in the biomedical field beyond the baccalaureate degree will be required to score at least 1,000 on the quantitative and verbal portions of the Graduate Record Examination.

Doctor of Philosophy Degree Program

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

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

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

**THE MASTER'S PROGRAM**

All students must take at least 4 credit hours in 500- or 600-level courses in basic mechanisms of disease and at least 7 credit hours of 500-level biochemistry or cell biology. See listings under Biochemistry and Life Sciences programs 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 at least one member from the Graduate School of Medicine. If a minor is declared, one member must be from the minor discipline.

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

**THE DOCTORAL PROGRAM**

All students must take at least 4 credit hours in 500- or 600-level courses in basic mechanisms of disease and at least 7 credit hours of 500-level biochemistry or cell biology. See listings under Biochemistry and Life Sciences programs for information on these courses. In addition, students must complete a minimum of 8 hours of coursework in a specified discipline. Areas of emphasis may include hematology, oncology, comparative pathology, comparative pharmacology, toxicology, immunology, genetics, infectious diseases, or biochemistry of disease. At least 24 hours of coursework, including a minimum of 6 hours at the 600 level, and 24 hours of Dissertation 600 are required for a total of 48 hours. For students with professional degrees, a minimum of 18 hours of coursework beyond the professional degree is required for a total of 42 hours.

The doctoral committee (at least 4 members) is chosen during the first year. Three of the four members, including the chair, must be approved by the Graduate Council to direct doctoral research. At least one member must be from the College of Veterinary Medicine and at least one member from the Graduate School of Medicine. A comprehensive examination is given at the conclusion of coursework. A seminar and final oral defense of the dissertation culminates the program.

**Comparative and Experimental Medicine--Veterinary Medicine**

**GRADUATE COURSES**

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

503 Predictive Toxicology (3) Principles and techniques of predictive toxicology: structure-activity relationships, expert systems, neural nets and molecular similarity.

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

506 Experimental Animal Surgery (3) Competence in performing human surgical modifications of experimental animals. Techniques of anesthesia, Drug administration and postoperative care. Prereq: Embryology, 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 Biochemistry I or equivalent or consent of instructor. Recommended prerequisite: Biochemistry I or I 1. (Same as Zoology 521.) 3 hrs and 1 lab. E

522 Advanced Mammalian Physiology II (4) (Same as Zoology 522.)

530 Wildlife Diseases (2) (Same as Wildlife and Fisheries Science 530.)

533 Epidemiology/Public Health (4) (Same as Veterinary Medicine 533.)

536 Toxicology (2) (Same as Veterinary Medicine 536.)

537 MultiSpecies 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.)
508 Graduate Research Participation (3) Advanced research techniques with conducting individual biomedical research projects under supervision of faculty. Open to all graduate students. Prereq: Consent of instructor. May be repeated with consent of instructor. Maximum 9 hrs. S/N only. E

521 Principles of Oncology (3) Lectures, classroom discussion, and case reports surveying major topics of oncology. Prereq: Biology 220-30 or consent of instructor.

541 Molecular Basis for Metabolic Disease (4) Disease at molecular level. Changes in molecular events in cells that lead to disease and occur as result of disease. Correlation with clinical and pathological states. Prereq: Biochemistry 410-419 or equivalent. F,Sp

545 Clinical Genetics (3) Human genetic disorders: new developments in cytogenetics, molecular genetics, clinical diagnosis and prevention. Prereq: Biology and genetics background or consent of instructor.

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

601 Medical Biology Seminar (1) Invited speakers. Topics posted in advance. May be repeated. S/N only. F

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

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

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

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

607 Diagnosis and Pathogenesis of Virus Diseases of Domestic Animals (3) Advanced study of virus diseases important to domestic animals: virus biology, pathogenesis, pathology and diagnosis technical training in virus diseases diagnosis. Prereq: Celluar and Comparative Biochemistry, and Advanced Topics in Biochemistry, Virology and Virology Lab, or Microbiology-Veterinary Medicine 811-812. 2 hrs and 1 lab, Sp,A

609 Mechanisms of Disease (4) Advanced topics in 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. F,A

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

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

652 Special Topics in Pathology (1-3) Pathologic anatomy, biochemical pathology, and related areas. Primarily for doctoral candidates in Comparative and Experimental Medicine. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. F,Sp

568 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/N only. E

Comparative and Experimental Medicine—Graduate School of Medicine

DEGREES

MAJOR

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

Robert C. Ward, Head

Professors:


Associate Professor:

MacLennan, Bruce J., Ph.D. ............... Purdue Vose, Michael D., Ph.D. ............... Texas

Assistants Professors:

Beck, Micah, Ph.D. ...................... Cornell Berry, Michael W., Ph.D. ............. Illinois Gregor, Jens, Ph.D. ................... Aalborg (Denmark) Raghavan, Padmini, Ph.D. .......... Penn State Straight, David W., Ph.D. ............. Texas Vander Zanden, Bradley, Ph.D. ........ Cornell

Instructor:

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

THE MASTER'S PROGRAM

Two semesters of calculus plus two additional semesters of college mathematics (e.g., linear algebra, differential equations, probability) and a course in Discrete Structures and in Systems Programming are required for admission. For the master's degree, 30 semester hours of graduate credit are required, 24 of which must be 500 level or above. Computer Science 530, 560 and 580 are required for the degree. Graduate courses taken outside the department are sometimes allowed but must be approved by the Graduate Committee before enrollment.

Thesis Option

The student must reach agreement on a thesis topic with a faculty advisor and must take 6 hours of 500 Thesis. Six hours of 500 Thesis may count in the 24-hour requirement at the 500 level or above.

Non-Thesis Option

The student must take coursework in an area to prepare for the non-thesis master's examination. The student's advisor must verify that an acceptable set of courses has been taken before the student may schedule the examination. Information concerning the examination is available in the departmental office.

Master's Minor in Computer Science

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

THE DOCTORAL PROGRAM

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

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

2. The student is expected to have taken the GRE verbal and quantitative general test within the past three years and to have these scores sent to The Graduate School.

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

Original research reported in a dissertation of high quality is emphasized. The minimum hour requirements are 24 hours of course 600 Doctoral Research and Dissertation and 24 hours of graduate courses beyond the equivalent of a master's degree (i.e., beyond 30 graduate credit hours) graded A-F. Computer Science 530, 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.
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 programs, 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) Theories and research concerning development of person's sexual role and its relevance in educational and counseling settings. F.Su

431 Personality and Mental Health (3) Various perspectives of mental health with application to education and other social institutions. 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 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 15 hrs. S/NC or letter grade. E

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

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

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 concluding 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 analysis. Survey of standardized tests of intelligence, achievement, aptitude, vocational interests, attitudes and personality. Prereq: 525 or equivalent. F.Su

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

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

552 Career Development: Vocational Theory, Research and Practice (3) Relationship of vocational theory, career development research and societal factors to life career roles. F.Su

553 Career Development: Vocational and Educational Resources (3) Application and use of career and educational resources in personnel planning and program development. Sp

554 Group Dynamics and Methods (3) Theory and types of groups, discussions of group practices, methods, dynamics, and facilitative skills, supervision of leadership skills. E

555 Practicum in Counseling (3) Supervised practice and application of counseling skills with individual clients. Prereq: Admission to program. 431, 525, 551 and consent of instructor. May be repeated. Maximum 0 hrs. E

556 Seminar in Community Agency Counseling (1) Orientation to professional organizations, code of ethics, certification requirements, and role identity of community agency counselors. May be repeated. Maximum 2 hrs. S/NC only. F.Sp

559 Internship in School Counseling (1-6) Supervised postpracticum 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 postpracticum employment at 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. Sp.Su

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

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


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

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

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

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

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

635 Ethical, Legal, and Professional Issues in Psychology (3) (Same as Psychology 635 and Psychoeducational Studies 635) Sp

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

655 Practicum in Counselor Education (3) Supervised practice and application of counseling skills with clients. Prereq: Admission to counselor education program and consent of instructor. May be repeated. Maximum 6 hrs. Sp

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

661 Education Implications of Neuropsychology (3) Theory and assessment. Common syndromes and their behavioral and cognitive manifestations. Prereq: 516 and 541 or equivalent individual assessment course; or consent of instructor. F.Su


670 Foundations of Counseling Psychology (3) History, theory, research, and practice of counseling psychology. Prereq: Admission to counseling psychology doctoral program. May be repeated. Maximum 6 hrs. F.Sp

671 Personality and Vocational Assessment (3) Use and interpretation of personality and vocational measures in assessment of clients. Prereq: 525, 552 or consent of instructor. A

672 Psychological Dysfunction (3) Classification methods, dynamics, and medical behaviors of emotional and personality disorders. Prereq: 225 and course in abnormal psychology, or consent of instructor. A

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

674 Practicum in Counseling Psychology (3) Supervised practice of individual counseling. Minimum 135 clock hrs. required each semester. Prereq: Admission to counseling psychology doctoral program, 555, and consent of instructor. F

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

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

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**Cultural Studies in Education**

(College of Education)

**MAJOR**

**DEGREES**

**MAJOR**

Curriculum and Instruction .................... M.S., Ed.D.

Human Performance and Sport Studies ............... M.S., Ed.D.

**J. Paul, Leader**

Professors:

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

Capen, Edward K. (Emeritus), Ph.D. ........ Iowa

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

Mallik, Anand, Ed.D ...................... Columbia

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

Phillips, Madison (Emeritus), Ph.D. ....... Purdue

Wrisberg, C. A., Ph.D. ................... Michigan

**Associate Professors:**

Behel, Patricia A. .......................... North Carolina (Greensboro)

deMarrs, Kathleen, Ed.D. ....................... Cincinnati

Desensi, J. T. ................................. Minnesota

Morgan, W. J., Ph.D. .......................... Minnesota

The Cultural Studies in Education unit offers graduate programs leading to the Master of Science with a major in Curriculum and Instruction, concentration in educational foundations; the Doctor of Education with a major in Curriculum and Instruction, concentration in educational foundations; and the Doctor of Science and the Doctor of Education with a major in Human Performance and Sport Studies, concentrations in mental health and rehabilitation. 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.

544 Survey in Contemporary Philosophies of Education (3) Existential, phenomenological, philosophical analysis, Marxism, structuralism, hermeneutics and other philosophies.

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

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

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

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

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

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

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

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

599 Special Topics (1-3) Study for doctoral students in selected aspects of cultural studies. May be repeated. Maximum 9 hrs. S/NC or letter grade.

EcoLogy

(College of Arts and Sciences)

MAJOR

DEGREES

Ecology ........................................... M.S., Ph.D.

Dewey L. Bunting, Director

J. Larry Wilson, Associate Director

Paul A. Delcourt, Associate Director

Professors:

Bunting, Dewey L. (Liaison), Ph.D............ Oklahoma State

Emler, D. A., Ph.D........................... Minnesota

Farkas, Walter, Ph.D. ......................... Duke

Mc Cormick, Frank, Ph.D. ....................... Emory

Pimm, S. L., Ph.D. ............................... New Mexico State

Riechert, Susan E., Ph.D. ....................... Wisconsin

Saylor, Gary S., Ph.D. .......................... Idaho

Smith, W. O., Ph.D. ............................ Duke

Stacey, G., Ph.D. ............................... Texas

Associate Professors:

Amundsen, C. C., Ph.D. ......................... Colorado

Delcourt, Hazel, Ph.D. ........................ Minnesota

Delcourt, Paul A., Ph.D. ........................ Minnesota

Drake, James A., Ph.D. ........................ Purdue

Gross, L. J., Ph.D. ............................... Cornell

Shared faculty are drawn from other University departments, the Oak Ridge National Laboratory, and the Tennessee Valley Authority.

The Graduate Program in Ecology offers Master of Science and Doctor of Philosophy degrees. This interdepartmental program provides advanced courses in contemporary ecology for students from undergraduate programs in basic and applied biology, social sciences, mathematics, and engineering. Research opportunities in both fundamental and applied ecology are intended to prepare students for academic careers as well as professional positions in industry or government.

The Environmental Sciences Division of the Oak Ridge National Laboratory, the National Park Service, and the Tennessee Valley Authority provide advisors and research facilities. The Great Smoky Mountains, Cumberland Plateau, valley and ridge topography, TVA reservoirs and wild rivers provide a spectrum of natural habitats and consequent biological diversity that is truly unique. In addition, faculty research programs provide opportunities for student research elsewhere on this continent and abroad.

ADMISSION REQUIREMENTS

Requirements for admission to this program are: (1) admission to The Graduate School; (2) chemistry including organic, mathematics including calculus, and 3 semester hours of ecology at the upper division level (physically highly recommended); (3) departmental application and 3 rating forms; (4) the Graduate Record Examination.

Application forms for admission should be obtained from The Graduate School as well as
the Ecology Program. Inquiries concerning the admission requirements should be addressed to the Director, Graduate Program in Ecology, University of Tennessee, Knoxville, Tennessee 37996-1610.

THE MASTER'S PROGRAM

Within the minimum requirements of The Graduate School, the program of study must include Ecology 573, 574, and 610 as designated, or an approved equivalent and one course from an approved list of quantitative methods offerings. The list is available from the ecology office and is updated annually by the Ecology Curriculum Committee. The remainder of a student's course program is determined in consultation with the graduate thesis committee. A listing of approved campus-wide ecology offerings is provided to each student during orientation.

A graduate minor in ecology is available on an individual basis.

THE DOCTORAL PROGRAM

The requirements for this degree are in general the same as those of The Graduate School. The doctoral program must include Ecology 573, 574, and 610 as designated, or an approved equivalent and one course from an approved list of quantitative methods offerings. A student cannot enroll for dissertation hours until the research proposal has been discussed and approved by the doctoral committee. A foreign language is required.

ADVISORS

Advisors are selected from ecologists on the shared faculty of the University who have competence in the area in which the student expects to work. Entering students should consult early with the director of the program on the choice of a faculty committee. The master's committee need not have more than three members. Doctoral committees consist of the major professor as chairperson, one additional member who should have an appointment in the same department, and at least two additional Ecology faculty from other departments.

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 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.

GRADUATE COURSES

484 Conservation Biology (3) (Same as Zoology 484).

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

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

510 Special Problems in Ecology (1-3) Individual investigations in ecology. May be repeated with consent of instructor. Maximum 6 hrs.

520 Ecology for Planners and Engineers (3) Ecological principles and effects that human-caused changes have on living organisms. Lectures and field trips. Appropriate for students in Planning and Environmental Engineering.

552 Development Planning in the Third World (3) (Same as Planning 552.)

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

561 Environmental Toxicology (3) (Same as Biochemistry 561.)

573 Population Biology (3) (Same as Zoology 573 and Botany 573.)

574 Communities and Ecosystems (3) Patterns underlying principles behind short and long term community and ecosystem organization, dynamics, energetics and nutrient cycling.

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

604 Current Topics in Environmental Toxicology (1) (Same as Biochemistry 604.)

610 Special Topics in Ecology (3) Seminars on advanced topics and recent developments. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

620 Seminar in Ecology (2) May be repeated. Maximum 12 hrs.

635 Environmental Assessment and Sustainable Development in Third World Countries (3) Concepts and methods of environmental impact assessment and risk assessment. Sustainable development concepts and issues in developing countries. The role of risk and impact assessment in achieving sustainable development. Prereq: General ecology or equivalent. (Same as Botany and Planning 635.)

Economics

(Major of Business Administration)

MAJORS DEGREES

Economics M.A., Ph.D.

Business Administration MBA

William F. Fox, Head

Professors:

Buhl, Robert A. (Liaison), Ph.D. Washington (St. Louis)

Bowby, Roger L., Ph.D. Texas

Carroll, Sidney L., Ph.D. Harvard

Cheng, Hsi-Shui-Hsin, Ph.D. Vanderbilt

Clark, Don P., Ph.D. Michigan State

Cole, William E., Ph.D. Texas

Davidson, Paul (J. Fred Holly Chair), 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, Ph.D. Texas

Moore, John R. (Distinguished Prof.)

(Emmerich), Ph.D. Cornell

Neale, Walter C. (Emeritus), Ph.D. London

Russell, Milton, Ph.D. Oklahoma

Schiottman, Alan M., Ph.D. Washington (St. Louis)

Spiva, George A. (Emeritus), Ph.D. Texas

Associate Professors:

Gauger, Jean A., Ph.D. Iowa State

Glustoff, Errol, Ph.D. Stanford

Kahn, James R., Ph.D. Maryland

Mayo, John W., Ph.D. Washington (St. Louis)

Murray, M. N., Ph.D. Syracuse

Phillips, Keith E., Ph.D. Washington

Assistant Professors:

Bearac, 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 minimum of 18 hours in economics at the 500 level or above, 12 hours must consist of 511, 512 and 513, 514, and the remaining 6 hours must be in one field of economics. Of the 30 hours, a maximum of 9 hours in courses approved by the department may be taken in fields other than economics. Students electing the non-thesis option are required to pass a final comprehensive examination.

The thesis option requires 30 hours of coursework at the 400 level or above, including at least 24 hours at the 500 level or above, 6 hours of which may be thesis hours. Of the remaining 18 hours at the 500 level or above, at least 15 hours must be in economics and must
Economics 81

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 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 examination taken not later than the beginning of the fourth semester of study. b. History of Economics: Completion of 515 or 515 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. Students failing a qualifying examination must retake the examination the next time offered. A qualifying examination may be taken a third time only with approval of the department. Failing a qualifying examination for a third time will result in dismissal from the doctoral program. 2. Students are required to demonstrate competence by comprehensive examination in at least two fields of specialization in economics. Students failing a comprehensive examination must retake the examination the next time offered. A comprehensive examination in a specific field may be taken a third time only with approval of the department. 3. Students are required to complete with a grade of B or better two elective courses in economics at the 500 level or above, outside the core subject areas and outside the fields of specialization. 4. Students are required to complete a doctoral dissertation and to defend it successfully before the faculty.

Minor in Environmental Policy

The program is designed to give master's 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; 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 discipline and one course in quantitative methods are required. These requirements may be fulfilled before or after admission to the minor. Students admitted to the minor will be required to register for at least three hours of Economics 579, Environmental Policy Research Workshop, and to complete successfully the following: 1. Environmental Economics (3) Analysis of environmental economics, including the role of monetary and fiscal policies in the economy. Major writing requirement. Prerequisite: Intermediate Microeconomics or consent of instructor. 2. Six hours of coursework outside the master'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. Prerequisites determined by department. May be repeated.

413 Macroeconomic Fluctuations (3) Analysis of historical data, methods of analyzing macro-economic fluctuations, theoretical models, theoretical cycles, and role of monetary and fiscal policies in aggregate economy. Major writing requirement. Prerequisite: Intermediate Microeconomics or consent of instructor.

415 History of Economics (3) Methods of study of doctrinal history. Origins and evolution of major doctrines: classical and neoclassical economics, economics of Keynes and his followers, major developments of the 20th century. Major writing requirement. Prerequisite: 201 or equivalent and consent of instructor.

424 Political Economy of World Development (3) Topics vary. Latin America, Asia, Soviet Union and Eastern Europe. Analysis of major economic strategies, policies, and problems. Prerequisite: 201. This course includes a major writing requirement. May be repeated when topics vary. Maximum 9 hrs.


462 Economics of Resources and Environmental Policy (3) Economic analysis of environmental policy and allocation of resources. Benefits and costs of development of natural resources and impacts of growth on environment. Major writing requirement. Prerequisite: 201.

471 Public Finance: Optimal Government Functions and Expenditure Analysis (3) Problems of collective consumption, external effects, public investment, social decision making. Major writing requirement. Prerequisite: 201.

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

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

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

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

511 Microeconomic Theory (3) Theory of consumer choice and demand, theory of revealed preference, attributes of goods and implicit prices, market demand, labor supply, individual behavior under uncertainty, theory of firm, theory of production and cost, market structures, derived demand and factor pricing.

Introduction to welfare economics, market failure and theory of second best, pure exchange.

513-14 Macroeconomic Theory (3,3) Determination of national income, prices, and employment. Results using Keynesian, non-market economy, monetarist, and rational expectations paradigms.


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

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

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

562 Labor Relations and Collective Bargaining (3) (Same as Management 522.)

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

579 Environmental Policy Research Workshop (1) Multidisciplinary analysis of advanced topics in environmental policy. Student participation. Major writing requirement. Prerequisite: Consent of instructor. May be repeated. Maximum 6 hrs.

581 Mathematical Methods in Economics (3) Mathematical analysis in economic theory. Applications of selected mathematical techniques to economic topics: theories of choice, firm behavior, consumer behavior, transportation, games, distribution, growth, stability, and input-output. Prerequisite: 201.

582 Elements of Econometrics (3) Elementary econometric concepts and techniques: Statistical inference, linear regression, estimation, hypothesis testing, generalized least squares, distributed lags, and simultaneous equations. Applications of econometrics to problems of economic development. Prerequisite: Introductory statistics.

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

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

615 History of Economics (3) Background for and origins, concerns, methods, and conclusions of neoclassical economics: W.S. Jevons, A. Marshall, C. Menger, L. Walras, and principal developments in microeconomics after 1800. Background for and origins, concerns, methods, and conclusions of economics of J.M. Keynes and his followers. Major writing requirement. Prerequisite: 515.

621-22 International Economics (3,3) Comparative advantage, trade migration, commodity composition of trade, protectionist measures, interest rates, trade liberalization, U.S. trade policy, exchange rate determination, balance of payments adjustment, multinational corporations, and international capital flows. Prerequisite: 512 and 514.

623 Economic Development: Theories and Policies (3) Principal theories explaining economic behavior in developing countries and policies and strategies used to promote development. Prerequisite: Intermediate 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 emerging countries of Asia and Africa. Prerequisite: 21 hrs of economics undergraduate social science or consent of instructor.

631 Industrial Organization and Public Policy (3) Organization of industry in modern mixed enterprise economy. Problems of monopoly and competition.
Antitrust and direct regulation. Prereq: Consent of instructor.

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

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

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

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

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

671 Public Finance: Optimal Government Size and Expenditure Analysis (3) Theory of public goods, private goods and externalities, public choice, expenditure incidence and determinants; benefit cost analysis.

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

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

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.

681-62 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 application to current econometric problems. Prereq: 582 or equivalent.

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

Counselor Education and Counseling Psychology

Cultural Studies in Education

Education in the Sciences, Mathematics, Research and Technology

Exercise Science

Holistic Teaching/Learning

Inclusive Early Childhood Education

Language, Communication and Humanities Education

Leadership Studies

Psychoeducational Studies

Rehabilitation and Deafness

Sport and Physical Activity

The College also offers an extended teacher preparation program with majors in Curriculum and Instruction and in Special Education. The program features a professional year internship with accompanying coursework.

TEACHER LICENSURE

For teacher licensure, a student must complete the 24 hours associated with the professional year as follows:

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Spring Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>575 Internship</td>
<td>575 Internship</td>
</tr>
<tr>
<td>4 hrs</td>
<td>8 hrs</td>
</tr>
<tr>
<td>Specialty Studies</td>
<td>Analysis of Teaching for Professional Development</td>
</tr>
<tr>
<td>6 hrs</td>
<td>2 hrs</td>
</tr>
<tr>
<td>574 Analysis of Teaching for Professional Development</td>
<td>591 Clinical Studies</td>
</tr>
<tr>
<td>4 hrs</td>
<td>4 hrs</td>
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<tr>
<td>TOTAL</td>
<td>TOTAL</td>
</tr>
<tr>
<td>24 hrs</td>
<td>24 hrs</td>
</tr>
</tbody>
</table>

To receive graduate credit, a student must be admitted to The Graduate School prior to the first semester of internship and register as a graduate student. If a master’s degree is desired, a major in either Curriculum and Instruction or Special Education, a student must be admitted to the program prior to completion of the first semester of internship. See the individual Track 2 program descriptions below for complete details.

THE MASTER’S PROGRAMS

College Student Personnel

This program under the unit of Leadership Studies is designed for individuals interested in entering the field of student personnel administration in colleges and universities and in community or junior colleges. The program has both a thesis and non-thesis option. A minimum of 36 hours, which includes 6 hours of practicum experience, is required in either option, with a minimum of 12 hours in Higher Education courses.

Curriculum and Instruction

Two tracks for the master’s degree with a major in Curriculum and Instruction are offered. Track 1 is for students who are already certified to teach in a curriculum and instruction disciplinary area 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.

<table>
<thead>
<tr>
<th>Track 1</th>
<th>Track 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concentrations are available in social foundations under Cultural Studies; curriculum, elementary education, instructional media and technology, mathematics education, and science education under Education in the Sciences, Mathematics, Research, and Technology; elementary education, reading education and social science education under Holistic Teaching/Learning; elementary education under Inclusive Early Childhood Education; and art education, English education, foreign language education and reading education under Language, Communication, and Humanities Education. The non-thesis option requires the completion of 33 hours of coursework. The thesis option requires the completion of 36 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 Art 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 536, 558, 569 or 588 for a total of 36 semester hours.</td>
<td></td>
</tr>
</tbody>
</table>

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’s committee, for a total of 36 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, the unit admissions application form and letters of recommendation. All programs include thesis and non-thesis options. Under Counselor Education and Counseling Psychology, a major in Guidance, concentrations in community counseling, requires 60 hours plus supervised practicum and internship experiences working with clients. Under Psychoeducational Studies, the major in Educational Psychology requires 36 hours. 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 48 hours plus 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 36 hours, including a minimum of 18 hours in the specific discipline, and a final written and oral comprehensive examination. The thesis option requires 50 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 the 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 of study in the general special education concentration area are qualified to be teachers and/or consultants in a variety of special education programs providing services to people certified as emotionally retarded, learning disabled, multiply disabled, and socially or emotionally disturbed.

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.

The program under Rehabilitation and Deafness prepares professional counselors for consultation in schools, hospitals, private organizations, and human service agencies. Rehabilitation counselors assist individuals with disabilities to achieve their optimal level of functioning in living, working, and leisure 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 develop skills in specific or general disability caseloads. The program is fully accredited by the Council on Rehabilitation Education, Inc. and the 18-week summer 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.

Leadership Studies in Education

The master’s degree program under Leadership Studies offers concentrations in adult education and in educational administration and supervision. Both concentrations require a minimum of 33 credit hours including 6 hours of Thesis 500 for the thesis option and 36 hours for the non-thesis option.

The concentration in adult education requires a minimum of 12 hours in Adult Education courses.

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

Rehabilitation Counseling

The program under Rehabilitation and Deafness prepares professional counselors for consultation in schools, hospitals, private organizations, and human service agencies. Rehabilitation counselors assist individuals with disabilities to achieve their optimal level of functioning in living, working, and leisure 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 develop skills in specific or general disability caseloads. The program is fully accredited by the Council on Rehabilitation Education, Inc. and the 18-week summer 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.

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higher education, the minimum hours are determined by the student’s doctoral committee. Six to 9 hours must be in a cognate area within the college and 6-9 hours outside the college unless the student has a master’s degree in a field outside the College of Education. Two consecutive semesters of 604 must be taken during residence. An internship is highly recommended but not required. A foreign language requirement is at the discretion of the committee. A written comprehensive examination is given as well as an oral exam over the dissertation.

The Leadership Studies unit also offers an Ed.D. concentration for practicing school administrators. Please contact the unit for further information.

Human Performance and Sport Studies

The Doctor of Education with a major in Human Performance and Sport Studies is available under Cultural Studies in Education with concentrations in motor behavior and sociocultural foundations (history, philosophy, sociology); under Exercise Science with a concentration in exercise science (exercise physiology/fitness, kinesiology/sports medicine). Please contact the appropriate unit for further information.

**THE DOCTOR OF PHILOSOPHY PROGRAM**

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

The program requirements are:

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Minimum Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Research Area</strong></td>
<td>14</td>
</tr>
<tr>
<td><strong>Foreign or Computer Language</strong></td>
<td>6</td>
</tr>
<tr>
<td><strong>General Core Requirements</strong></td>
<td></td>
</tr>
<tr>
<td>--History and philosophy of education (both areas must be represented)</td>
<td>4</td>
</tr>
<tr>
<td>--Learning theory and curriculum (both areas must be represented)</td>
<td>4</td>
</tr>
<tr>
<td>--Administrative theory</td>
<td>2</td>
</tr>
<tr>
<td>--Trans-college seminar: three consecutive semesters (including summer)</td>
<td>3</td>
</tr>
<tr>
<td><strong>Alternative Core Requirements</strong></td>
<td></td>
</tr>
<tr>
<td>--Courses in philosophy of science</td>
<td>3</td>
</tr>
<tr>
<td>--Trans-college Seminar: three consecutive semesters (including summer)</td>
<td>3</td>
</tr>
<tr>
<td>--Seminar in area of specialization</td>
<td>3</td>
</tr>
<tr>
<td>--Courses in learning theory/group or independent study</td>
<td>3</td>
</tr>
<tr>
<td><strong>Concentrations</strong></td>
<td></td>
</tr>
<tr>
<td>--Primary Concentration: A minimum of 16 hours normally selected from one or two specializations within the primary concentration</td>
<td>16</td>
</tr>
<tr>
<td>--Supporting Specialization: A minimum of 9 hours selected from a specialization in a concentration other than the primary concentration</td>
<td>9</td>
</tr>
</tbody>
</table>

**Cognate**

--A minimum of 6 hours selected from outside the college in addition to the designated research courses

**Dissertation**

24

The concentrations and specializations are:

**Administrative Theory and Practice**

Specializations:
1. School administration
2. Higher education administration
3. Organizational leadership and policy studies

**Theories of Curriculum Development and Foundations of Education**

Specializations:
1. Anthropological, historical, philosophical, and sociological bases for educational planning and curriculum
2. Principles and models for planning, developing, and evaluating educational programs
3. Research design for educational programs

**Instructional Theory and Practice**

Specializations:
1. Principles and models for instructional improvement
2. Elementary and early childhood instruction and practices
3. Secondary/community colleges: (English, foreign language, mathematics, science, social studies education)
4. Elementary: mathematics, science, social studies education
5. Reading education
6. Instructional media and technology
7. Special education and rehabilitation

**Theories and Practice of Educational and Personal Adjustment**

Specializations:
1. Counselor education
2. Counseling psychology
3. Educational psychology
4. School psychology

**Foundations of Human Movement**

Specializations:
1. Exercise Science: Kinesiology/Sports Medicine
2. Motor Behavior: Motor Control
3. Psychological Foundations of Sport: Sport History, Sport Philosophy, Sport Sociology

For the Ph.D. with a major in Education under Counselor Education and Counseling Psychology and under Psychoeducational Studies, two applications are required: one for the Ph.D. in Education program and one for the unit that specifies which specialization is desired, in addition to the application for admission to The Graduate School.

Under Counselor Education and Counseling Psychology, the following minimum number of hours is required in each program specialization: counseling psychology, 98; counselor education, 98; educational psychology, 92. Residence is three consecutive semesters of full-time coursework. The program requires coursework in both a supporting specialization and a cognate area, as well as either foreign language or computer proficiency. Coursework in statistics and research design is a requirement in all specializations. Pre-dissertation research participation is also a requirement. The specializations in counseling psychology and counselor education each require a year-long practicum sequence and the equivalent of a year's full-time work as an intern in an appropriate counseling setting. The specializations in educational psychology and counselor education also require supervised practicum experience in classroom teaching.

Under Psychoeducational Studies, the following minimum number of hours is required in each program specialization: educational psychology, 92; school psychology, 97.

The guidelines for each program specialization 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 only). The M.S. program in Human Performance and Sport Studies (concentration in motor behavior) is available to residents of Georgia. 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 (3-6)** Integration of advanced educational and clinical procedures, skills and knowledge for implementing instruction and for consulting with other persons in treatment of exceptional individuals. May be repeated. Maximum 6 hrs.

**517 Seminar (1-3)** Curriculum, instructional technology, elementary education, secondary education, or social foundations as related to goals of students' programs. May be repeated. Maximum 6 hrs. S/C or letter grade.

**520 Research: Theory and Application (3)** Theory and application of research findings into instructional performance. Prereq: Consent of instructor. E

**540 Topics in Improvement of Instruction (1-3)** Special conferences, workshops, and inservice programs. May be repeated. Maximum 6 hrs. S/C only. E
Education in the Sciences, Mathematics, Research, and Technology

(Course of Education)

MAJOR DEGREES

Curriculum and Instruction ...... M.S., Ed.S., Ed.D. Education ...... Ph.D.

M. E. Myer, Leader

Professors:


DeSantis, Donald J., Ph.D. .......... Maryland
Doak, J. Dale, Ed.D. .......... Colorado
French, Russell L., Ph.D. .......... Ohio State
Frandsen, Harry, Ph.D. .......... Illinois
McLennan, Lonnie D., Ed.D. .......... Indiana
Myer, M. E., Ph.D. .......... Florida
Roeske, C. E., Ph.D. .......... Ohio State

Assistants:

Grant, A. D., Ph.D. .......... Wisconsin

Assistant Professor:

Barden, Laura M., Ph.D. .......... Maryland
Robinson, Stephanie O., Ph.D. .......... Florida
Smith, Michael, Ph.D. .......... Tennessee

The graduate programs offered within this unit lead to the Master of Science, the Specialist in Education, and the Doctor of Education, all with majors 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.

This unit is comprised of four areas of focus: Teacher Education, which includes the advancement of science and mathematics education, Educational Research and Statistics, Instructional Media and Technology, and Curriculum Studies. All four areas will contribute to the preparation and advancement of math and science teachers at the elementary, secondary, and college levels. In addition each area will be responsible for the continued advancement of its discipline, and the education of students in other units needing or wanting coursework in that discipline.

For further information, write the Education in the Sciences, Mathematics, Research, and Technology unit.

GRADUATE COURSES

475 Utilization of Instructional Media (3) Basic concepts of communication and instructional development for improving instructional use of media. (Same as Information Sciences 475.) E

485 Teaching Mathematics, Grades 7-12 (3) Preparing to teach mathematics, teaching methods, and applications for improved learning. E

490 Teaching Science Grades 7-12 (3) Methods, materials, recent trends in science and environmental education programs for secondary schools. Prereq: Admission to Teacher Education Program. F

495 Introduction to Instructional Computing (3) Classroom uses of computers, applications for teachers, overview of computer operation and software for teachers of all grades. F

496 Teaching Science Grades 7-12 (3) Methods, materials, recent trends in science and environmental education programs for secondary schools. Prereq: Admission to Teacher Education. F

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

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


515 Seminar (1-3) Curriculum, Instructional technology, elementary education, secondary education, or social foundations as related to goals of students' programs. May be repeated. Maximum 6 hrs. S/NC only. E

516 Seminar (1-3) Curriculum, Instructional technology, elementary, secondary education, or social foundations as related to goals of students' programs. May be repeated. Maximum 6 hrs. S/NC only. E

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

520 Techniques of Research in Education (3) Study and application. E

522 Teaching Mathematics in Elementary and Middle Schools (3) Fundamental research methodology applicable to curriculum, instruction, and classroom management. F

531 Teaching Science in Elementary and Middle Schools (3) Recent trends in methods, materials, and content in teaching elementary school science. Prereq: Course in teaching elementary school science or consent of instructor. F

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. F

541 The High School Curriculum (3) Identification of program objectives with curriculum study, Tennessee curriculum framework, assessment of trends in programs of local, regional, and national significance. E

577 The Junior High and Middle School Curriculum (3) Curriculum and instructional design for junior high and middle school. Choosing curriculum units, student, curricular designs, instructional patterns, and organization and structure of junior high and middle school. F

558 Curriculum Planning and Development (3) Foundations and principles of curriculum planning and development. Critical analysis of curriculum theory, principles of planning and development, and classroom applications for improved learning. E

561 Educational Statistics (3) Applications of descriptive and inferential statistics to educational and institutional problems. Use of electronic calculators in educational research. Prereq: One year of college mathematics, an elementary course in statistics, or consent of instructor. F

565 Instructional Trends and Issues in Science Education (3) Analysis of current trends in science instruction, instructional issues facing elementary, secondary, and community college science teachers, and application of learning theory to teaching biological, physical, and environmental sciences. Prereq: 456, 422, or equivalent. E

566 Administering Instructional Media Programs (3) Leadership roles and responsibilities of professional media administrator in variety of organizational settings. F

569 Advanced Production of Audiovisual Software (3) Hand and mechanical lettering, flat picture mounting, laminating, overhead projection, audio production, TV studio orientation, sync-taping, multiframe presentations, and printing techniques. (Same as Information Sciences 566.) S/NC

573 Utilization of Educational Television and Radio (3) Television and radio as instructional and training media. Selecting, making and evaluating instructional training video and audio tapes. F

577 Introduction To Data Processing in Curriculum and Instruction (3) Analysis of current activities in educational computing and data processing. Curriculum, institutional, research, and classroom management applications from microcomputers to super computers. Prereq: Consent of instructor. F

580 Techniques for Research in Curriculum and Instruction (3) Fundamental research methodology applicable to curriculum, instruction, and other areas of educational inquiry. Critical reading of research and development of skills needed for proposal development. E

581 Seminar in Mathematics Education (3) Current issues influencing instruction in mathematics in schools, elementary through college. Related teaching methodologies. Opportunities for work on special problems. Prereq: Undergraduate course in teaching of mathematics. F

582 Teaching Enrichment Mathematics in Middle and Junior High Schools (3) Topics to enrich middle
and/or junior high mathematics. Geometrical, laboratory, and problem-solving activities. Special attention to metric system. Opportunities for individual projects. Prereq: 581. Su


586 Teaching Probability & Statistics (3) Teaching of probability and statistics in schools, elementary through college. Probabilities and statistical experiments, demonstrations, and applications. Prereq: 581. F

588 Instructional Theory and Design (3) Relationship of curriculum to instruction; examination of instructional and related learning theories; instructional models and teaching styles. E

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

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

595 Special Topics (1-3) May be repeated. S/NC or letter grade. E

596 Curricular Trends and Issues in Science Education (3) Analysis of elementary and secondary curriculum projects in biological, physical, and environmental sciences. Impact of current learning theories on future curriculum development projects. Prereq: 496, 422, or equivalent. Prereq or coreq: 565 or consent of instructor.

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

623 Using Research for Curriculum Improvement (3) Research methodology; application to descriptive/survey curriculum materials. Critical reading of research, methodological development in descriptive and survey areas. So


669 Instructional Media Research (3) Identification, location, and collection of developmental and experimental research on instructional media. Application of research. Sp

671 Advanced Educational Statistics (3) Applications of parametric and non-parametric statistical inference to educational problems. Use of microcomputers in educational research. Prereq: 581. Sp, Su

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. Sp

675 Curriculum Evaluation: Theory and Application (3) Evaluation trends and issues. Theoretical frameworks and design evaluation studies for various educational programs. Sp

678 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. E

683 Advanced Studies in Elementary School Mathematics (2) Research in elementary school mathematics. Prereq: Graduate course in mathematics education or consent of instructor. Sp

688 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


**Electrical and Computer Engineering (College of Engineering)**

<table>
<thead>
<tr>
<th>MAJOR</th>
<th>DEGREES</th>
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<tbody>
<tr>
<td>Electrical Engineering</td>
<td>M.S., Ph.D.</td>
</tr>
<tr>
<td>R.C. Gonzalez, Head</td>
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</tr>
</tbody>
</table>

Professors:
- Alexeff, Igor, PE, Ph.D. | Wisconsin |
- Bailey, J. Milton, Ph.D. | Georgia Tech |
- Birdwell, J. Douglas, Ph.D. | MIT |
- Bishop, A.A. Jr., Ph.D. | Clemson |
- Blaick, A. Vaughan, Ph.D. | Tennessee |
- Bodenheimer, Robert E., Ph.D. | Northwestern |
- Bose, Bimal K. (Condra Chair of Excellence), Ph.D. | Calcutta |
- Boudin, Donald W., PE, Ph.D. | Vanderbilt |
- Gonzalez, R. C. (Distinguished Prof.), Ph.D. | Florida |
- Hoffman, Graham W., Ph.D. | Harvard |
- Hung, James C. (Distinguished Prof.), Ph.D. | New York |
- Kennedy, Eldridge J., Ph.D. | Tennessee |
- Lawler, Jack S., Ph.D. | Michigan State |
- Leffell, Will O. (Emeritus), M.S. | Tennessee |
- Neff, Herbert P., PE, Ph.D. | Auburn |
- Pace, Marshall O. (Liaison), Ph.D. | Georgia Tech |
- Pierce, J. Frank (Distinguished Prof.) | (Emeritus), PE, Ph.D. | Pittsburgh |
- Pujo, Alfonso Jr. (UTSI), Ph.D. | Vanderbilt |
- Roberts, M. J., Ph.D. | Tennessee |
- Rochelle, Robert W. (Emeritus), Ph.D. | Maryland |
- Roth, J. Rose, Ph.D. | Cornell |
- Symonds, Frederick W., Ph.D. | Nottingham |
- Tillman, James D. (Emeritus), Ph.D. | Auburn |
- Trivedi, Mohan M., Ph.D. | Utah State |
- Weaver, Charles H. (Emeritus), PE, Ph.D. | Wisconsin |

Associate Professors:
- Abidi, M. A., Ph.D. | Tennessee |
- Bomar, Bruce W. (UTSI), Ph.D. | Tennessee |
- Brzakovick, Dragana, Ph.D. | Florida |
- Crilly, Paul B., Ph.D. | New Mexico State |
- Joseph, Roy D. (UTSI), Ph.D. | Case Western |
- Kosh, Daniel, Ph.D. | Missouri (Rolla) |
- Ronzenberg, David, Ph.D. | New York |
- Rochelle, James M., Ph.D. | Tennessee |
- Waller, J. Wayne, Ph.D. | Tennessee |

Assistant Professor:
- Smith, I. Montgomery (UTSI), Ph.D. | UTSI |

The Electrical and Computer Engineering Department has a graduate committee to administer, promote, and advance the general well-being of the graduate program.

The Department of Electrical and Computer 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 and Computer Engineering Department. A limited number of Graduate Research 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 must meet the admission standards except for this background students from fields other than electrical engineering who have met the admission standards for this background will be admitted only as non-degree students until they have completed coursework to provide this background.

**Master's Degree Requirements**

Specific degree requirements which must be met include:

1. Electrical and Computer Engineering 503 and 504.
2. Six semester hours of graduate credit in mathematics consisting of mathematics courses of 400 level or higher which have been approved by the E.C.E. Graduate Committee.
3. An additional 12 semester hours of 500-level work in electrical and computer engineering courses or 6 semester hours of 500-level work in one area of electrical and computer 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 and computer engineering courses must include at least 6 hours in the student's major area.
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, computers, electronics, communication theory, electromagnetic theory, plasma engineering, power systems, solid-state electronics, and control systems.

Applicants must submit scores on the General Graduate Record Exam. A TOEFL score of 580 is required for non-native speakers of English, including those who have earned degrees at U.S. institutions. The TOEFL must have been taken within the past two years.

Specific departmental requirements for the Ph.D. include the following:

1. A Master of Science or Master of Engineering degree.
3. A minimum of 24 semester hours of work in electrical and computer engineering courses at the 500 and 600 levels.
4. 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.
5. A minimum of 12 hours of mathematics courses approved by the Electrical and Computer Engineering Graduate Committee. All 12 hours must be 400-level or above, and at least 8 hours must be at 500-level or above.

A foreign language proficiency examination is required by the Department.

1. A minimum of 24 semester hours of work in electrical and computer engineering courses at the 500 and 600 levels.
2. 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.
3. A minimum of 12 hours of mathematics courses approved by the Electrical and Computer Engineering Graduate Committee. All 12 hours must be 400-level or above, and at least 8 hours must be at 500-level or above.

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

4. Satisfactory performance on both a qualifying and comprehensive examination. The qualifying examination is prepared by the department and consists of a 3-hour written examination in each of four areas. Areas (1) and (2) are usually taken from the second of the graduate course divisions in the field. The comprehensive examination is usually chosen from two of the graduate courses divisions in the field and cover material from undergraduate courses in the first year.

A comprehensive examination is required by the 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 listed in the catalog. The comprehensive exam is given when the student is ready to apply for admission to candidacy.

A student who fails the qualifying examination must take and pass the examination the next time it is offered to remain in the Ph.D. program. The qualifying examination is normally taken after the completion of 24 hours of graduate coursework or immediately after completion of a master's degree. A minimum of 18 hours of graduate coursework must be completed after the student has taken the qualifying examination the first time.

A comprehensive examination is required by The Graduate School. In the 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 listed in the catalog. The comprehensive exam is given when the student is ready to apply for admission to candidacy.

A comprehensive examination is required by The Graduate School. In the 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 listed in the catalog. The comprehensive exam is given when the student is ready to apply for admission to candidacy.
651 Computer-Aided Design of VLSI Systems I (3) Fabrication of microelectronic devices; computer architecture design; algorithmic state machines; partitioning; structured design methodology. Prereq: 551-2 or consent of instructor.

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

663 Advanced Plasma Physics I (3) Basic concepts of high temperature plasma physics. Magneto-hydrodynamics and kinetic descriptions of plasma, plasma transport, plasma waves, equilibrium, and stability. Prereq: Physics 541-2, 461-2 or 554, or consent of instructor. (Same as Physics 653.)

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 576 or 577 or consent of instructor.

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

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


599 Graduate Seminar (1-3) Topics of interest discussed in weekly seminar. May be repeated. Maximum 6 hrs. S/NC or letter grade.

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

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


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

617 Special Topics in Systems Theory I (I) 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 (I) 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.

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

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

631 Advanced Topics in Electronic Instrumentation I (3) Based on particular interests of students. Fundamental physical processes in instrumentation transducers: thermoelectric, magneto-electric, electromagnetic and quantum-mechanical devices. Prereq: 531-2 or consent of instructor.


643 Detection and Estimation Theory (3) Detection theory; coding theory; system identification. Signals with unknown parameters; optimal filter synthesis; adaptive systems; sequential detection; suboptimal detection. Prereq: 504 or consent of instructor.

644 Coding and Information Theory (3) Structure of algebraic and probabilistic codes; linear codes, convolutional codes, error detecting, correcting codes, decoding methods, identification schemes: deterministic, stochastic, and hierarchical methods. Prereq: 543.

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

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

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631 Advanced Topics in Electronic Instrumentation I (3) Based on particular interests of students. Fundamental physical processes in instrumentation transducers: thermoelectric, magneto-electric, electromagnetic and quantum-mechanical devices. Prereq: 531-2 or consent of instructor.


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644 Coding and Information Theory (3) Structure of algebraic and probabilistic codes; linear codes, convolutional codes, error detecting, correcting codes, decoding methods, identification schemes: deterministic, stochastic, and hierarchical methods. Prereq: 543.
Engineering Science and Mechanics

7. A final examination on the student's dissertation and related fields will be taken by the student after completion of the Ph.D. dissertation and course requirements.

ACADEMIC COMMON MARKET

An agreement among Southern states for sharing graduate programs that allows residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The Ph.D. program in Engineering Science 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 400-LEVEL COURSES

421 Materials of Engineering (3) Mechanical properties of engineering materials; data collection and processing; time-dependent and cyclic-dependent properties. Prereq: 251, Materials Science and Engineering 201. 3 hrs or 2 hrs and 1 lab.

423 Fracture-Safe Design (3) Critical review of variables controlling fracture toughness: part and flaw geometry, temperature, loading rate, section size, material; characterization of fracture toughness by stress intensity factors; factor stress release rates, J integral, COD data, transition temperature tests; use of fracture toughness data in design. Prereq: 321 and Materials Science and Engineering 201. (Same as Materials Science and Engineering 475) 3 hrs or 2 hrs and 1 lab.

431 Fundamentals of Vibrations (3) Free and forced vibrations of damped and undamped lumped parameter systems; energy methods; free vibration of continuous bodies. Prereq: 231, Mathematics 231.

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 students use University facilities and/or faculty time before degree completion. May be repeated. S/NC only. E

25-22 Advanced Mechanics of Materials (3.3) Three dimensional transformations for stress and strain, unsymmetrical bending, energy methods, thick-walled pressure vessels, beams on elastic foundation, beam columns, introduction to elementary theory of elasticity. Prereq: 322 and Mathematics 431.

523 Theory of Elasticity (3) Equations of equilibrium; strain-displacement relations, strain energy, constitutive equations in three-dimensions. Beams, plates, shells, stress concentrations. Elasticity, complex potentials, plane stress and plane strain in rectangular and polar coordinates. Thermal stresses in beams, rings, plates, and shells; thermal buckling problems.

525 Theory of Plates (3) Classical bending theory of thin plates; plates, buckling and large deflection problems. Prereq: 523 or 535.


536 Advanced Engineering Acoustics (3) Introduction to theory and application of acoustical analysis; vibration of continuous systems, plane and spherical waves, transmission phenomenon, radiation and scattering. Resonators, filters, acoustical mechanics, microphones, ultrasonics, sonar transducers. Prereqs: 431 or 435.

539 Continuum Mechanics (3) Cartesian tensors, transformations, balance laws, basic continuum mechanics concepts; stress, strain, deformation, constitutive equations. Conservation laws in field systems. Applications in solid and fluid mechanics.

541 Fluid Dynamics (3) Kinematic, kinetic and thermodynamic properties of fluids. Development of rate deformation laws; mass, momentum and energy conservation relationships; non-dimensionalization. Applications of Euler and Navier-Stokes equations: exact solutions, potential flow, transonic boundary layer approximations, coupled heat/mass transfer models. Coreq: 593.

542 Fluid Dynamics II (3) Development of basic concepts and general equations for turbulence and turbulent field motion. Formulation for correlation function, energy spectra, diffusion. Introduction to turbulent transport processes, direct numerical simulation; use of engineering turbulence closure models; examination of simple and experimental methods. Prereq: 541.


557 Biomechanics of Hard and Soft Tissue (3) Introduction to terminology, physiology, and analytical methods for mechanics of living tissue. Continuum mechanics analysis of hard and soft tissue, biological fluid flows. Flow properties of blood, tissue mechanics in micro vessels; biomechanics of fluids and solids, mechanical properties of blood vessels, skeletal, heart and blood/soft tissue in the heart and extremities. Research paper.

576 Optical Engineering I (4) Wave optics; scalar diffraction theory; introduction to Fourier optics; ray or geometric optics, lens, mirror, gratings; paraxial design methods; introduction to aberrations.

578 Optical Engineering II (4) Statistical optics; spontaneous and induced emission; black and gray body radiation; incandescence, recombination and totally coherent radiation; mutual coherence function; detectors; radiometry. Prereq: 556.


575 Applied Artificial Intelligence (3) (Same as Nuclear Engineering 575 and Mechanical Engineering 575.)

576 Expert Systems in Engineering (3) (Same as Nuclear Engineering 576 and Mechanical Engineering 576.)

577 Neural Networks in Engineering (3) (Same as Nuclear Engineering 577 and Mechanical Engineering 577.)

581 Flow and Mass Transfer (3) (Same as Mechanical Engineering 581.)

587 Fuzzy Systems in Engineering (3) (Same as Nuclear Engineering 587.)

588 Measurement Science I (3) (Same as Nuclear Engineering 588, Aviation Systems 588, Civil Engineering 588, Mechanical Engineering 588 and Aerospace Engineering 588.)

589 Measurement Science II (3) (Same as Nuclear Engineering 589 and Aviation Systems 589.)

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

621 Analysis and Design of Thin Shell Structures (3) Geometry of surfaces, deformation and stress theory for arbitrary shell geometry; selected applications of theory in structural engineering. Prereq: 525 or Civil Engineering 525.

English
(College of Arts and Sciences)

MAJOR DEGREES
English .................................................. M.A., Ph.D.

D. Allen Carroll, Head

Professors:
Bratton, Edward W., Ph.D. ................. Illinois
Carroll, D. Allen, Ph.D. ................. North Carolina
Cox, Don R., Ph.D. .............................. Missouri
Drake, Robert Y., Jr., Ph.D. .............. Yale
Ensor, Allison R., Ph.D. ..................... Indiana
Finnernan, Richard J. (Hodges Chair of Excellence), Ph.D. ............. North Carolina
Goslee, Nancy M. (Distinguished Prof.), Ph.D. .......... Yale
Heffeman, Thomas J., Ph.D. ............... Cambridge
Kallet, Marilyn, Ph.D. ................. Rutgers
Keene, Michael, Ph.D. ................. Texas
Kelly, Richard M. (Lindsay Young Prof.), Ph.D. ........ Duke
Leggett, B. J. (Distinguished Prof.), Ph.D. ....... Florida
Leki, Ilona, Ph.D. .......................... Illinois
Lofaro, Michael A., M.A. ............... Maryland
Maland, Charles J. (Lindsay Young Prof.), Ph.D. ........ Michigan
Pennea, A. Richard, Ph.D. .............. Colorado
Reese, Jack E. (Univ. Prof.), Ph.D. ......... Kentucky
Sanders, Norman J. (Lindsay Young Prof.), Ph.D. ....... Duke
Scour, Dorothy M., Ph.D. .......... North Carolina
Shinn, William, Ph.D. ................. North Carolina
Thomas, Joyce Carol, M.A. ........... Stanford
Trabern, Joseph B., Jr., Ph.D. ............. Princeton
Weir, Allen, M.F.A. ......................... Bowling Green
Wheeler, Thomas V., Ph.D. .......... North Carolina
White, Jon M. (Emeritus), M.A. ........ Cambridge

Associate Professors:
Bensel-Myers, Linda D., Ph.D. ........ Oregon
Dumas, Bethany K., Ph.D. .............. Arkansas
Dunn, Allen, Ph.D. ......................... Washington
Garner, Stanton B., Jr., Ph.D. .......... Princeton
Gill, J. E., Ph.D. ................... North Carolina
Goslee, David F., Ph.D. .......... Yalie
Hutchinson, George, Ph.D. .......... Indiana
Papke, Mary E., Ph.D. ..................... McGill
Robinson, Frank K., Ph.D. .......... Texas
Smith, Arthur, Ph.D. ....................... Houston
Stillman, Robert, Ph.D. ............... Pennsylvania
Zomchick, John (Liang), Ph.D. ........ Columbia

Assistant Professors:
Atwill, Janet, Ph.D. ......................... Purdue
Bhatt, Rakesh, Ph.D. ....................... Illinois
Hammontray, Patsy G., M.A. .......... Tennessee
Hirst, Russel, Ph.D. ...................... Rensselaer
Howes, Laura L., Ph.D. ................. Columbia
Jennings, La Vina, Ph.D. .......... North Carolina

The Department of English offers the Master of Arts and the Doctor of Philosophy degrees with a major in English. Thesis and non-thesis options are available for the M.A. as well as a special concentration in writing. Detailed information about the major's and doctoral programs, and about individual graduate courses, may be obtained by writing to the Director of Graduate Studies in English, 305 McClung Tower. A prospective student must contact the department to receive the proper information and forms with which to apply. The Department of English does not accept students in non-degree or provisional status. A student who wishes to enter the department must apply in degree-seeking status for his/her application to receive consideration for admission to any graduate program in English.

THE MASTER'S PROGRAM

Requirements

Coursework: A minimum of 24 semester hours in English beyond the B.A., to include 6 hours at the 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.

Final Examination: The reading list may be modified by the M.A. examining committee, meeting as a body with the student, to reflect the candidate's particular writing emphasis. However, most of the oral examination should focus upon the literature outlined in the original reading list.

THE DOCTORAL PROGRAM

Requirements

A student must successfully complete a program of study, normally 6 full semesters as outlined below, approved by the candidate's committee or the Director of Graduate Studies in English.

Coursework: At least 51 semester hours beyond the B.A., 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.); a special three-hour course in teaching composition; and 12 additional hours at any level, including the 400 level. Up to 6 of these additional hours may be taken in any graduate credit courses at the 300 level or above in the foreign language or literature with at least a grade of B in each course; (c) passing of the regular Ph.D. foreign language examination as currently administered at UT Knoxville.

Dissertation: Twenty-four semester hours of dissertation. The research and dissertation will be directed by a faculty member of the department and approved by a doctoral committee of three or four other faculty members.

Language Requirement: A language requirement met in one of the following ways:

1. Two languages approved by the Director of Graduate Studies in English.

Writing Projects: One of the following writing projects for six hours of credit:

1. A thesis, using research to analyze some aspect of writing or rhetorical theory.

2. A creative project, such as a collection of poems or short stories, a short novel, a play, or a creative work of non-fiction prose.

The nature and length of each project will be determined by the Director of Graduate Studies after consulting with the student and the project director. In addition to the director, two other English Department faculty members will supervise and approve the project; at least one should be from the literature faculty.

Final Examination: The reading list may be modified by the M.A. examining committee, meeting as a body with the student, to reflect the candidate's particular writing emphasis. However, most of the oral examination should focus upon the literature outlined in the original reading list.

Oxford English Dictionary

Oxford English Dictionary

Oxford English Dictionary

Oxford English Dictionary

Oxford English Dictionary

Oxford English Dictionary
3. One modern language approved by the Director of Graduate Studies in English and intensive study of the English language. This requirement must be fulfilled by completion of (a), (b), or (c) in option 1, for one foreign language and completion of 6 semester hours in English language courses with grades of B or better, at least three of which must be from English 508 or 509 History of the English Language (offered in alternate years 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) 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 each teaching semester.

GRADUATE COURSES

Note: Students enrolling in English graduate courses must first register in the office of the Director of Graduate Studies in English 280 McClung Towers.

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 achievements up to 1592. 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 1590 and 1592. Reading and discussion of plays from tragedy, including Othello, problem plays, including Measure for Measure, and dramatic romances, including The Tempest.

406 Renaissance Drama (3) English theatre between 1590 and 1640 through reading of representative plays by Shakespeare's contemporaries: Marlowe, Webster, Jonson.

409 Spenser and his Contemporaries (3) Principal achievements in prose and poetry of sixteenth century authors: Spenser, Wyatt, Marlowe, More, Sidney, and Bacon.

410 Milton, Donne and their Contemporaries (3) Principal achievements in prose and poetry of first two-thirds of seventeenth century: poetry of Milton, Donne, Marvell, and prose of Browne, Bacon, Watton.

411 Literature of Restoration and Early Eighteenth Century: Dryden to Pope (3) Survey of English literature and culture from 1660 to 1745.

412 Literature of Later Eighteenth-Century: Johnson to Burns (3) Survey of English literature and culture from 1745 to 1800.

413 Restoration and Eighteenth-Century Genres and Modes (3) A major genre or literary mode: drama, novel, poetry, non-fiction prose, romance, or epic, written between 1660 and 1700. May be repeated.

414 Romantic Poetry and Prose I (3) Wordsworth, Coleridge, and Blake; readings from Lamb, De Quinncy, and other prose writers.

415 Romantic Poetry and Prose II (3) Keats, Shelley and Byron; readings from Hazlitt, Peacock, and other prose writers.

416 Victorian Poetry and Prose I (3) Tennyson, Pre-Raphaelites, Carlyle, Newman, and Mill.

419 Victorian Poetry and Prose II (3) Browning, Arnold, Hopkins, Hardy, Ruskin, Darwin, and Wilde.

420 The Nineteenth-Century British Novel (3) Scott to Hardy.

421 Modern British Novel (3) Lawrence, Joyce, and Woolf.

422 Women Writers in Britain (3) Literary consciousness and works of women writers. Topics vary: Marie de France, Margery Kempe, Aemilia Lanyer, Elizabeth Cary, Aphra Behn, Frances Burney, Mary Wollstonecraft, Mary Shelley, George Eliot, Virginia Woolf, and Doris Lessing. May be repeated. (Same as Women's Studies 422.)

423 Colonial, Federal, and Early National American Literature (3) From Columbus to Washington Irving.

424 American Romanticism and Transcendentalism (3)

425 American Realism and Naturalism (3)

426 Modern American Literature (3) World War II to present.

427 American Novel before 1900 (3) From earliest sentimental novels through Brown and Cooper, and major figures to 1900: Hawthorne, Melville, Stowe, Clemens, and James.


429 Southern Literature (3) Southern writing from colonial period into twentieth century: frontier humorists, local color writers, and Southern literary renaissance.

430 American Humor (3) Early nineteenth century into twentieth century: Mark Twain.

431 American Historicism and Transcendentalism (3)

432 American Realism and Naturalism (3)

433 American Modern Literature (3) World War I to present.

434 American Modern Novel before 1900 (3) From earliest sentimental novels through Brown and Cooper, and major figures to 1900: Hawthorne, Melville, Stowe, Clemens, and James.

435 American Novel after 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 1845 to present: Langston Hughes and Harlem Renaissance, Richard Wright and Gwendolyn Brooks, writing by Black women, international Black literature in English, and Black American autobiography.

444 American Modern Poetry and Prose (3) From Yeats and Frost to Auden, Stevens, and more recent poets.

445 Modern British and American Drama (3) O'Neil's works as precursor to modern dramatists: Williams, Miller, Albee, and representatives of Black theater, Bullins and Baraka.

446 Twentieth-Century International Novel (3) Joyce, Camus, Kafka, Nabokov.

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: 456 and 459, 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 definitions, 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. Prereq: 355 or 372 or English 202 or consent of instructor. (Same as English 461.)

463 Advanced Poetry Writing (3) Further development of skills acquired in basic writing poetry course. Prereq: 355 or consent of instructor.

464 Advanced Fiction Writing (3) Further development of skills acquired in basic writing fiction course. Prereq: 355 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: 271 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. American English: dialects, references, and implications for cultural pluralism. Prereq: 271 or 372 or Linguistics 200 or consent of instructor. (Same as Linguistics 472.)

473 Teaching English as a Second or Foreign Language (3) Grammatical structures of English; particular grammatical difficulties of non-native learners of English; basic phonological structures of English. Teaching grammar and pronunciation to non-native speakers: contrastive analysis of English with other languages. Prereq: 272 or 273 or 371 or 372 or 373 or 374 or 471 or 472 or consent of instructor. (Same as Linguistics 473.)

474 Teaching English as a Second or Foreign Language (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. Observation of and team teaching with experienced staff member. Prereq: English 474. (Same as Linguistics 474.)

475 Teaching English as a Second or Foreign Language (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. Observation of and team teaching with experienced staff member. Prereq: English 474. (Same as Linguistics 474.)

476 Second Language Acquisition (3) Theoretical models and research; differences between first and second language acquisition. Aspects must be: age, cognitive factors in second language acquisition; learner variables; socio-cultural factors; and implications for second-language instruction.

479 Literary Criticism (3) Historical survey of major works of literary criticism.


481 Studies in Folklore (3) Topics vary. May be repeated with different topic. Maximum 6 hrs.

482 Major Authors (3) Content varies. Concentrated study of at least one of the most influential writers in British or American literary history: e.g., Donne, Tennyson, Jane 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 485.)

486 Special Topics in Criticism (3) Content varies. Theoretical and practical approaches to British and American literature. May be repeated with consent of department. Maximum 6 hrs.

489 Special Topics in Film (3) Content varies. 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
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. Introductory 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/C/NC only. E

505 Teaching Freshmen 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 English language. Old and Middle English. Sp, A

509 History of the English Language II (3) Phonological, morphological, and syntactic development of the English language with concentration on developments after about 1500, especially in American English. Sp, 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 Eighteenth-Century Literature (3,3) Content varies: particular literary figure or figures, genres, 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, fiction, drama; period: Restoration, eighteenth-century. Sp, A

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.

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

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

580 Fiction Writing (3) Advanced fiction projects under supervision of instructor and for independent study. Prereq: Extensive background in reading and writing fiction.

581 Colloquium in Poetry Writing (3) Major poetic project or continuation of project begun in 485. Individual consultation with instructor supplements class analysis; readings in contemporary poetry and theory. Prereq: 483 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 contemporary research in rhetoric and composition.

586 History of Rhetoric I (3) Survey of rhetoric from Sophocles to Ramanus.

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

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

590 Topics in Critical Theory (3) Topics vary.

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

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

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

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

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

610 Studies in Old English Language and Literature (3) Old English grammar with readings in prose and poetry. Sp, A

611 Studies in Beowulf (3) Translation and critical study of Beowulf. Prereq: English 610 or consent of instructor. Sp, S

620 Studies in Medieval English Literature (3) Seminar in 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: Spenser, Milton, seventeenth-century prose and poetry; Shakespeare, sixteenth-century prose and poetry; non-Shakespearean drama.

640-41 Readings 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) Seminar content varies: particular literary figure or figures, genres, theme, or other coherent focus.

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, textual and stylistic analysis, historiography, style and ethics.


686 Studies in Creative Writing (3) Content varies. Connection between theory and practice in writing.

688 Studies in Literary Criticism (3) Content varies. Advanced work in theory and history of literary criticism.

690 Special Topics (3) Content varies. History of ideas, humor, biography, autobiography, extra-literary disciplines.

694 Studies in Film (3) Content varies. Advanced work in film history and analyses.

Entomology and Plant Pathology

(Master of Science in Agriculture and Natural Resources)

MAJOR

THE THREE-YEAR PROGRAM

Admission Requirements

For admission to the M.S. degree program, a student must meet all requirements of The University of Tennessee Graduate School and must have completed (1) general botany or biology, 6 hours; (2) advanced biological sciences, 9 hours; (3) general inorganic chemistry, 6-8 hours; (4) organic chemistry, 3 hours. In addition, three completed rating forms and a written statement of career goals and interest in entomology or plant pathology are required.

Degree Requirements

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

THE MASTER'S PROGRAM

Admission Requirements

For admission to the M.S. degree program, a student must meet all requirements of The University of Tennessee Graduate School and must have completed (1) general botany or biology, 6 hours; (2) advanced biological sciences, 9 hours; (3) general inorganic chemistry, 6-8 hours; (4) organic chemistry, 3 hours. In addition, three completed rating forms and a written statement of career goals and interest in entomology or plant pathology are required.

Degree Requirements

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

THE MASTER'S PROGRAM

Admission Requirements

For admission to the M.S. degree program, a student must meet all requirements of The University of Tennessee Graduate School and must have completed (1) general botany or biology, 6 hours; (2) advanced biological sciences, 9 hours; (3) general inorganic chemistry, 6-8 hours; (4) organic chemistry, 3 hours. In addition, three completed rating forms and a written statement of career goals and interest in entomology or plant pathology are required.

Degree Requirements

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

THE MASTER'S PROGRAM

Admission Requirements

For admission to the M.S. degree program, a student must meet all requirements of The University of Tennessee Graduate School and must have completed (1) general botany or biology, 6 hours; (2) advanced biological sciences, 9 hours; (3) general inorganic chemistry, 6-8 hours; (4) organic chemistry, 3 hours. In addition, three completed rating forms and a written statement of career goals and interest in entomology or plant pathology are required.
Environmental Engineering

See Civil Engineering

Exercise Science

(College of Education)

MAJORS

DEGREES

Human Performance and Sport

Ph.D.

M.S., Ed.D.

E. Howley, Leader

Professors:

Howley, Edward T., Ph.D. .................... Wisconsin
Kozar, Andrew J. (University Prof.), Ph.D. ............... Michigan
Liemohn, W. P., Ph.D. .................... Iowa
Rickett, Ian R., Ph.D. ..................... Brown
Welch, Hugh (Emeritus), Ph.D. ............... Florida

Associate Professor:

Bassett, David R., Jr., Ph.D. .................... Wisconsin

Assistant Professors:

Lewis, J. L., Ed.D. ............................ Tennessee
Thompson, Dixie, Ph.D. ........................... Virginia

The Exercise Science unit offers graduate programs leading to the Master of Science with a major 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 3.0 GPA.

2. Any student who falls below this standard will be advised in writing by the unit leader of the need to discuss the matter with his/her advisor.

3. If a student’s overall GPA remains below 3.0 for a second semester, the student will have his/her degree status revoked.

GRADUATE ASSISTSHIPS

A limited number of graduate assistantships are available for qualified women and men who are graduates of accredited colleges or universities. These assistantships are open to students in the master’s and doctoral programs. Students interested in these opportunities should file their applications before February.

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

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

601 Research Seminar in Exercise Science (1) Research topics in different aspects of exercise science. May be repeated. S/NC only.

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. Prereqs: 583 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

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**Finance**

*(College of Business Administration)*

**MAJOR**

**DEGREES**

Business Administration ............. MBA, Ph.D.

Harold A. Black, Head

Professors:

Black, Harold A. (James F. Smith, Jr., Prof.), Ph.D. ........................................ Ohio State

Boehm, T. P., Ph.D. ................. Washington (St. Louis)

Dotterweich, William W. (Emeritus), Ph.D. ........................................ Pennsylvania

Philipatos, G. C. (Distinguished Prof.), Ph.D. ........................................ New York

Shreve, Ronald E. (Wm. Voigt Scholar), Ph.D. ........................................ UCLA

Wachowicz, J. M., Jr., CPA, Ph.D. .......... Illinois

Wansley, James W. (Clayton Chair of Excellence), Ph.D. .................. South Carolina

Associate Professors:

Auxier, A. L., Ph.D. ......................... Iowa

Daves, Phillip R., Ph.D. .................... North Carolina

DeGennaro, R. P., Ph.D. .......... Ohio State

Ehrhardt, M. C., Ph.D. .............. Georgia Tech

Assistant Professors:

Collins, M. Cary, Ph.D. ................. Georgia

Gunthorpe, Deborah L., Ph.D. .......... Florida

Stern, Mitchell B., Ph.D. .............. Virginia

**BUSINESS ADMINISTRATION CONCENTRATIONS**

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

**MBA Concentration:** Finance.

The curriculum offers courses for those interested in careers in corporate financial management, security analysis and investment, banking and financial institutions, and real estate.

Minimum course requirements are three courses: Finance 510 (6 hours), plus two from the following: 512, 522, 532, 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/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

510 Contemporary Concepts and Methods in Finance (6) Strategic issues and broad-based valuation concepts in finance; integrative approach in the investments, corporate finance and institutions areas.

511 Contemporary Issues in Corporate Finance (3) Selected topics in financial management, recent developments that have significant impact on strategic issues in financial management; Capital budgeting, financial and ownership structure, dividend policy and corporate growth and control. 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.

521 Investment Analysis (3) Principles and concepts of asset valuation in competitive and efficient financial markets. Basics of investment analysis of various securities. 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 competition and changing trends in U.S. financial system. Prereq: Business Administration 504 and 505 or consent of instructor.

551 Financial Management of a New Enterprise (3) Financial issues associated with formation, control, and long-term planning of new enterprise. Acquisition of venture capital. Prereq: Business Administration 504 and 505 or consent of instructor.

581 Real Estate Investment and Finance (3) Financial and market analysis used to make real estate investment decisions. Effects of variety of financing options on rate of return on income-producing properties. Effect of various financing options on consumer's decisions to purchase. Relationship between primary and secondary mortgage markets and impact of those markets on cost and availability of funds for real estate lending. Effects of government intervention (taxation, subsidization, and regulation) in both real estate and mortgage markets. Prereq: Business Administration 504 and 505 or consent of instructor.

599 Special Topics in Finance (1-3) Topics vary. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

641 Seminar in Finance I: Capital Markets (3) Capital markets; capital market imperfections, and market dynamics; interest rate theory and term structure of interest rates; utility theory, state preference theory, mean-variance, capital asset pricing, efficient set, theorems, interest rate theory, financial market microstructure.

642 Seminar in Finance II: Theory of the Firm (3) Financial theory of firm and financial decision making under conditions of uncertainty, equilibrium models of firm. Option pricing, agency theory, capital structure, economics of information, and dividend policy.

651 Advanced Seminar in Finance I (3) Recent theoretical and empirical developments in micro-finance literature. Topics vary. May be repeated. Maximum 6 hrs.

652 Advanced Seminar in Finance II (3) Recent theoretical and empirical developments in macro-finance literature. Topics vary. May be repeated. Maximum 6 hrs.

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**Food Science and Technology**

*(College of Agricultural Sciences and Natural Resources)*

**MAJOR**

**DEGREES**

Food Science and Technology .......... M.S., Ph.D.

Clark J. Brekke, Head

Professors:

Brekke, C. J., Ph.D. ...................... Wisconsin

Collins, J. L., Ph.D. .................... Maryland

Draughon, F. A., Ph.D. ................. Georgia

Jaynes, H. O. (Emeritus), Ph.D. ........ Illinois

Melton, S. L., Ph.D. ...................... Tennessee

Miles, J. T. (Emeritus), Ph.D. ............. Wisconsin

Overcast, W. W. (Emeritus), Ph.D. ........ Iowa State

Penfield, M. P., 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

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 areas by careful selection of courses and the research topic. Minors are available in cognate fields. For detailed information, contact the department head.

Graduate School rating forms or letters of recommendation from at least three people are required. Respondents should be familiar with the applicant's scholastic ability and professional potential.

**THE MASTER'S PROGRAM**

Applicants must have a B.S. in food technology, food science or a related scientific field.

**Thesis Option**

1. Prior to research for the thesis, the student must develop a detailed written
research plan. Registration for 6 hours of 500 Thesis is required.

2. In addition to the thesis requirement, a minimum of 24 semester hours of graduate coursework is required. This work must be approved by the student's committee and a minimum of 14 hours must be courses numbered above 500. The committee may require additional coursework if the student's progress or background indicates such need.

3. All students are required to take 2 hours of 501 Seminar in their program and are expected to attend this course and participate in discussions during their master's program. Completion of 510 or equivalent is also required.

4. An oral, final examination covering the thesis and coursework is required.

Non-Thesis Option

1. In lieu of a thesis, students are required to complete a problem in cooperation with their employer (company or governmental agency) and their faculty committee. Students working on a problem must register for 6 hours of 503.

2. In addition to the requirement for 6 hours of 503, a minimum of 24 semester hours of graduate coursework is required. This work must be approved by the student's committee and a minimum of 14 hours must be courses numbered above 500. The committee may require additional coursework if the student's progress or background indicates such need.

3. All students are required to take 2 hours of 501 Seminar in their program and are expected to attend this course and participate in discussions during their master's program. Completion of 510 or equivalent is also required.

4. Students will be required to take a written comprehensive examination covering their coursework. In addition, an oral, final examination covering the problem and coursework is required. The oral examination will be held on the 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 as required is expected for admission. Scores on the GRE aptitude test are also required.


3. A minimum of 72 hours beyond the Bachelor's degree, excluding credit for the master's thesis, is required. Of this, 24 semester hours must be 600 Doctoral Research and Dissertation.

4. At least 24 hours of coursework numbered above 500 are required exclusive of doctoral research and dissertation. At least 9 of the 24 hours must be courses numbered above 600.

5. A minimum of 6 hours of courses for graduate credit must be taken outside the Department of Food Science and Technology.

6. All candidates must complete 601 (2 hrs.) and are expected to attend 601 during their Ph.D. program.

7. Each candidate must pass both written and oral comprehensive examinations prior to admission to candidacy. Major professors will advise candidates on competencies expected. A final oral examination is required that includes a defense of the dissertation and subject matter that the student's committee considers appropriate.

GRADUATE COURSES

410 Food Chemistry I (3) Reactions of proteins, enzymes, and additional foods. Physicochemical interactions of food materials. Prereq: Chemistry 110 or equivalent. 2 hrs and 1 lab. F

411 Food Chemistry II (3) Reactions of inorganic compounds, carbohydrates, lipids and vitamins in foods. Prereq: Chemistry 110 or equivalent. 2 hrs and 1 lab. Sp

420 Food Microbiology (2) Physical, chemical and environmental factors moderating growth and survival of foodborne microorganisms. Prerequisite: Food Science 210, Coreq. 429, F

429 Food Microbiology Lab (3) Methods for examination, enumeration, cultivation and identification of foodborne microorganisms. Prereq: Microbiology 210, Coreq. 420, F

430 Sensory Evaluation of Food (3) Principles and methods of sensory evaluation of foods. Prereq: Basic statistics. 2 hrs and 1 lab. F

440 Preservation of Food (3) Prevention of deterioration and spoilage of foods. Methods of preservation. Prereq: Agricultural Engineering Technology 422. 2 hrs and 1 lab. Sp


460 Meat Products Technology (4) Processing methods for making cured, smoked, fresh, frozen and formed products. Effect of processing methods on product characteristics. Prereq: 456 or consent of instructor. 3 hrs and 1 lab. F

470 Food Crop Products (3) Food products from plants: types, manufacturing systems, quality attributes and utility. Prereq: 3 hrs biological science. 2 hrs and 1 lab. Sp

480 Cereal Science and Bakery Products (3) Chemical and technological properties affecting quality and functionality of food ingredients. Prereq: 410 or 411 or equivalent. 2 hrs and 1 lab. Sp

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

501 Seminar (1) Individual reports and discussion on topics from current literature. May be repeated. Max. 3 hrs. E

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

503 Problems in Lieu of Thesis (2-3) May be repeated. S/N only. E

510 Instrumental Analysis of Food (5) Modern instrumental methods for control of food manufacturing processes. Prereq: 410-11, 2 hrs and 1 lab. F

511 Color and Flavor of Foods (3) Chemical basis, measurements, and reactions involved in color and flavor changes in foods. Manufacture and modification of foods to enhance color and flavor. Prereq: 410-11: 2 hrs and 1 lab. F

520 Food and Industrial Fermentations (2) Microbiology, biochemistry and technology of food-related fermentations involving dairy products, meat, cereals, fruits and vegetables. Production of food ingredients. Prereq: 420-29, 440, Biochemistry 410 or equivalent. 2 hrs and 1 lab. Sp

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: 420-29, 421 and 2 labs. Sp

540 Food Product Development (3) Art, science and technology of developing and marketing new food products. Prereq: 440, 2 hrs and 1 lab. Sp

560 Advanced Meat Science (3) Physical and chemical changes that occur in conversion of muscle to meat.
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.

6. 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.

Forestry

GRADUATE COURSES

422 Forest and Wildland Resource Policy (3) Policy formulation; criteria for policy determination; forest and wildland law and regulation; theory of conflict resolution; formal and informal resolution. Prereq: Senior standing. F

423 Wildland Recreation Planning and Management (3) Planning processes, master and site planning, site design projects, management strategies, methods of visitor and recreation site management; case studies. Weekend field trips. Prereq: 321, 323, Ornamental Horticulture and Landscape Design 280, or consent of instructor. 2 hrs and 1 lab. Sp

433 Wood Adhesives and Glued Wood Products (2) Theory and practice of bonding wood; wood substrate-adhesive interface for bonding; principles of adhesion; wood adhesives; gluing of solid wood and composite wood manufacturing practices; laboratory manufacture and testing of adhesives, adhesive bond strength and glued-wood product performance; day field trips. Prereq: Wood Properties and Use and Wood Identification, or consent of instructor. 1 hr and 2 labs. F

434 Wood Processing and Machining (2) Primary log breakdown and secondary processing into major products. Fundamentals of machining technology for major types of cutting operations: sawing, boring, planing, veneer cutting, and laser machining; day field trips. Prereq: Wood Properties and Use 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, application, and disposal of preservative treated wood. Day field trips. Prereq: Wood Properties and Use and Wood Identification, or consent of instructor. 1 hr and 2 labs. 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 toward degree requirements. May be repeated. SNC only. E

511 Problem Analysis in Forest Resources (3) Problem identification, analysis and solution in forest resource management. Identify, analyze and prepare written reports, oral presentations, and other forms of written work. Prereq: Consent of instructor. Available only to non-thesis option for M.S. in Forestry. E

512 Seminar (1) Current developments in forestry. Required of all graduate students in residence fall in fall. May be repeated. Maximum 2 hrs. SNC 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, A

530 Advanced Forest Resource Management (3) Analysis of forest management problems as experienced 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, A

540 Genetics in Forestry (3) Genetic improvement of forest species, selection of superior phenotypes; field testing for genetic variability; tree breeding; development of seed orchards; hybridization; tree cytology and tissue culture; use of biochemical variation; planning and conducting forest genetics research. Prereq: Silvicultural methods and Biology 220 or consent of instructor. Sp, A

550 Recreation Planning for Forests and Associated Lands (3) Planning process for recreation development on forests and associated lands; analysis and critique of specific contemporary alternatives. Overnight field trips. Prereq: Senior level in forest recreation or consent of instructor. F, A

560 Management & Policy of Forest Resource Organization (3) Theory and management practices as applied to national resource organizations: institutional direction and control, and strategic management. Development of policy as planning tool and as results from conflict resolution. Linkage between policy development and execution, and structure and management of organizations. Prereq: Forest administration and policy or consent of instructor. F, A

565 Advanced Silviculture (3) Silvicultural characteristics, silvicultural practices and systems applied to commercial important hardwoods and softwoods. In-depth analyses of silvicultural principles involved and tools used to implement those practices. In regeneration and management; computer modeling of stand dynamics, structure, growth/yield. Prereq: Undergraduate silviculture course or consent of instructor. 2 hrs and 1 lab. Sp, A

585 Advanced Forest Biometry (3) Application of sampling techniques to forest inventory; fixed and variable plot sampling; list sampling; Poisson sampling; regression estimation; multistage and multiphase sampling. Growth and yield predictions for even-aged and uneven-aged forests. Prereq: Land Measurement Techniques and Forest Resource Inventory or consent of instructor. F, A

590 Advanced Topics in Forestry (1-3) Recent academic concepts and developments in natural resource management. Prereq: Consent of instructor. May be repeated. Maximum 8 hrs. E

593 Independent Study in Forestry (1-4) May be repeated. Maximum 8 hrs. E

Forestry, Wildlife & Fisheries

GRADUATE COURSES

410 Wildlife Habitat Evaluation and Management (3) Ecological relationships between wildlife and habitat. Evaluation, modeling, and management of wildlife habitat. Effects of land-use practices on wildlife habitat. Weekend field trips. Prereq: Principles of Wildlife and Fisheries Management or General Ecology. Applicable to majors in Forestry and in 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/resource management through developing land management plans and analyzing case studies including conflict resolution. Applications to forestry and wildlife and fisheries management. 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 necessary for decision making and implementation. Prereq. 6 hrs of biological sciences or consent of instructor. Not available to students in forestry or wildlife and fisheries science. 4 hrs and 1 lab for six weeks. Sp.

536 Environmental Impacts to Natural Ecosystems
(3) Current environmental problems impacting natural ecosystems: climate change, acid deposition, air pollution, species declines, and introductions of exotic species. Management methodologies to mitigate environmental problems. 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 (2) Methods of wildlife damage control, forest, farmland, wetland wildlife habitat management, identification, field and 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, 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 and 1 lab or field. F.


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

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

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 Geography is available to residents of the states of Alabama, Arkansas, Mississippi, Virginia, or West Virginia. The master's program is also available to residents of Texas. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE COURSES

411 Computer Mapping and Geographic Information Systems (3) Concepts, management, and presentation of digital data for spatial analysis: cartographic data structures. Prereq: 310 and knowledge of a computer language or consent of instructor. 2 hrs and 1 2-hr lab.

412 Cartography (3) Cartographic techniques applied to design, compilation, and reproduction of maps and other graphics. Prereq: 310 or consent of instructor. 2 hrs and 1 2-hr lab.

413 Remote Sensing: Types and Applications (3) Principles and uses of remote sensing imagery: digital data, and spectral data; geographic interpretation and mapping techniques. Prereq: 310 or consent of instructor.

415 Quantitative Methods in Geography (3) Geographic application of statistical techniques, point pattern analysis, and analysis of area units. Prereq: Mathematics 115 or two semesters of calculus or consent of instructor.

421 Geography of Folk Societies (3) Geographical study of folk culture, traditional material culture, and rural settlement, examples from eastern North America and selected foreign areas. Prereq: 101-02 or 320 or consent of instructor.

425 Historical Geography of the United States (3) Survey of changing human geography of the United States during four centuries of settlement and development. Changing population patterns, development of agricultural regions, and patterns of urban-industrial development. Prereq: 101-02 or 320 or consent of instructor.

511 Topics in Physical Geography (3) Examination of trends, problems, and methods in physical geography. May be repeated with consent of instructor. Maximum 6 hrs.

517 Geographic Information Management and Processing (3) Concepts and methods in management of geographic information. Database design, manipulation, sampling and analysis. Prereq: Consent of instructor.

521 Topics in Cultural Geography (3) Examination of trends, problems, and methods in cultural geography. Prereq: 421 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

533 Topics in Physical Geography (3) Examination of trends, problems, and methods in physical geography. Prereq: 433 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

535 Topics in Biogeography (3) Examination of trends, problems, and methods in biogeography. Prereq: 435 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

541 Topics in Urban Geography (3) Analysis of research on urban systems, urban morphology. urban problems and urban spatial behavior. Prereq: 441 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

549 Topics in the Geography of Transportation (3) Examination of trends, problems, and methods in transportation geography and transportation networks. Prereq: 448 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

550 Regional Geomorphology (3) (Same as Geology 450.)

577 Biological Conservation (3) Analytical treatment of politics, policies, and forms of biological conservation as practiced in U.S. and abroad. Prereq: Consent of instructor.

591 Foreign Study (1-15) See College of Arts and Sciences. Prereq: Written consent of department prior to registration. S/NC or letter grade.

592 Off-Campus Study (1-15) See College of Arts and Sciences. Prereq: Written consent of department prior to registration. S/NC or letter grade.

593 Independent Study (1-15) See College of Arts and Sciences. Prereq: Written consent of department prior to registration. S/NC or letter grade.

595 Geographic Concept and Method (3) Traditional and modern geographic thought; readings on nature, scope, problems, and methods of geography. Prereq: Consent of instructor.

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

609 Seminar in Geography (2-3) Topics vary. Prereq: Individual consent of instructor. May be repeated. Maximum 6 hrs.

633 Seminar in Physical Geography (3) Prereq: 533 or consent of instructor. May be repeated. Maximum 6 hrs.

635 Seminar in Biogeography (3) Prereq: 535 or consent of instructor. May be repeated. Maximum 6 hrs.

641 Seminar in Urban Geography (3) Prereq: 541 or consent of instructor. May be repeated. Maximum 6 hrs.

643 Seminar in Rural Geography (3) Prereq: 443 or consent of instructor. May be repeated. Maximum 6 hrs.

645 Seminar in Geography of Transportation (3) Prereq: 549 or consent of instructor. May be repeated. Maximum 6 hrs.

663 Seminar in Geography of the American South (3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

673 Seminar in Geography of Latin America (3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

677 Seminar in Biological Conservation (3) Conduct of original research. Prereq: 577 or consent of instructor. May be repeated. Maximum 6 hrs.

Geological Sciences

(College of Arts and Sciences)

MAJOR

Geology ..................... M.S., Ph.D.

Harry J. McSween, Head

Professors:

Broadhead, Thomas W., Ph.D. .......... Iowa

Driese, Steven G., Ph.D. .......... Wisconsin

Dunne, William M., Ph.D. .......... Arthur

Hatcher, Robert D., Jr. (Distinguished Scientist), Ph.D. .......... Boston

Kopp, Otto G., Ph.D. .......... Columbia

Labotka, Theodore C., Ph.D. .......... Caltech

McLaughlin, Robert E. (Emeritus), Ph.D. .......... Tennessee

McSween, Harry Y., Ph.D. .......... Harvard
Graduation requires passing a comprehensive examination, taken no later than the end of the second year. Completion of all course requirements with a minimum GPA of 3.0, completion of the language requirement, and successful oral defense of the dissertation.

The comprehensive examination includes both written and oral parts in which the candidate will be tested on his/her knowledge of the area concerned. The proposed dissertation is expected to be conversant in a wide field of geological sciences.

A minimum of 24 hours of graded coursework beyond the master's degree is required in addition to the 24 hours of Dissertation 600. The coursework includes the sum of 9 hours of 600-level geology courses, 9 hours of 500-level or higher geology courses, and 6 hours of additional graduate courses. Extra-departmental coursework is encouraged.

The student must demonstrate a reading knowledge of a foreign language in which there is a body of geological literature, as approved by the student's dissertation committee.

**GRADUATE COURSES**

401 Quantitative Methods in Geology (3) Applications of calculus and differential equations to problems in earth sciences. Examples of diffusion equations in hydrogeology, wave equation in geophysics, mechanical modeling and boundary conditions in structural geology and tectonics.


420 Paleocology (4) Principles of ecological analysis as applied to fossils and fossil assemblages: data collection and interpretation. Laboratory designed around preparation of scientific samples and environmental analysis. Writing emphasis. course: 3 hrs and 1 lab.

421 Invertebrate Paleontology (4) Survey of invertebrate animal phylogeny and skeletal structures 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 science in societal context. Field techniques demonstrated, practiced, and applied to solution of geological problems. Prereq: Completion of major course and consent of instructor.

450 Process Geomorphology (3) Integrative approach to development of surface of earth based upon case histories, maps, remote sensing imagery. Prereq: 101-02. (Same as Geography 450.) 2 hrs and 1-2 hr lab.

455 Basic Environmental Geology (3) Applications of geologic sciences toward comprehension of effects of geological processes 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.

460 Principles of Geochemistry (3) Application of chemical principles to geologic problems. Crystal chemistry and relation between basic atomic structures and distribution and behavior of elements in earth’s crust. Prereq: Chemistry 120-30. Recommend prereq: 330. 2 hrs and 1 lab.


471 Fieldwork in Geophysics (2) Geophysical investigations applied to solution of problems in tectonics, hydrogeology, or environment. Summer field course off-campus. Requires full time for 2 or more weeks. Prereq: 470 or consent of instructor.

475 Physical and Chemical Systems of the Earth (3) Development of physical earth from solar nebula to present. Formation, composition and evolution of hydro-sphere, crust, mantle, and core. Interdependence of earthquakes, volcanism, plate tectonics, geomagnetism, and chemical and isotopic processes of earth, and earth's temperature. Historical perspective on major controversies of time frameworks and problems of today. Prereq: 16 hrs of geology courses numbered 300 and above. 2 hrs and 1 discussion.

480 Principles of Economic Geology (4) Ore-forming processes, classification of mineral deposits, survey of different types of mineral deposits with examples, and metallogenesis. Prereq: 310 and 330 or equivalents. Recommended prereq: 460. 1 hrs and 1-2 hr lab.

485 Principles of Geohydrology (3) Ground water flow, aquifer analysis, ground water contamination, and ground water management. Prereq: General Geology or equivalent or consent of instructor, General Chemistry or equivalent, and Calculus or equivalent. (Same as Civil Engineering 485.)

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

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

505 Structure of the Southern and Central Appalachians (2) Structural development of Southern and Central Appalachians from extensional Late Proterozoic to early Paleozoic rift-drift-platform margin through processes related to compressional events producing accretional elements that formed Appalachians throughout the Paleozoic. Comparisons to similar orogens. Prereq: Structural Geology.

510 Clay Mineralogy (3) Origin, chemistry, structures, and properties of clay minerals; applications of mineralogical techniques in clay mineral studies. Prereq: 310 and 568 or equivalent. 2 hrs and 1 lab.

521 Data Analysis in Geology and Environmental Science (3) Application of statistical and other quantitative techniques using computers to analyze geological data. Environmental problems.

525 Biostatistics (3) Examination of principles of stratigraphy and biostatistics through selected case histories. 2 hrs and 1-2 hr lab.

530 Petrogenesis of Crystalline Rocks (4) Origin and properties of igneous rocks, magmatic and metasomatic processes, and prehnite-pumpellyite zone. Prereq: 410. 10 hrs and 1 lab.

534 Geological Engineering (3) (Same as Civil Engineering 534.)

535 Ground Water Hydrology (3) (Same as Environmental Engineering 555.)

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 study of terrigenous clastic rock textures. Physical properties of sediments, processes of sedimentation, transport 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 throughout the planet and their evolution. May be repeated with consent of instructor. Max. 6 hrs. (Same as Geography 550.)

556 Quaternary Geology of North America (3) Interpretation of stratigraphic, geomorphic, 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 with paleo-oceanographic changes in Atlantic and Pacific Oceans. Prereq: 101 or consent of instructor.

557 Quaternary Paleoclimatology (3) Perturbation, process, and pattern within Quaternary ecosystems; climatic and vegetational responses during last 2.5 million years. Prereq: Consent of instructor.

561 Aqueous Geochemistry (4) Introduction to and applications of equilibrium thermodynamics to surfaces; geochemistry of natural water, weathering reactions, and early sediment 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, isotopic exchange, variations in natural waters, diagnostic and hydrothermal metamorphic systems. Prereq: General Chemistry or equivalent. 3 hrs and 1 lab or seminar.

565 Chemical Petrology (3) Application of thermodynamics to geologic materials. Thermodynamics of condensed phases, solutions, and the stability of hydrous and anhydrous minerals. Prereq: Chemistry 120-30. 3 hrs and 1 lab or seminar.

567 Mineral Physics (3) Application of thermodynamics to the properties of minerals. Prereq: Chemistry 120-30. 3 hrs and 1 lab or seminar.

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 lab or seminar.

571 Regional Tectonics and Structural Geology (3) Major subdivisions of earth's crust and processes that act to form them. Conservation of internal structure of mountain chains and how they function in the context of the crust. Examples from different parts of the world. Prereq: Structural geology or consent of instructor.

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 Plate Tectonics and Orogeny (4) Tectonic development of orogenic belts in context of plate tectonics; current literature and ongoing research for both modern and ancient examples. Prereq: 370 or consent of instructor. 3 hrs and 1 seminar.

576 Reflection Seismology (3) Imaging, subsurface features using reflected seismic waves. Energy sources, modes of wave propagation, field procedures, computer data processing, and pitfalls. Applications to tectonic and environmental problems. 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, and water treatment. Prereq: 485 or 535; 460 or 561; or Environmental Engineering 553 or equivalent; and consent of instructor.

586 Field and Laboratory Methods in Hydrogeology (2) Research methods. Measurement of hydraulic properties, drilling, sampling and instrumentation, tracer experiments. Formulating hypotheses and research plans. Prereq or coreq: 485 or 535, 585, and consent of instructor.

590 Special Problems in Geology (1-3) Directed study or special topics. Prereq: Instructor. May be repeated. Maximum 10 hrs.

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

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

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

594 Field Problems in Geology (1-2) Literature study and seminars on specific regions of geologic interest, supplemented by field trip. Prereq: Consent of instructor. May be repeated. Maximum 8 hrs.

595 Selected Topics in Geology (1) Presentation of graduate, faculty, and visiting scientist research. Registration required each semester except summer for resident full-time graduate students. S/N only.

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

620 Seminar in Paleontology (3) May be repeated with consent of department. Maximum 6 hrs.

630 Seminar in Petrology (3) May be repeated with consent of department. Maximum 6 hrs.

640 Seminar in Sedimentary Geology (3) May be repeated with consent of department. Maximum 6 hrs.

650 Seminar in Geomorphology and Quaternary Geology (3) May be repeated with consent of department. Maximum 6 hrs.

660 Seminar in Structural Geology (3) May be repeated with consent of department. Maximum 6 hrs.

675 Seminar in Geophysics (3) May be repeated with consent of department. Maximum 6 hrs.

680 Seminar in Economic Geology (3) May be repeated with consent of department. Maximum 6 hrs.

### Germanic and Slavic Languages

#### (College of Arts and Sciences)

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**Professors:**
- Falen, James E. (Emeritus), Ph.D. Pennsylvania
- Fiene, Donald M. (Emeritus), Ph.D. Indiana
- Kratz, Henry (Emeritus), Ph.D. Ohio State
- Osborne, J. C. (Emeritus), Ph.D. Northwestern
- E. (Emeritus), Ph.D. Connecticut

**Associate Professors:**
- Hodges, Carolyn R., Ph.D. Chicago
- Laukner, Nancy A. (Liaison), Ph.D. Wisconsin
- Lee, David E., Ph.D. Stanford
- Meller, C. J., Ph.D. Chicago
- Pervukhin, Natalia K., Ph.D. Bryn Mawr

**Assistant Professors:**
- Hoeyng, Peter, Ph.D. Wisconsin
- Moser, Beverly, Ph.D. Georgetown
- Ohnecserg, 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.

#### 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 additional training in at least two foreign 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 graduate degrees from institutions outside the United States must have a grade point average of at least 3.0. Consideration will also be given to applicants who do not have an undergraduate degree in one of the three foreign languages but do have the equivalent of an undergraduate major in one of them.

**Degree Requirements**

Candidates must complete a minimum of 63 semester hours of coursework beyond the Bachelor's degree in addition to 21 hours of doctoral research and dissertation. Two tracks are available.

The coursework for Track I must be distributed as follows: (1) at least 39 hours in the first concentration; (2) at least 18 hours in the second concentration; and (3) at least 6 hours in a cognate field.

1. First Concentration: French, German, or Spanish. It consists of a minimum of 39 semester hours beyond the Bachelor's degree, distributed as follows:
   - At least 6 hours of 400-level classes taken for the M.A. may be applied.
   - At least 21 hours at the 500 level (exclusive of dissertation hours) including French 584 (3), German 560 (3), or Spanish 550 (3); German 512 (3), French 512 (3), or Spanish 512 (3); French 515-16 (2,2) or German 520 (3).
   - At least 12 hours at the 600 level (exclusive of dissertation hours).

2. Second Concentration: French, German, Italian, Russian, or Spanish (different from the first concentration). It consists of at least 18 hours of courses beyond the Bachelor's degree, at least 12 of which must be at the 500 or 600 level.

3. Cognate Field: Six hours must be in graduate courses numbered 400 and above and in a field outside the department of the first concentration but related to the student's principal area of research. If the cognate field is yet a third foreign language, a reading proficiency exam will be administered after completion of the 6 cognate hours by the language section concerned.

The coursework for Track II must be distributed as follows: (1) at least 45 hours in the first concentration; (2) at least 12 hours in the second concentration; and (3) at least 6 hours in a cognate field.

1. First Concentration: French or Spanish. It consists of 45 semester hours beyond the bachelor's degree, distributed as follows:
   - A maximum of 6 hours of 400-level classes taken for the M.A. may be applied.
   - A minimum of 27 hours at the 500 level (exclusive of thesis hours) including French 584 (3), German 560 (3), or Spanish 550 (3); French 512 (3), or Spanish 512 (3); French 515-16 (2,2) or German 520 (3).
   - At least 12 hours at the 600 level (exclusive of dissertation hours).

2. Second Concentration: French, German, Italian, Russian, or Spanish (different from the first concentration). It consists of at least 18 hours of courses beyond the Bachelor's degree, at least 12 of which must be at the 500 or 600 level.

3. Cognate Field: Six hours must be in graduate courses numbered 400 and above and in a field outside the department of the first concentration but related to the student's principal area of research. If the cognate field is yet a third foreign language, a reading proficiency exam will be administered after completion of the 6 cognate hours by the language section concerned.
2. Second Concentration: French, German, Italian, Portuguese, Russian, or Spanish (different from the first concentration). It consists of at least 12 hours, with a minimum of 3 hours at the 500 level. Students are encouraged to take classes that complement the primary area of expertise in the first concentration, so that this second concentration will be a useful research tool for the dissertation and future professional activities. (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 language at institutions which follow SACS guidelines for college foreign language teaching.)

3. Cognate Field: Six hours must be in courses numbered 400 and above and in a field outside the candidate's first concentration but related to the student’s principal area of research. If the cognate field is yet a third foreign language, a reading proficiency exam will be administered after completion of the 6 cognate hours by the language section concerned.

4. Additional requirements for both tracks: A student must demonstrate competence in the languages of both the first and second concentrations by taking a test in each language. 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 the 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.

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 in the program should have the opportunity and will be strongly encouraged to instruct at least two foreign language sections or to staff needs. Doctoral students are strongly encouraged to reside and study abroad and will be assisted in identifying potential sources of financial support (e.g., Fulbright, McClure, Rotary fellowships).

For additional courses, see Romance and Asian Languages.

ACADEMIC COMMON MARKET
An agreement among southern states for sharing graduate 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 10,000 word translation project. Open to graduate students preparing for language examinations, and upper division students desiring reading knowledge of the language. No credit for students having completed 101-02 or 107. 332 may be repeated. Maximum 6 hrs. Undergraduate credit only.

411-12 Advanced Conversation and Composition (3,3) Prereq: 311-12 or equivalent or consent of department.

420 Selected Topics in German Literature from 1750 to 1860 (3) Content varies. May be repeated. Maximum 6 hrs.

421 German Lyric Poetry (3) Prereq: 6 hrs of 300-level courses. May be repeated. Maximum 6 hrs.

422 German Drama (3) Prereq: 6 hrs of 300-level courses. May be repeated. Maximum 6 hrs.

423 German Narrative Prose (3) Prereq: 6 hrs of 300-level courses. May be repeated. Maximum 6 hrs.

424 German Literary Movements (3) Survey of major periods in development of German literature since 1750. Problems and pitfalls of periodization.

425 Introduction to Descriptive Linguistics (3) Content varies. May be repeated. Maximum 6 hrs.

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. May be repeated. Maximum 6 hrs.

431 The Structure of the German Language (3) 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 COURSES**

401-02 Advanced Grammar, Conversation and Composition (3,3) Prereq: Russian Composition and Conversational or equivalent.

425 Introduction to Descriptive Linguistics (3) Prereq: Russian Composition and Conversation or equivalent.

426 Methods of Historical Linguistics (3) Prereq: Russian Composition and Conversation or equivalent.

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

501 Regulation for Use of Facilities (1) 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

510 German Phonetics and Advanced Grammar (3) Advanced work in phonetics, pronunciation, and selected topics in German grammar. For teachers and prospective teachers. Prereq: Consent of instructor.

512 Teaching a Foreign Language (3) Practical application of methods for teaching and evaluating basic language skills and foreign language skills, and cultural knowledge through seminars, demonstrations, peer teaching, and observation of foreign language classes. Required of all M.A. and Ph.D. students holding GTAs, except those whose training or experience warrants excuse by department.

519 Bibliographical Methods (1) Bibliographical methods, major reference works and bibliographical problems in language and literature.

520 Proseminar (2) Advanced training in use of bibliographic and reference tools; illustrative problems: paper preparation.

541-42 Medieval 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 1945-1990 (3) Content varies. May be repeated. Maximum 6 hrs.

557, 72 Old Norse Language and Literature (3,3)

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

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

593 Independent Study (1-15) See College of Arts and Sciences. Letter grade or S/N/C.

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

610 Gothic (3) Phonology, morphology, and syntax of Gothic language. Relationship to Indo-European languages and other Germanic languages. Readings from Gothic 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 18 hrs.

631-32 Seminar in German and Germanic Philology (3,3)
Health, Leisure, and Safety Sciences

(Majors of Human Ecology)

DEGREES

Human Ecology ........................................ Ph.D.
Health Education .................................... Ed.D.
Health Promotion and Health Education .......... M.S.
Public Health .......................................... Ed.D.
Recreation and Leisure Studies ...................... M.S.
Safety Education and Service ........................ M.S., Ed.S.

Charles B. Hamilton, Head

Professors:

Gorski, June, Dr.P.H. ................................. UCLA
Hamilton, Charles B. (Liaison), Dr.P.H. .......... Oklahoma
Hayes, Gene E. (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:

Blackmon, James T., Ed.D. ............................ Tennessee
Ellison, Jack S. (Liaison), 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 and course experiences leading toward Educational Specialist degree in Safety Education and Service. Inquiries should be directed to the department head. Application packets are available by request to department.

The department fosters a natural unifying of disciplines that contribute to a holistic approach to healthy living and the enjoyment of life for all citizens. The academic disciplines focus on assisting students, clients, and faculty to: (1) develop a healthful and safe lifestyle that considers the dimensions of disease and injury prevention, and the role of leisure as it contributes to mental, social, and physical health; and (2) prepare persons for competent practice of their respective disciplines, including scholarly, creative, and management endeavors. The department is committed to the educational value of community-based experiential learning.

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 health education.

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 services/products. (Same as Public Health 400.) Sp

405 Alcoholism and Alcohol Education (3) Problems of alcoholism. Factors which make alcoholism serious health and safety problem. Various types of instructional/educational and intervention programs. F

406 Death, Dying and Bereavement (3) Aspects of dying, death and handling 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

428 Crisis Intervention (3) Factors which make suicide serious health problem. Assessment, intervention, and prevention techniques. F

500 Thesis (1-15) P/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

Public Health

Graduate study with a major in Public Health leads to the Master of Public Health (M.P.H.). Two professional preparation concentrations are available: community health education and health planning/administration. The M.P.H. program is accredited by the Council on Education for Public Health. A minor in statistics is available to interested M.P.H. students due to public health affiliation with the Intercollegiate Graduate Statistics Programs.

ADMISSION REQUIREMENTS

A statement of the applicant's educational and career goals and three rating forms are required. Request application packet from the department. Preferential consideration for admission to degree status shall be given to those with a minimum undergraduate grade-
be taken for credit by occupational health concentration majors.

493 Directed Independent Study (3) Individual in-depth study of selected issues. Prereq: Consent of instructor. May be repeated: Maximum 6 hrs. E

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree completed. 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 selecting scope of public health as discipline and its interactions with other academic and professional disciplines. Speakers both internal and external. May be repeated. Maximum 4 hrs. (Same as Nutrition 509, Public Health 509 and Social Work 509.) S/NC only. F, Sp


511 Fundamentals of Industrial Hygiene (3) Occupational health theory, practice and regulations: recognition, evaluation and control of workplace health hazards. Pertinent workplace problems and situations. Prereq: 2 yrs. of chemistry and biology and consent of instructor. F


513 Industrial Hygiene Instrumentation and Sampling (3) Instruments and methods for evaluating industrial environment for personal exposure to chemical and physical stresses affecting worker's health. Lectures, demonstration, and lab. Prereq: 511, MPH (OEHS) major, and consent of department. F

514 Industrial Toxicology and Occupational Exposures (3) Principles of industrial toxicology, basic toxic mechanisms, portals of entry, physiologic and biochemical responses. Occupational exposure assessment, physical factors and environmental conditions that influence exposure characterization, statistical aspects of sampling, and transport of contaminants into general environment. Prereq: 1 yr. of general chemistry and 1 semester of human biology.

520 Public Health Policy and Administration (3) Administrative considerations of community-based health care programs. Social and political environment and governmental involvement in health, legal responsibilities, and management concepts/techniques/process. F, Sp

521 Organization Theory and Health Care Delivery (3) Administrative theories 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 supervision and administration of domiciliary health care services programs. Management and operation of health services programs, clients in institutions providing activities of daily living and special psychosocial environmental needs: programs for home health services, comprehensive rehabilitation, nursing homes, congregation 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 reporting and control. Opportunities to apply techniques. Prereq: 520 or consent of instructor. F

530 Biostatistics (3) Application of descriptive and inferential statistical methods to health-related problems and programs. Microcomputer applications, use and interpretation of vital statistics and introductory research methodology preparation 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 origins of discipline, hypothesis formulation, research design, data and error sources, measures of frequency and association, etiologic reasoning, disease screening, and injury control. Prereq: or coreq 550. F, Sp


550 Principles and Practices of Community Health Education (3) Theoretical foundations for community health education; opportunities for skill development in variety of educational processes; and introduction to community health analysis. F

552 Community Health Problem Solving (4) Dynamic nature of community organizations, 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, plan design, evaluation and implementation. Health problems of institutions, communities and selected population groups, appropriate diagnoses, and programs for addressing needs. F, 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.)

580 Special Topics (3) Prereq: Consent of instructor. May be repeated under different topic. Maximum 6 hrs.

585 Seminar in Gerontology (1) (Same as Human Ecology 585, Recreation and Leisure Studies 585, Exercise Science 585, Nursing 585, Psychology 585, Social Work 585, Sociology 585.)

587-88-89 Internship (3-3,3) Internship (community health education or health planning/administration) in either approved organization or research setting under supervision of designated preceptor. Prereq: MPH major, one semester advance notice and consent of major advisor. May be taken for credit. S, Sp

590 Research Methods in Health (3) (Same as Health 590.)

593 Directed Independent Study (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

595 Health Aspects of Gerontology (3) (Same as Nutrition 595, Social Work 595, Exercise Science 595, Psychology 595, Social Work 595, Sociology 595.)

597-88-89 Internship (3-3,3) Internship (community health education or health planning/administration) in either approved organization or research setting under supervision of designated preceptor. Prereq: MPH major, one semester advance notice and consent of major advisor. May be taken for credit. S, Sp

600 International Health (3) (Same as Health 660.)

Recreation and Leisure Studies

Graduate study with a major in Recreation and Leisure Studies leads to the Master of Science. Professional preparation concentrations are available in therapeutic recreation, general recreation, and sport administration.
management. The third concentration is an interdisciplinary program with the unit of Sport and Physical Activity in the College of Education.

The M.S., with thesis and non-thesis options, requires completion of 32 semester hours. The following retention policy applies to graduate students seeking the M.S. with a concentration in sport administration/management:

1. Graduate students are required to maintain an overall 3.0 GPA.
2. Any student who falls below this standard will be advised in writing by the department head of the need to discuss the matter with his/her advisor.
3. If a student's overall GPA remains below 3.0 for a second semester, the student will have his/her degree status revoked.

GRADUATE COURSES

410 Maintenance and Management of Recreation and Sports Related Facilities (3) Principles for operationalizing maintenance, emergency systems, maintenance systems and management strategies. Cost tracking, inventory systems, specialized maintenance techniques, safety guidelines, maintenance management systems and security. Prereq: 110, 310 or 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: Leisure Program Development and Evaluation, or consent of instructor. (Same as Sport Management 415.) F

430 Organization and Administration of Leisure Services (3) Principles of organization and administration to provision of leisure services offered by public, private and/or commercial enterprises. Emphasizing personnel management, evaluation, legal authority, introduction to budgeting and fiscal policies. Prereq: 310 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. Sp

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/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

510 Perspectives and Trends in Leisure Studies and Services (3) Basic role of leisure delivery systems in today's society, scope of leisure services, determinants of leisure behavior, developmental features of leisure and recreation. Current trends, problems, laws, and issues affected by and/or affecting delivery of leisure services. Prereq: Consent of instructor. Sp

515 Philosophical and Conceptual Foundations of Leisure (3) Philosophical and conceptual perspective of leisure and recreation; nature of philosophy, concepts of leisure, recreation, play, work, and other, history of field, and relationship of ideas to contemporary society and to professional practice. Prereq: Consent of instructor. F

520 Program Design and Evaluation in Therapeutic Recreation (3) History, philosophy, nature, purpose, special populations served, programming process, professional aspects of therapeutic recreation. Basic overview of aspects of leisure delivery systems. Prereq: Consent of instructor. F

521 Facilitation Techniques in Therapeutic Recreation (3) Role of therapeutic recreation in clinical and non-clinical settings; application of life-style planning, self-awareness, values clarification and assertiveness training in therapeutic recreation, relationship of leisure education to therapeutic recreation. Prereq: 520 or consent of instructor. Su

522 Clinical Aspects in Therapeutic Recreation (3) Concepts and techniques utilized by experienced and advanced therapeutic recreation specialists: clinical issues, comprehensive program concerns, administrative funding and trends in practice of therapeutic recreation services. Prereq: 520 or consent of instructor. Su

540 Fiscal Policies for Recreation and Sports Related Organizations and Facilities (3) Application of fiscal policies and procedures to operation of recreation and sports related organizations and facilities. Finance, revenue generating strategies, cash and inventory control, commercial/public cooperative ventures and microcomputer applications. Prereq: 430 or consent of instructor. Sp

541 Management and Operation of Recreation and Sport Related Facilities (3) Research for making program and management decisions, process of cost analysis, and basic design and maintenance of recreation and sport related facilities. Prereq: Consent of instructor. (Same as Sport Management 541.) Sp

590 Graduate Internship (1-8) Required of all graduate students. Minimum 100 clock hrs for each 2 hrs credit. Requires work experience, evaluation by agency and university and written paper. E

591 Directed Study in Leisure & Recreation (1-6) Detailed study of themes, 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

Safety

Graduate programs are available leading to the Master of Science with a major in Safety Education and Service (thesis and non-thesis options) and to the Specialist in Education with a major in Safety Education and Service. The M.S., with thesis and non-thesis options, requires completion of 30 semester hours. The Specialist in Education (Ed.S.) requires 30 semester hours beyond the M.S. An internship and research of a significant safety problem are included as professional development activities.

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. and Ed.S. programs in Safety Education and Service are 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, college, industry and commercial agencies. Students required to teach at least two non-drivers to drive. Valid driver's license required. 3 hrs and 2 labs. F

442 Advanced Driver & Traffic Safety Education (3) Development of competence in teaching of driver education through use of simulation, multimedia, and multiplex car driving range. Teaching skills and supervision. 2 hrs and 2 labs. F

453 Sports & Recreational Safety (3) Accident prevention and injury control in sport activities; philosophy of sports safety; human environmental factors and interrelationship in sports injury and control, risk-taking and decision solution strategies; and contributions of sports medicine to safety. 3 hrs and 2 labs. Sp

452 General Safety (3) Principles, practices, and procedures for general safety. Safety problems in schools, traffic, recreation, industry, and home public areas. F, Su

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

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

532 Behavioral Problems in Safety Education & Accident Prevention (3) Problems of behavior, causes of accidents, and application of principles of psychology in development of safe behavior in all segments of environment. F

533 Problems and Research in Accident Prevention (3) Safety problems found in wide variety of accidents that occur in community; findings of current research in behavioral sciences as related to variation incidence of accidents. F

534 Organization, Administration and Supervision of Safety Programs (3) National, federal and local level programs; administrative, instructional, and supervisory aspects. Implementation of relevant programs. Sp

535 Emergency Management (3) Civil and defense problems: tornadoes, floods, fires, mass civil disorders, and nuclear and personnel attack by alien countries. Sp

573 Graduate Workshop in Safety (3) Special safety education problems. For advanced graduate students, teachers, supervisors, and administrators. May be repeated. Maximum 12 hrs. F

590 Special Topics (1-3) Advanced study in selected disciplinary or professional area of safety education/management. May be repeated. Maximum 12 hrs. F

593 Directed Independent Study (1-3) Individual identification of problem/situation in safety, Extensive reading and critical analysis of safety literature. Specific proposal to instructor before registration. May be repeated. Maximum 12 hrs. E

601 Internship/Research in Safety and Health (3-6) Field experience. Significant problem identified, researched, and reported in acceptable form. May be repeated. Maximum 8 hrs. (Same as Health 601.) E

History

(College of Arts and Sciences)

MAJOR

DEGREES

History............................................M.A., Ph.D.

Russell Buhite, Head

Professors:

Bergeron, Paul H., Ph.D. ......................Vanderbilt
Buhite, Russell D., Ph.D. .................Michigan State
Cutler, Everette W., Ph.D. .................Wisconsin
Finger, John R., Ph.D. ......................Washington
Jackson, Charles O., Ph.D. ..............Emory
Klein, Milton M. (Emeritus) (Distinguished Prof.), Ph.D. ..............................................California
Moser, Harold, Ph.D. .......................Wisconsin
Ratner, Lorman A., Ph.D. .....................Cornell
Shepherd, James G., Ph.D. ..............Iowa
Simpson, Howard S., Ph.D. ..............Michigan State
Vaughan, Richard L., Ph.D. ...............Indiana
Weber, John H., Ph.D. ......................Texas
Winters, W. Wayne, Ph.D. ...............New York
Haskins, W. Roy, Ph.D. .................Illinois
Haas, Arthur G., Ph.D. .................Chicago
Hao, Yen-Ping, Ph.D. ......................Harvard
Haskins, W. Roy, Ph.D. ......................Georgia
Cutter, Everett W., Ph.D. .................Georgia
Moscato, John J., Ph.D. .................Wisconsin
Carter, A. C., Ph.D. ......................California
Morse, Harold, Ph.D. ......................Wisconsin
Nathan, Lorman A., Ph.D. ..............Illinois
Klein, Milton M. (Emeritus) (Distinguished Prof.), Ph.D. ..............................................California
**The Department of History offers graduate study leading to the Master of Arts and Doctor of Philosophy degrees. The M.A. program includes a thesis and non-thesis option. The doctoral program has concentrations in American and European history with special focuses in the areas identified under group II doctoral fields. Detailed information may be obtained from the Director of Graduate Studies in History who also advises all incoming students.**

**The Master's Program**

**Admission Requirements**
1. Successful completion of a baccalaureate degree from an accredited institution, preferably with a major in history.
2. Acceptable scores on the Graduate Record Examination (general 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 within one week of the one-hour oral examination with the single grade of pass/fail given at the conclusion of the oral examination. No examination is given on the secondary field.

**M.A. Fields**
- United States (colonial to present)
- Premodern Europe
- Modern Europe
- Asia

**Retention and Termination**
A 3.0 overall grade-point average is required to remain in good standing. M.A. students must take the M.A. examination no later than the semester following the completion of 30 hours. A student who fails the M.A. examination must 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 9 hours in each of two Group I doctoral fields. (The courses in the non-examined field must be graded A-F. There is no minimum grade 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 600-level research seminars. (One must be completed at UT Knoxville.) Students who have completed a master's thesis need complete only one research seminar (must be taken at UT Knoxville), and History 521.
7. Maintain a 3.0 overall grade-point average in graduate work attempted.
8. Complete 21 hours of graduate coursework graded A-F at UT Knoxville beyond that required for the M.A.
9. Except by prior approval of the Director of Graduate Studies, a student's coursework must be at the 500 level or above.

**Language Requirements**
Students must demonstrate competence in one foreign language through coursework or examination. The student's doctoral committee may specify any other languages or research tools, such as statistics, essential for the student's preparation. The foreign language requirement must be fulfilled before taking the comprehensive examination.

**Comprehensive Examination**
The comprehensive examination is to be taken no later than the semester following the term in which the student has completed the residence, coursework, and language requirements. A student stands examination in one field selected from Group I and one field selected from Group II below. Both parts are 4-hours, written, and taken during the same semester. A general oral exam will be taken following the successful completion of the two written portions. The two written and one oral exams are separate examinations, and Group I must be passed before taking Group II, and the latter passed prior to taking the oral portion. A student who fails any one of the three parts (Group I or Group II or the Oral) which constitute the Comprehensive Exam must repeat the failed exam within two semesters, excluding summer. A second failure on any one of the three parts (regardless of which one) will cause the student to be dropped from the History graduate program. Likewise, a student who does not repeat a failed exam within the allotted time (two semesters) will be dropped from the program. Upon successful completion of the residence, coursework, and language requirements and passing the comprehensive examination, a doctoral student may be admitted to candidacy.

**Doctoral Fields**
- Group I: Premodern Europe
- Modern Europe
- United States (colonial to present)
- East Asia

- 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 in its historical context. The program must be completed within eight years from admission as a potential candidate.

**Graduate Courses**

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

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

**510 Foundations to 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 seminars: secondary sources on Premodern European movements and trends. Focus varies. May be repeated. Maximum 15 hrs. E.

**532 Topics in Modern Europe (3)** Reading seminars: secondary sources on movements and trends that are multinational in focus. Focus varies. May be repeated. Maximum 15 hrs. E.

**533 Topics in European National History (3)** Reading seminars: secondary sources on intra-national topics, usually British, Russian, German or French. Focus varies. May be repeated. Maximum 15 hrs. E.

**541 Topics in Early American History (3)** Reading seminars: secondary sources on early North American
Holistic Teaching/Learning

MAJORS

DEGREES

Curriculum and Instruction ........................................... M.S., Ed.D.

Education ........................................................................... Ed.D.

Special Education ............................................................. Ph.D.

L. Knight, Leader

Professors:

Alexander, J., Ed.D. ...................................................... Kentucky

Carr, J., Ph.D. ................................................................. Ohio State

Hargis, Charles H. ......................................................... Louisiana

Educational Psychology (3) Focus varies. May be repeated. Maximum 15 hrs.

Ph.D. (3) Methods and materials (knowledge base) for teaching science and social studies: plans and materials. Prereq: Admission to Teacher Education Program and Curriculum and Instruction. Coreq: 422. Coreq: 420. Credit/no credit only.

Reading Instruction (3) Word recognition (including phonics), comprehensions, evaluation, and materials. Prereq: Admission to Teacher Education Program. Credit/no credit only.

Teaching/Learning

Graduate Program in Language and Literacy (3) Goals, objectives, materials, and evaluation: directed observation in public schools; preparation of teaching plans and materials; simulated teaching experiences. Prereq: Admission to Teacher Education Program.

Speech and Language Learning Disabilities in the Classroom (3) Normal communication development; understanding of speech and language impairments in school-age students; integration of oral and written communication skills into existing curriculum, especially for high incidence special education students.

Psychology of the Exceptional Child (3) Varieties of exceptional children; characteristics and educational needs. Implications of developmental variations for functioning as adults. Opportunity to expand study upon particular exceptionality. Enrollment limited to non-special education majors.

Thesis (1-15) P/NP only.

Holistic Teaching/Learning

(Programe of Ed)

MAJORS

DEGREES

Curriculum and Instruction ........................................... M.S., Ed.D.

Education ........................................................................... Ed.D.

Special Education ............................................................. Ph.D.

L. Knight, Leader

Professors:

Alexander, J., Ed.D. ...................................................... Kentucky

Carr, J., Ph.D. ................................................................. Ohio State

Hargis, Charles H. ......................................................... Louisiana

Educational Psychology (3) Focus varies. May be repeated. Maximum 15 hrs.

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Thesis (1-15) P/NP only.

Holistic Teaching/Learning

(Programe of Ed)

MAJORS

DEGREES

Curriculum and Instruction ........................................... M.S., Ed.D.

Education ........................................................................... Ed.D.

Special Education ............................................................. Ph.D.

L. Knight, Leader

Professors:

Alexander, J., Ed.D. ...................................................... Kentucky

Carr, J., Ph.D. ................................................................. Ohio State

Hargis, Charles H. ......................................................... Louisiana

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Teaching/Learning

Graduate Program in Language and Literacy (3) Goals, objectives, materials, and evaluation: directed observation in public schools; preparation of teaching plans and materials; simulated teaching experiences. Prereq: Admission to Teacher Education Program.

Speech and Language Learning Disabilities in the Classroom (3) Normal communication development; understanding of speech and language impairments in school-age students; integration of oral and written communication skills into existing curriculum, especially for high incidence special education students.

Psychology of the Exceptional Child (3) Varieties of exceptional children; characteristics and educational needs. Implications of developmental variations for functioning as adults. Opportunity to expand study upon particular exceptionality. Enrollment limited to non-special education majors.

Thesis (1-15) P/NP only.
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during a semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N C only. E


504 Studies and Theory in Language Development (3) Studies and theory of language development in children. Prereq: 1 elementary school language arts course or consent of instructor. F

505 Elementary and Middle School Teaching Methods II (6) Content area teaching and development of students to apply methods. Prereq: 422; Coreq: 757.

506 Internships in Teaching in Special Education and Rehabilitation (3-15) Placement in professional settings in public schools or agencies under supervision of master practitioners. Enrollment limited to those in fifth-year program. S/N C only.

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. E

521 Teaching Social Studies in Elementary and Middle Schools (3) Planning and techniques. Trends in curriculum, development of concepts and generalizations, integration of social sciences. Prereq: Course in teaching of social studies or consent of instructor. Su

523 Diagnosis and Correction of Children's Difficulties in Learning Mathematics (3) Children's difficulties in learning mathematics and procedures for helping teacher understand and correct difficulties. Prereq: 522 or equivalent or consent of instructor. F


525 Strategies, Programs, and Materials for Teaching Social Studies (3) Analysis of new and innovative social studies program materials and techniques. Exploration of current trends in social studies education. Prereq: Permission of instructor. F

526 Teaching Language Arts Elementary and Middle School (3) Recent trends and current materials and methods in teaching elementary language arts (except reading). Prereq: Course in language arts or consent of instructor. F, Su

528 Practicum in Diagnosis and Remediation of Difficulties in Learning Mathematics (3) Assessment and practicum experience with children having difficulties in learning mathematics. Prereq: 523 or consent of instructor. F

530 Teaching Reading in Elementary and Middle Schools (3) Trends in methods, materials, basic approaches, skill development and assessment procedures for teaching reading at elementary school level. Prereq: Course in teaching of reading or consent of instructor. F, Su

534 Seminar in Reading Education (1-6) May be repeated. Maximum 8 hrs. E

536 Psychology of Reading (3) Reading act, relationship between learning theory and reading, role or reading in child's overall development. Prereq: F.

537 Diagnosis and Correction of Classroom Reading Problems (3) Procedures, methodologies and materials for diagnosing and correcting classroom reading problems. Prereq: Course in reading education, or equivalent 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 of elementary school, secondary school, preparing case study reports, and conducting parent conferences. Prereq: Course in diagnosis and correction of classroom reading problems or consent of instructor. Sp

539 Practicum in Remediation of Reading Problems (3) Application of teaching and learning methodology in working with elementary and/or secondary school students on one-to-one or small group basis. Prereq: Course in diagnosis and correction of reading problems or consent of instructor. Sp

550 Assessment and Correction of Language Arts Difficulties (3) Procedures and materials for diagnosing and correcting language arts difficulties, analysis of children's work. Prereq: At least one language arts course or consent of instructor. Su

553 Assessment of Exceptional Students (3) Current issues related to assessment; advanced study of evaluation models for special education; dynamic and other innovative assessment approaches; advanced study of application to educational programming; basic statistics and application in assessment. F

554 Developmental Reading Practicum (2) Diagnosing and teaching children having developmental and corrective reading needs. Prereq: Course in diagnosis and correction of reading problems or consent of instructor. May be repeated. E


556 Instructional Systems for Affective/Motivational Education for Children with Disabilities (3) Educational strategies and models of instruction; motivation and teaching methods; development of attitudes; materials and techniques. Prereq: Consent of instructor. F

557 Psychological of Mental Retardation (3) Psychological, social, legal, and ethical issues related to mental retardation. F

558 Instructional Systems for the Mentally Retarded (3) Specific developmental behavioral strategies and techniques. Curriculum, instructional techniques and evaluation. Educational needs of mentally retarded children and youth. Prereq. or coreq. 561 or consent of instructor. Sp

559 Special Topics (1-3) Prereq: Admission to graduate program. May be repeated. Maximum 9 hrs. S/N C or letter grade.

565 Teaching Secondary School Social Studies (3) Strategies, projects, materials, and programs in social studies. Prereq: Undergraduate course in teaching of social studies. F

566 Seminar in Research Techniques in Special Education (3) Evaluation of appropriate research methodologies with handicapped populations. F

567 Seminar: Issues and Theories in the Education of the Exceptional Child (3) Current trends. Analysis of major research and theoretical issues. Prereq: Research course or consent of instructor. F

570 Application of Microcomputer Technology in Special Education and Vocational Rehabilitation (3) Application of microcomputer technology with all categories of exceptionalities and across all chronological and functional age ranges. Microcomputer-interactive software, special switch access, authoring systems, telecommunication, and strategies for cognitive development. F

571 Clinical Studies (4) Relationship between educational theory and applications during internships; research project, development of portfolio, and capstone experience. F

573 Independent Study (1-3) May be repeated. S/N C or letter grade. E

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

595 Special Topics (1-3) May be repeated. S/N C or letter grade. E

596 Clinical Experience in Assessment and Instruction (3) Academic remediation applied in field setting; tasks related to teaching; assessment, preparation of lessons and delivery of instruction. Coreq: SSIC, S/N C or letter grade. F

599 Seminar in Social Studies Education (3) Research, trends, and issues in secondary social studies. Su

600 Doctoral Research and Dissertation (3-15) May be repeated. Maximum 6 hrs. E

603 Advanced Studies and Theoretical Models of Reading (3) Research on reading processes. Current theoretical models related to how learners process print. Prereq: 500-level courses in reading education or consent of instructor. Sp

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

606 Research in Elementary Education (3) Analysis of research in reading education with application to classroom teaching. Prereq: Research course. Su

610 Internship in College Teaching and Supervision (1-3) Supervised practice in college teaching and supervision. Prereq: Admission to doctoral program or consent of instructor. May be repeated. Maximum 9 hrs. S/N C only.

617 Trends and Issues in Curriculum and Instruction - An Interdisciplinary Perspective (3) Current trends and issues in field of curriculum and instruction. Prereq: Admission to Ed.D. program. F

620 Internship in Special Education and Rehabilitation (3-9) Placement with professional engaged in theoretically-based research: public schools, institutions, agencies or universities. Prereq: 9 hrs. in statistical and research methods. May be repeated. Maximum 8 hrs. S/N C only.

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 experiences under supervision of practitioner. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/N C only.

651 Advanced Studies in Elementary School Language Arts (3) Selected issues in elementary school language arts. Prereq: Graduate course in elementary school language arts or consent of instructor. Sp

679 Special Topics (1-3) Prereq: Admission to doctoral program. May be repeated. Maximum 8 hrs. S/N C or letter grade.

689 Internship (1-3) Experiences in application of principles and practice of curriculum development and instructional improvement. Prereq: Program prerequisites and consent of instructor. May be repeated. Maximum 9 hrs. S/N C only. E

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

694 Supervised Reading (1-3) May be repeated. S/N C or letter grade. E

695 Special Topics (1-3) May be repeated. S/N C or letter grade. E
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 file, College of Human Ecology application, Graduate Record Examination (GRE) scores, and the General section for the M.S. program in Human Ecology, the Miller's Analogy Test (MAT) score (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 seeking 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 professionals 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 non-thesis option (33 hours) includes 6 hours of 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 (36 hours) includes 3 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, 12 hours in courses in the college (must be selected from three departments within the college) and 6 hours of approved electives. If non-thesis option requires a creative project (3 hours) and a written and oral comprehensive examination.

Track 2 - The thesis option (45 hours) includes 6 hours of statistics and/or research methodology, Human Ecology 540, 545, 574, 591, 9 hours in courses in the college (must be selected from three departments within the college) and 575 (12 hours). The thesis option requires six 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, health education, 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 integrating 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;

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 90 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 500 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 major concentration or area of interest. 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 560, 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.

Graduate Committee

At least one faculty member from the Gerontology Policy Committee who is qualified to work with graduate students, must serve on the graduate committee of each student who declares a gerontology minor. Contact Dr. Jim Moran, Associate Dean in Human Ecology, for a current list.

Admission to Candidacy

When application is made for admission to candidacy, indication of the minor must be noted on the Admission to Candidacy form.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows 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
**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 searches.**

**502 Registration for Use of Facilities (2-15) Required for the student not otherwise registered during any semester when student uses University facilities. 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: At least 1 hr 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 instructor. 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 classroom. Prereq: 325, Coreq: 575, F**

**545 Evaluation in Home Economics Education (3) Assessment of programs and pupil progress; techniques, methods and purposes. Prereq: 540, Coreq: 575, F,Sp,A**

**563 Family Life Education Programs (3) (Same as Child and Family Studies 563.)**

**574 Analysis of Teaching for Professional Development (2) Strategies to document and analyze effectiveness of teaching and of professional development. Study and application of various approaches. Coreq: 575, F,A**

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

**80 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 fields. Problems of both individual and external to UTK. Prereq: Consent of Instructor. May be repeated. Maximum 3 hrs. (Same as Counselor Education and Counseling Psychology 585, Exercise Science 585, Nursing 585, Public Health 585, Preventive Educational Studies 585, Social Work 585, and Sociology 585.) S/N only.**

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

**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 future thinking in human ecology, Sp**

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**Human Resource Development (College of Human Ecology)**

**MAJORS**

- Human Ecology
- Human Resource Development
- Vocational-Technical Education

**DEGREES**

- Ph.D.
- M.S.
- Ed.D.
- Ed.S.

**Gregory C. Petty, Interim Head**

**Professors:**
- Campbell, C. P., Ed.D.
- Cheek, Gerald D., Ph.D.
- Cox, Carroll B. (Liaison), Ph.D.
- Craig, G. D., Ed.D.
- Hanson, R., Ph.D.
- Haskell, R. W., Ph.D.
- Mathews, John L. (Emeritus), Ph.D.
- Reed, J. L. (Emeritus), M.S.
- Waggoner, G. A. (Emeritus), M.S.
- Petty, G., C. Ph.D.

**Associate Professors:**
- Ledford, B. J., Ed.D.
- Marn, E. C., Ed.D.
- Petty, G. C., Ph.D.

**Assistant Professors:**
- Pierce, R., Ph.D.
- Powell, Terrence L., M.S.

**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 those 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. This non-thesis option is available for both tracks.

**Track 1 - Concentrations**
- Business and marketing education, industrial education, and technical education.

**Track 2 - Concentrations**
- Business and marketing education, and technology education.

**THE SPECIALIST PROGRAM**

The Ed.S. program is a cooperative undertaking involving all vocational service areas. Concentrations are available in agricultural, business, marketing and distributive, home economics, industrial, and technical education, and in general vocational education. The degree requires a minimum of 60 hours of graduate study. Credit earned for the master's 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 college is designed to provide opportunities for graduate students to achieve professional objectives, develop needed competencies, and gain desirable experiences and understanding of human resource development. The minimum requirements for the doctoral program consist of the following: department specialization, 12 hours; department 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 basic graduate experience is required.

The Doctor of Philosophy with 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 is available to residents of Kentucky and 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: Consent of Instructor. E**

**415 Coordination Techniques (3) Necessary procedures, duties and responsibilities to implement, maintain, and evaluate successful cooperative education programs. Prereq: Senior standing and consent of instructor. E**

**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**

**435 Supervised Occupational Experience (9-9) 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**

**454 Training Aids Development (3) Study and preparation of instructional aids and non-print media commonly used by technical instructors and trainers. Prereq: Senior standing or consent of instructor. F,Su**

**456 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. F,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. F,Su**
457 Adapting Vocational Instruction for Special Needs Learners (3) Modification of vocational-technical programs for special needs learners. Economical, social, educational, and legal considerations and provisions 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 the student not otherwise registered during any semester when using university facilities and for whom faculty time before degree is completed. May not be used toward degree requirements. May be repeated. SNC only. E

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


505 Selection, Placement, and Follow-up Procedures in Human Resource Development (3) Methods and procedures utilized in establishing criteria for trainee selection and placement in instructional programs and in jobs. Collective 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 8 hrs. E

510 Foundations of Human Resource Development (3) Historical, philosophical, economical, social, and psychological foundations of vocational, technical and adult education and human resource development; fundamental principles and contemporary objectives. Prereq: Consent of instructor. F

511 Issues and Trends in Human Resource Development (3) Academic, socioeconomic, political and other handbooks of special studies. 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 12 hrs. E

515 Microcomputer Operations and Programming in Education (3) Operating procedures and BASIC programming for education and training applications. Hands-on experience in operating and programming programs, 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, search and sort algorithms, and bitmaps for general educational use. Hands-on learning and problem 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

520 Methods and Materials for VOE Programs (3) Development of instructional aids, recent developments and research in individualized instruction, and occupational clusters. Prereq: 510 or equivalent. Sp, Su

531 Organization and Supervision of VOE and Marketing Programs (3) Developing office and marketing occupations, guidelines in cooperative laboratory, and model office organization. Trends in office and marketing education, physical facilities, state plans, instructor qualifications and advisory committees. Prereq: Consent of instructor. F, Su

532 Improvement of Instruction in Basic Business and Marketing Education (3) Issues, research findings, methods, and materials for improved instruction of both secondary and post-secondary levels. Prereq: 12 hrs of graduate credit. Sp, Su

533 Improvement of Instruction in Office Technology (3) Research, principles of learning issues, and materials and typewriting, word processing, business communications, and office procedures. Prereq: Consent of instructor. Su

534 Improvement of Instruction in Accounting and Data Processing (3) Principles of learning, issues, research findings and instructional materials and automated accounting and data processing at secondary and post-secondary levels. 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

537 Measurement in Business and Marketing Education (3) Testing and evaluation of learner performance in business and marketing education; teacher-made tests. Prereq: Consent of instructor. Sp, Su

540 Special Topics in Business and Marketing Education (1-3) Specific objectives, activities, and evaluations vary. Prereq: Consent of instructor. May be repeated. Maximum 8 hrs. E

541 Practicum in Business/Marketing Education (3) Practical updating and upgrading experiences in non-traditional settings for business and marketing teachers. Prereq: 15 hrs of graduate credit. 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.

550 Administration of Industrial Education Programs (3) Developing, staffing, administering and evaluating trade, technical and industrial 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: 450 or equivalent. F

552 History and Philosophy of Industrial Education (3) Social, political, and economic events that impact development of industrial education. Philosophical foundations of vocational education, industrial education, and research in human resource development. Prereq: Consent of instructor. F

553 Planning Technical Education Facilities (3) Preparation of educational specifications, site selection, and working relationships with other professionals involved in planning educational facilities. Prereq: Consent of instructor. F

554 Technical Program Planning (3) Instructional systems, planning and program updating techniques. Prereq: Consent of instructor. F

555 Curriculum Planning for Industrial Education Programs (3) Developing performance-based, criterion-referenced instructional programs. Prereq: 374 or 564 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

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: 573. 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 to justify revisions. Prereq: 455 and consent of instructor. Sp

560 International Perspective of Workforce Training (3) Examination and comparison of workforce systems in highly industrialized countries. In-school training pro-

grams, out-of-school training systems, update training of incumbent workers, retraining displaced workers, transfer of technologies, and role and responsibilities of businesses, private sector organizations/agencies, and state and federal government agencies.

562 Grant Writing and Project Implementation (3) Writing grant proposals, negotiating with funding sources, implementing and evaluating grant programs, and closing out projects at end of funding support.

564 Self-Directed Work Teams (3) Theory and practice of implementing self-directed work teams, motivating employees, increasing employee productivity via teams and related issues.

571 Supervisory Skills for Improving Industrial Productivity (3) Philosophy of improving industrial productivity through quality and introduction to basic tools of statistical process control. Deming philosophy, control charts and interpretation, process capability, techniques for training hourly workers in quality control, and measurement procedures for quality control. Prereq: Statistics course and consent of instructor. F

572 Advanced Training Methods for Industrial Productivity (3) Techniques of training hourly workers in use of statistical process control tools. Techniques for involving hourly workers in quality assurance, inventory control, and productivity improvement groups. Prereq: 571. Sp, Su

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

601 Curriculum Planning in Human Resource Development (3) Curriculum theory, models, contents, planning, implementation and evaluation of training programs. Prereq: 555 or equivalent. Sp, Su

602 Planning and Evaluation of Programs in Human Resource Development (3) Techniques utilized in planning, developing, and evaluating instructional programs. Prereq: 500-level planning course and consent of instructor. Sp, Su

604 Seminar in Human Resource Development (1) Required 2 consecutive semesters during doctoral residency. May be repeated. Maximum 3 hrs. SNC only. E

605 Administration and Supervision of Human Resource Development (3) Leadership, policy, organizational planning, personnel, student development services, and budgeting relating to vocational, technical and adult education at secondary, post-secondary, and higher education levels; Principles, problem solving, and management activities. Prereq: Administrative theory course and consent of instructor. F, 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


Inclusive Early Childhood Education

(Majors of College of Education)
GRADUATE COURSES

445 Early Childhood Education: Program Development and Teaching in Kindergarten (3) Curriculum planning, classroom organization and management practices for teaching young children, role of kindergarten as a total elementary school. Prereq: Admission to teacher education. E

454 Education of the Gifted and Talented Children (3) Orientation to psychometric and behavioral studies of giftedness. Analysis of past and present school practices in reference to curriculum and program implemention. Sp

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

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

503 Problems In Lieu of Thesis (2-3) May be repeated. Maximum 9 hrs. S/NC only. E

504 Clinical Experience in Teaching an Supervision of Exceptional Children (3-9) Placement in educational settings. May be repeated. Maximum 9 hrs. S/NC or letter grade. (Same as Rehabilitation and Deafness 504.)

506 Internships in Teaching in Special Education and Rehabilitation (3-15) Placement in professional settings in public and private agencies under supervision of master practitioners. Enrollment limited to those in fifth-year program. S/NC only.

515 Seminar (1-3) Curriculum, instructional technology, elementary education, secondary education, or social foundations as related to goals of students' programs. May be repeated. Maximum 6 hrs. S/NC only. E

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/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 appropraiate formal and informal assessments of handicapped infants and young children; screening, identification, diagnosis, placement and programming assessment issues. Prereq: 553 or consent of instructor.

558 Neuromuscular and Health Disorders: Educational Implications (3) Neuromuscular disoders, physical disabilities and special health conditions, autism. Investigation of instructional techniques and adaptations.


565 Instructional Systems for the Gifted and Talented (3) Instructional methods and systems evaluated in terms of effectiveness in various educational environments. Prereq: 550 or 554 or consent of instructor.

566 Curriculum for Early Childhood Education (K-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 6 hrs. Sp, Su.

577 Application of Theory in Early Childhood Education (K-3) (3) Principles and practices from selected theoretical orientations. Prereq: Course in early childhood education or consent of instructor. May be repeated. Maximum 6 hrs. Sp, Su.


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. Maximum 6 hrs. 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.

610 Internship in College Teaching and Supervision (3-4) 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 (3-6) Placement with agencies 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 (3-6) Advanced level field experiences under supervision of practitioners. Prereq: Consent of instructor. May be repeated. Maximum 6 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 6 hrs. S/NC or letter grade.

INDUSTRIAL AND ORGANIZATIONAL PSYCHOLOGY

MAJOR DEGREES

Industrial and Organizational Psychology M.S., Ph.D.

Michael C. Rush (Liaison), Director

Industrial and Organizational Psychology (College of Business Administration and the College of Arts and Sciences)

ADMISSION REQUIREMENTS

Applicants for admission should request information and application forms from both The Graduate School and the Director, Industrial and Organizational Psychology Program, 408
on the qualifications for pursuing a Ph.D. are required.

A dissertation is required with a minimum of 24 semester hours of Management or Psychology 600.

The doctoral degree can be completed with a minimum of 54 semester hours in the major as follows:

Management 567-68 or Psychology 517-18, Psychology 557, Statistics 537-38.

A minimum of five doctoral seminars (15 hours) selected from Management 610; Management/Psychology 625, 626, 627, 638; Psychology 620, 624. (Five doctoral seminars are viewed as the absolute minimum; more are recommended. Statistics 671 and Psychology 605 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 650 (90th percentile) on the Subject GRE (Psychology-81) within two years of entry, successfully complete the qualifying examination covering scientific methodology before or during the third fall semester, and successfully complete the comprehensive examination in the areas of the student's major research and professional interests.

An overall B average is required in the course sequence Management 567-68 or Psychology 517-18 to continue in the program beyond the first year.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of 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 Florida. 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

(College of Engineering)

MAJOR DEGREE

Industrial Engineering M.S.

C. H. Aikens, Head

Professors:

Bonteddli, J. A., P.E., Ph.D. Ohio State University
Claycombe, W. W., Ph.D. VPI

DePorter, Elden L., Ph.D. VPI
Douglas, Dan C. (Emeritus), Ph.D. M.S. Tennessee
Garrison, G. W. (UTSI), Ph.D. NC State University
LaForge, R. M. (Emeritus), PE. M.S.
Loveless, Howard L. (Emeritus), PE. M.S.
Schmitt, Harold W., Ph.D. Texas Tech University
Snider, John E., Ph.D. Ohio State University

Associate Professors:

Aikens, C. H. (Liaison), PE, Ph.D. Tennessee
DeShaw, D. L. (UTSI), Ph.D. Texas Tech University
Kirby, E. K., Ph.D. Tennessee
Pakinson, E. L. (UTSI), Ph.D. Florida

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. Admission is open to graduates of ABET-accredited undergraduate curricula in engineering, or to graduates of other technical curricula who satisfy prerequisite requirements. The program offers flexibility in selection of academic background 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 and 6 hours 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 systems, human factors engineering, information systems, quality 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) Characterization of materials and processes used in modern manufacturing. Prerequisite: Chemistry 130, Engineering Science and Mechanics 321.

401 Integrated Manufacturing Systems (3) NC and CNC machine tools, robotics and related materials handling systems, hand automation, alternative integrated manufacturing systems, and manufacturing information control systems. Prerequisite: 400.

402 Production System Planning and Control (3) Theory and application of forecasting systems, regression and time series analysis, programmed inventory. Prerequisite: 400, 201 or 202.

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. Client layout and service areas. Design of facilities for such diverse groups as hospitals, banks, industry. Prerequisite: 302, 401.

405 Engineering Economy (3) Methods and problems in selection of engineering systems. Determination of expected return on investment, unit cost, overhead, capital recovery, etc., present or future worth. Prerequisite: Math 220 or equivalent.


412 Quantitative Methods in Project Management (2) Project planning, scheduling, and control based on network and precedence diagramming methods. Resource allocation and constraint trade-off analysis, multi-project control, computer applications, and PERT methods of handling uncertainty in activity time estimates. Prerequisite: 402.


421 Informational Systems I (3) Systems engineering approach to design, development, implementation, and evaluation of systems of information. Informational aspects of IE systems. Data bases and database management systems. Prerequisite: 400 and senior standing.

422 Senior Industrial Engineering Problems Analysis (3) Application of industrial engineering to field assignments in local organizations, problem definitions, analysis and presentation. Prerequisite: 402, 403, and 405.


440 Total Quality Management (3) Philosophy of continuous improvement in organizations: management and implementation of quality improvement and analysis of systems as compared to process analysis and improvement; flowcharts, pareto diagrams, cause and effect diagrams and related forms of analysis; design of control strategies; quality analysis; 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 experimental design to improve system value. Lab. Prerequisite: Quality Control or consent of instructor.

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

501 Project Design (1-3) Enrollment limited to industrial engineering students in need of course program. May be repeated. Maximum 6 hrs. S/C only.

502 Registration for Use of Facilities (3-15) Required toward degree requirements. May be repeated. S/N only. E

513 Facilities Planning and Design (3) Modern material handling techniques, computer-aided layout techniques, application of simulation and other models, and use of these to design manufacturing facility. Prerequisite: Production Facilities Design and Material Handling or consent of instructor.

514 Information Systems II (3) Systems analysis and systems control concepts applied to information systems. Role of IE in office and factory of future. Management support systems, decision support systems, and integrated support systems. Prerequisite: 416.

515 Production and Inventory Systems (3) Application of inventory control techniques to production and inventory systems. Deterministic and stochastic inventory models. Use of mathematical programming for product mix, process selection, blending and aggregate production planning problems. Application of simple and complex queueing models in manufacturing environment. Prerequisite: 402 or Engineering Management 537 or consent of instructor.

516 Statistical Methods in Industrial Engineering (3) Application of statistical methods to production and inventory systems. Classical statistical tools; parameter estimation and hypothesis testing; goodness-of-fit testing; linear regression and correlation; analysis of variance; single and multiple factor experimental design. Prerequisite: Probability and Statistics for Scientists and Engineers I or equivalent. (Same as Engineering Management 516.)

521 Human Factors Engineering Methodology (3) Background in methodology used by human factors engineering designer and systems analyst. Observational methods, functional modeling and design, computer-aided design techniques, computerized methods, human reliability and human error prediction, training analysis, evaluation of man-machine interfaces, subjective and objective techniques, scaling human performance, and survey design. Critical incident technique, consensus techniques (Delphi), accident investigation. Prerequisite: 516.

522 Optimization Methods in Industrial Engineering (3) Classical optimization theory, unidimensional and N-dimensional search techniques. Lagrangian relaxation, separable programming, linearization techniques, quadratic programming, and dynamic programming. Prerequisite: 531 or 532.

523 Linear Programming and Extensions (3) Simplex and revised simplex methods, duality, parametric and post-optimality analysis, use of LP software for programming techniques, branch and bound and cutting plane network programming. Prerequisite: 301 or 537.

526 Dynamic System Simulation (3) Systems engineering approach to simulation of dynamic systems. Design of simulation experiments. Prerequisite: 406.

591-92-93 Special Topics in Industrial Engineering (3, 3, 3) Individual or group research projects. Prerequisite: 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 analysis; Bayesian analysis of sequential decision making, artificial intelligence in complex decision analyses. Prerequisite: 518, 522.

602 Nonlinear Programming (3) Optimization techniques for static and dynamic nonlinear systems subject to various constraints. Applying optimization theory to solve nonlinear optimization problems. Variable metric methods, search methods, constrained nonlinear programming, and penalty function methods. Prerequisite: 522, 523.

604 Advanced Topics in Optimization (3) Multi-stage optimization theory. State-of-the-art optimization techniques in industry and government. Prerequisite: 522, 523.


691-92-93 Advanced Topics in Industrial Engineering (3, 3, 3) Forum to study individually or in groups. Prerequisite: Graduate standing and consent of instructor. May be repeated with consent of instructor.

Engineering Management

GRADUATE COURSES

501 Capstone Project (3-6) Application-oriented project to show competence in major academic area. Prerequisite: Enrollment in engineering graduate program. May be repeated. Maximum 6 hrs. S/N only.

502 Registration for Use of Facilities (3-15) Required toward degree requirements. May be repeated. S/N only. E

516 Statistical Methods in Industrial Engineering (3) Application of statistical methods to production and inventory systems. Classical statistical tools; parameter estimation and hypothesis testing; goodness-of-fit testing; linear regression and correlation; analysis of variance; single and multiple factor experimental design. Prerequisite: Probability and Statistics for Scientists and Engineers I or equivalent. (Same as Engineering Management 516.)
### Information Sciences

**Office of the Vice Chancellor for Academic Affairs**

**MAJOR DEGREE**

<table>
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<tr>
<th>Information Sciences</th>
<th>M.S.</th>
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**Professors:**

- Jose-Marie Griffths, Director
- Glenn E. Estes, Assistant Director

**Associate Professors:**

- Estes, Glenn E. (Liaison), M.L.S., Kent State
- Griffths, Jose-Marie, Ph.D., London (UK)
- Purcell, Gary R. (Emeritus), Ph.D.
- Case Western Reserve University
- Tencir, Carol, Ph.D., Illinois
- Wilson, P. (Emeritus), Ph.D., University of Michigan

**Assistant Professor:**

- Whitney, Gretchen, Ph.D., Simmons College

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.

The mission of the school is to educate people to live, work and flourish in an information society through excellence in teaching, research, and public service in Information Sciences. The goals and objectives of the school are:

1. To prepare students to understand the nature of information and the role of the library and other information agencies in the management of information resources, and the facilitation of information transfer. Students will demonstrate:
   - Knowledge of the generation, production, management, dissemination and uses of information.
   - Knowledge of the roles of various organizations/institutions in promoting the flow of information.
   - An understanding of the role of the information professional as mediatior between information resources and their users.
   - An understanding of the roles of various tools and technologies in facilitating access to information.
   - An understanding of the structure and content of information resources in various formats and subjects.
   - Knowledge of theoretical and practical evolution of information sciences and technologies and their relationship with other disciplines.
   - Competence in creating, managing and accessing information in a variety of formats.
   - 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:
   - Continuing education for information professionals and, on a selective basis, to persons outside the information field.
   - Advisory services to information organizations.
   - Leadership for professional associations.
   - To conduct basic and applied research which promotes the generation of new knowledge, services and technology. The school will encourage:
   - Research which strengthens its instructional and public service programs.
   - The use of a variety of research methods.
   - Sharing the results of its research.
   - Increased research quality and productivity.

**ADMISSION REQUIREMENTS**

Applicants to the Information Sciences program must have a minimum undergraduate grade-point average of 3.0 or a satisfactory graduate degree grade-point average for admission as a potential candidate for the MS degree.

The verbal and quantitative 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 in the 50th percentile or above on the verbal portion of the GRE.

A personal data sheet and three recommendations (obtained from the School of Information Sciences) should be returned to the admissions office of the school. Foreign applicants are required to take the Test of English as a Foreign Language.

**THE MASTER'S DEGREE**

The program leading to the Master of Science involves a total of 43 semester hours of graduate courses, 16 hours of which form a core curriculum required of all students. Either a thesis or a non-thesis option is available, with 6 hours required for thesis credit. At least 37 hours must be taken in the School of Information Sciences, allowing up to 6 hours outside the school with a maximum of 6 from outside the University. 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 six courses required of all students: 490, 520, 530, 560, 580, 590. These courses address the evolving information environment; foundations of information sciences and technologies; information resources selection, acquisition and evaluation; information content representation; information accessibility and retrieval. The core curriculum includes a one-hour electronic information and communications laboratory experience required of students during the first semester: 504.
programs at UT Knoxville on an in-state tuition basis. The M.S. program in Information Sciences is available to residents of the states of Arkansas, Georgia, Virginia, or West Virginia. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE COURSES

430 History of the Book (3) History of writing and various methods of bookmaking.
450 Writing About Science, Technology and Medicine (3) (Same as Journalism 450.)
475 Utilization of Instructional Media (3) (Same as Education in the Sciences, Mathematics, Research and Technology 475.) E
485 Electronic Communications and Information Resources on Internet (3) Exploration of worldwide information and communication resources including e-mail, gopher, Archie, Veronica, WAIS, WWW, and newsgroups. F,Sp
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. F,Sp,Su,A
500 Thesis (1-15) P,N,P only. E
502 Registration and 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 Electronic Information and Communications Laboratory (1) Methods for creating and managing information in electronic form. Communication of electronic information in networked environments. Location and use of electronic information resources. For G LSU graduate students only; must be completed satisfactorily in first semester. S/NC only. F,Sp
520 Information Content Representation (3) Principles of distinguishing, describing, and indexing intellectual works; current approaches: citation systems, descriptive cataloging, non-subject indexing, pre- and post-coordinate subject indexing, classification and categorization; authority control of index terms; standards. F,Sp,Su,A
521 Cataloging and Classification (3) Basic library-oriented cataloging and classification techniques, tools, and procedures. Descriptive cataloging, choice and form of non-subject entries, subject heading selection, general classification, authority control, bibliographic utility, online library catalog. F
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. Prima; Sp, Su,A
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. F
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 non-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. F
532 Sources and Services for Science and Engineering (3) Information sources in engineering, physical and life sciences. Sp
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. F
534 Government Information Sources (3) Selection, acquisition, organization, and utilization of government information in variety of forms. 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 databases, patents, document delivery alternatives, evaluation, and testing. F,Sp,Su,A
536 Creation and Distribution of Information and Knowledge Resources (3) Historical, political, and societal dimensions of creation, dissemination, growth, and institutionalization 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, enabling technologies, choices of distribution media, entrepreneurial opportunities. Legal, ethical, and quality concerns. F
538 Economics of Information (3) Costing and pricing of information; value of information and value added services; business methods, analysis and tradeoffs; policy issues related to economic aspects of information exchange and transfer. F
539 Information Policy (3) Role of government in creation and exchange of information; review of key national and international policy areas relevant to information creation, production, and distribution; development of information policy for organizations. Sp
540 Research Methods (3) Research methods in variety of information environments: primary and secondary research; research project design; research results; interpretation; analysis of published research; techniques supporting research process. F
550 Management of Information Organizations (3) Supervisory and management concepts, strategies, and techniques applicable to information professional working in libraries, archives, records management, and other information organizations. F
551 School Library Media Centers (3) Planning, implementing, and evaluating school library programs. Curricular involvement, role of technology, library-based management, relationships with district and state services. F
552 Information Centers in Higher Education (3) Development, mission, trends, issues, users, services, and environment of campus information centers including libraries and alternative information sources center and library-computer center models. F
553 Specialized Information Agencies (3) Development and present status, scope and objectives. Administrative and organizational problems and techniques. F
554 Public Library Management and Services (3) Development, roles, political environment, governance, organization, fiscal management, services, marketing, and performance evaluations. Sp
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 end users of information and information systems. Includes practical experience.
560 Information Resources Selection, Acquisition, and Evaluation (3) Principles of development and implementation of information in information agencies. Community analysis, users and uses, policies and procedures, evaluation of item 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, acquisition, 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 publication
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 with unique characteristics 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
Professionals (3) Principles and practice of environmental
scanning; information evaluation and synthesis; role
of strategic information in modern organization.

567 Information Network Applications (3) Scholarly
and community-based electronic communications.
National and international standards, tools, resources;
identification, analysis, evaluation, and management of
tools and resources; construction of local technologies as
developed and applicable. F

569 Advanced Production of Audiovisual Software
(3) (Same as Education in the Sciences, Mathematics,
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.
Evaluation, selection, and utilization for school and public
libraries. Su

573 Programming for Children and Young Adults (3)
Philosophy and objectives of public and school library
services for children and young adults. Reading, listening,
and viewing guidance for individuals and groups.
Program planning, implementation, and evaluation.
Prereq: 571 or 572. Su

574 Adult Materials and Services (3) Popular 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
informatics; relationships with other disciplines. F,Sp, Su

582 Library Automation (3) Computer-based applica-
tions and systems for libraries including MARC; biblio-
tographic 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 hyper-text. F

587 Information System Design Project (3) Super-
vised and structured experience in design and develop-
ment of computer-based information systems. Prereq:
583, 584 or 586, 588, and 589. F,Sp

588 Psychology of Human-Computer Interaction (3)
Survey of human-computer interaction and introduction
to psychological and other behavioral science knowl-
edge and techniques useful in design of computing
systems for human use. Basic psychological phenom-
nena of human cognition, memory, problem solving,
and language and how these processes relate to and con-
trol interactions between humans and interactive comput-
ing systems. Sp

589 Information Networking Technologies (3) Con-
cepts and terminology of information transmission.
Information network architecture and standards. Contem-
porary 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.

593 Independent Study (3-6) Prerequisite: Consent of
advisor. Maximum 6 hrs. F,Sp

594 Graduate Research Participation (3) Advanced
research techniques under supervision of staff research
director whose area coincides with interests of student.
Prereq: Consent of advisor and research director. SNC
only. F,Sp

595 Practicum (3-6) Opportunity to translate theory into
practice under guidance of qualified information profess-
ors. Prereq: Completion of core and pertinent advanced
courses relevant to student's practicum design.
Minimum 3.0 cumulative GPA. Written consent of
advisor and approval of practicum coordinator. May be
repeated. Maximum 6 hours. E

118 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 African-American Studies, American Studies, Anthropology, Art History, Asian Studies, Cinema Studies, Comparative Literature, Latin American Studies, Linguistics, Medieval Studies, Russian and East European Studies, Urban Studies, and Women's Studies. Certain courses within these programs are available for graduate credit as listed below. See the Undergraduate Catalog for program descriptions and directors.

African and African-American Studies

GRADUATE COURSES

421 Comparative Studies in African and African-
American Societies (3) Education, religion, and social
stratification. View of African-Americans and Africans have
each of 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
Science 452.)

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 483.)

Cinema Studies

GRADUATE COURSES

420 French Cinema (3) (Same as French 420.)

421 Topics in Italian Literature and Cinema (3) (Same
as Italian 421.)

486 Special Topics in Film (3) (Same as English 489.)

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.

Linguistics

GRADUATE COURSES

400 Topics in Linguistics (3) Content varies. May be
repeated. Maximum 6 hrs.

411 Linguistic Anthropology (3) (Same as Anthro-
pology 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, de-
scriptive, structural and transformational-generative lin-
guistics on contemporary diachronic theory. Prereq: 6
hrs of courses required for linguistics concentration or
consent of instructor.

425 Introduction to Descriptive Linguistics (3) (Same
as French 425, German 425, Russian 425, and Spanish
425.)

426 Methods of Historical Linguistics (3) (Same as
German 426, French 426, Russian 426, and Spanish
426.)

429 Romance Linguistics (3) (Same as French 429 and
Spanish 429.)

430 The Development of Synchronic Linguistics as a
Science (3) Development of first synchronic paradigm
of linguistics. Impact of social sciences on American
descriptivists. Prague School. Transformational-genera-
tive theory. Prereq: 6 hrs of courses required for lin-
guistics concentration or consent of instructor.

435 Structure of the German Language (3) (Same as
German 435.)

436 History of the German Language (3) (Same as
German 436.)

471 Sociolinguistics (3) (Same as English 471 and
Sociology 471.)

472 American English (3) (Same as English 472.)

474 Teaching English as a Second or Foreign Lan-
guage I (3) (Same as English 474.)

475 Teaching English as a Second or Foreign Lan-
guage II (3) (Same as English 475.)

485 Special Topics in Language (3) (Same as English
485.)
Urban Studies

GRADUATE COURSES
401 The City in the U.S. (3) (Same as Planning 401.)
441 Urban Geography (3) (Same as Geography 441.)
464 Urban Ecology (3) (Same as Sociology 464.)

Women's Studies

GRADUATE COURSES
400 Topics in Women's Studies (3) Content varies. May be repeated.
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.)

Journalism

(College of Communications)

MAJOR DEGREES
Communications ........................................ M.S., Ph.D.
James A. Crook, Director

Professors:
Adamson, June N. (Emeritus), M.S., Tennessee
Ashdown, Paul G., Ph.D. ................. Bowling Green
Bowles, Dorothy, Ph.D. ..................... Wisconsin
Cade, Dozler C. (Emeritus), Ph.D. ......... Iowa
Crook, James A., Ph.D. ............... Iowa State
Everett, George A., Ph.D. ................. Iowa
Haskins, Jack B. (Emeritus), Ph.D. ...... Minnesota
Lane, John L. (Emeritus), M.A. .......... Iowa
Leiter, B. Kelly (Emeritus), Ph.D. ....... Southern Illinois
Littmann, Mark, Ph.D. ......... Northwestern
Miller, M. Mark, Ph.D. ................... Michigan State
Singletary, Michael W., Ph.D. ......... Southern Illinois
Tucker, Willis C. (Emeritus), M.S. ..... Kentucky

Associate Professors:
Caudill, C. Edward, Ph.D. .............. North Carolina
Heller, Robert B., M.A. ................. Syracuse
Lucarelli, Susan M., Ph.D. ............... Tennessee
Morrow, Jerry L., Ph.D. ................. Toledo

Assistant Professor:
Foley, Daniel, M.S. ......................... Northwestern

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

GRADUATE COURSES
403 International Communications (3) Development and operations of world mass communications channels and agencies. Comparative analysis of media, media practices, and flow of news throughout world. Print and broadcast systems in terms of relevant social, political, economic, and cultural factors. Relation of communication practices to international affairs and understanding. Sp
412 Opinion Writing (3) Analysis of editorial positions, practices, and pages. Writing of editorials and columns for newspapers, magazines, and company publications, rhetorical devices and use of logic. Prereq: Communications 200, or consent of instructor.
414 Magazine Article Writing (3) Techniques of writing in-depth articles of mass circulation and specialized magazines. Organizing and presenting material, problems in specialized areas: business, science, agriculture, humanities. Prereq: Communications 200, or consent of instructor.
416 Issues in Journalism (3) Topics vary. Prereq: of instructor. May be repeated. Maximum 6 hrs.
420 Print Media Management (3) Current business practice among print media, especially newspapers. Problems in management and production and outlook for new technologies. Prereq: 6 hrs mathematics and/or accounting and senior standing. Sp
432 Advanced Editing (3) Sensitivity to language and editing skills. Headline writing, layout, and production. Prereq: 203.
444 Journalism as Literature (3) Study of writers from 17th century to modern era whose works have endured as both journalism and literature. Emerging genre called literary journalism: means of cultural reporting with personal narrative style. Prereq: Consent of instructor.
450 Writing About Science, Technology, and Medicine (3) Writing workshop to analyze examples of successful science writing and write series of articles for general public based on scientific journals, news conferences, technical meetings, and interviews. Prereq: Consent of instructor. (Same as Information Sciences 450.) F
451 Environmental Reporting (3) Writing for news media on environmental issues as strip-mining, water pollution, air pollution, allergens, nuclear power, fossil fuel power, and solid wastes. Presentations from and interviews of experts in environmental science and reporting. Prereq: 412 or consent of instructor. Prereq: 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.
460 Mass Communications History (3) Development of press and role of mass communications in American history. Newspapers, radio, television, and magazines. F
470 Public Relations Campaigns (3) Research, planning, and implementation of public relations campaigns. Oral and written presentation of public relations project from inception to completion. Extensive out-of-class work. Prereq: Public Relations Principles. E
480 Journalism in the High School (3) Functions and methods of high school publications. Problems related to student participation, 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 photographs and photo essays. Prereq: 290 or consent of instructor. Sp
516 Seminar in Journalism Issues (3) Topics vary. May be repeated. Maximum 6 hrs.
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.
535 Publications Management (3) Problems in management, production, market analysis, and design. Techniques of writing, editing, and presenting comprehensive articles and other material in 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. E
571 Seminar in Public Relations (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.
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: 200 or Advertising 360 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

(College of Education)

MAJOR DEGREES
Curriculum and Instruction ..................... M.S., Ed.S., Ed.D.
Education .............................................. Ph.D.
Patricia Davis-Wiley, Leader

Professors:
Christensen, Mark A. (Emeritus), Ph.D. .... Kansas State
Davis-Wiley, Patricia D., Ed.D. ............... Houston
Hull, H. N., Ed.S. ............................ Peabody

Associate Professors:
Hodge, R. L., Ph.D. ......................... Texas
Ryan, Thomas K., Ed.D. .................... Ball State
Watkins, J. Paul, M.S. ....................... Tennessee

The Language, Communication, and Humanities Education unit offers graduate programs leading to the degrees of Master of
Science with a major in Curriculum and Instruction, concentrations in art education, English education, foreign language education, reading education, and secondary teaching; 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 offers programs of study leading to teaching licensure in art, English, as a second language, foreign language, speech communications, and theatre. See Education under Fields of Instruction for full description of all degree requirements.

For further information, write the unit leader.

### 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 pacs.

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 evaluation 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/NC only. E


507 Teaching Poetry Grades 7-12 (3) Research and theory in application to teaching of poetry. Design of strategies and materials for teaching and writing and reading of poetry. Review of texts and materials. F

509 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.

513 Seminar (1-3) Curriculum, instructional technology, elementary education, secondary education, or social foundations as related to goals of students' programs. Prereq: Program prerequisites. May be repeated. Maximum 6 hrs. S/NC only. E

516 Seminar (1-3) Curriculum, instructional technology, elementary education, secondary education, or social foundations as related to goals of students' programs. Prereq: Program prerequisites. May be repeated. Maximum 6 hrs. S/NC only. E

519 Educational Specialist Research and Thesis (3) Prereq: Program prerequisites. May be repeated. P/NP only. E

533 Reading in Community College: Research and Theory (3) Analysis of components of effective community college reading programs. Attention to research and theoretical bases. Prereq: Course in reading education or consent of instructor. Su

555 Foreign Language in the Elementary Schools Practicum (3) Experiences designing, implementing and assessing second language instruction in elementary school setting. Prereq: 557 or consent of instructor.

556 English as a Second Language Practicum (3) Experiences designing, implementing and assessing English instruction to non-native English speakers. Required course for ESL certification. Prereq: 578 or consent of instructor.

578 Teaching English as a Second Language (3) Instructional methods: utilization of assessment procedures to diagnose English linguistic proficiency; materials for non-native speaker in K-12 classroom. Required for Tennessee ESL (K-12) licensure. Prereq: 578 or consent of instructor.

579 Teaching Foreign Languages in Secondary Schools (3) Advanced instructional techniques and evaluation procedures; materials selection; trends, issues, and research in modern foreign languages and Latin. Prereq: Consent of instructor.

590 Seminar in Teaching English in Secondary Schools (3) Content varies. Theoretical and practical approaches to teaching English in secondary school. May be repeated. Su

592 Linguistics and the Teaching of English (3) Grammar, usage, semantics, dialectology, history of language, and lexicography. Su

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

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

595 Special Topics (1-3) Prereq: Program prerequisites. May be repeated. S/NC or letter grade. E

597 Teaching Drama Grades 7-13 (3) Strategies and materials for teaching dramatic, writing and singing skills; activities, plays, reviews. Prereq: Consent of instructor.

598 Developing Speaking and Listening Skills, Grades 7-12 (3) Teaching approaches to nonverbal communication, interpersonal and group communication, public address and listening. Review of tests and materials. Sp

599 Developing Speaking and Listening Skills, Grades 7-12 (3) Teaching approaches to nonverbal communication, interpersonal and group communication, public address and listening. Review of tests and materials. Sp

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

601 Studies in English Education (3) Issues and research in teaching of English. Su

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

605 Organizing and Administering Reading Programs (3) Analyzing and synthesizing instructional strategies and materials components into classroom, school and system programs. Prereq: 2-500 level courses in reading education or consent of instructor. Sp

678 Advanced Studies in English as a Second Language (3) Research, curriculum, assessment, trends and issues in English as a second language. Prereq: 578 or consent of instructor.

687 Special Topics in Foreign Language Education (3) Research, curricula, assessment, trends and issues in foreign language education. Prereq: 578 or consent of instructor.

### Law

(College of Law)

**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
Dessem, Lawrence, J.D. ....... Harvard
Gray, R. Macdonald (Emeritus), LL.M. ...... George Washington
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, Frédéric S., LL.B. .... Duke
Lloyd, Robert M., J.D. .......... Michigan
Miller, Charles H. (Emeritus), J.D. .............. Duke
Overtan, Elvin E. (Emeritus), S.J.D. .......... Harvard
Phillips, Jerry J., J.D. .......... Yale
Picquet, Cheryl, M.S.L.S. ...... Tennessee
Rivkin, Dean H., J.D. .......... Vanderbilt
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
Anslay, Frances Lee, LL.M. .... Harvard
Beinstine, William J., J.D. .... Miami
Black, Jerry S., J.D. .......... Florida
Bunker, Mary Garrett, J.D. ...... George Washington
Cornett, Judy M., J.D. .......... Tennessee
Davies, Thomas Y., J.D. .......... Northwestern
Gray, Grayfred B., J.D. ......... Vanderbilt
Kennedy, Dee Ann C., L.L.M. .... Temple
Leatherman, Don A., L.L.M. .... New York
Parker, Carol M., J.D. .......... Illinois
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 a Public Administration degree. In addition, graduate-level courses may be used on a regular graded basis for any appropriate purpose in the college offering the course. The official academic record of the student maintained by the Registrar of the University shall show the actual grade assigned by the instructor without conversion.

**Non-Law Elective Course Credit**

Students enrolled in the J.D.-MBA degree program may not receive credit toward the J.D. degree for courses taken in other departments of the University except for those taken in conjunction with the dual degree program.

**Note:** Students are advised to consult The Graduate School's degree requirements as stated in the front section of this catalog as well as the requirements for this college.

### DUAL J.D.-M.P.A. PROGRAM

The College of Law and the Department of Political Science in the College of Arts and Sciences offer a coordinated dual degree program leading to the conferment of both the Doctor of Jurisprudence and the Master of Public Administration degrees. In this program, a student may earn the M.P.A. and J.D. degrees in about four years rather than the five years that otherwise would be required. Students pursuing the dual degree program should plan to be enrolled in coursework or an internship for one summer term in addition to taking normal course loads for four academic years.

**Admission**

Applicants for the J.D.-M.P.A. program must make separate application to, and be independently accepted by, the College of Law for the J.D. degree and the Department of Political Science and The Graduate School for the M.P.A. degree. Applicants must also be accepted by the Dual Degree Committee. All applicants must submit a Law School Admission Test (LSAT) score. An applicant's LSAT score may be substituted for the Graduate Record Examination (GRE) score, which is normally required for admission to the M.P.A. program. Application may be made prior to or after matriculation in either the J.D. or the M.P.A. program, but application to the dual program must be made prior to entry into the last 29 semester hours required for the J.D. degree and prior to entry into the last 15 hours required for the M.P.A. 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 M.B.A. degrees will be awarded upon completion of requirements of the dual degree program.

The College of Law will award a maximum of nine (9) semester hours toward the J.D. degree for acceptable performance in approved graduate-level courses offered by the College of Business Administration. Three of the 9 semester hours must be earned in Accounting 501, 503, or a more advanced accounting course.

The College of Business Administration will award credit toward the MBA for acceptable performance in a maximum of 9 semester hours of approved courses offered by the College of Law.

Except while completing the first year courses in the College of Law, students are encouraged to maximize the integrative facets of the dual program by taking courses in both colleges each year.

### Awarding of Grades

For grade recording purposes in the College of Law for graduate business courses and in the College of Business Administration for law school courses, grades awarded will be converted to either Satisfactory or No Credit and will not be included in the computation of the student's grade average or class standing in the college where such grades are so converted. The College of Law will award a grade of Satisfactory for a graduate business course in which the student has earned a B grade or higher and a No Credit for any lower grade. The College of Business Administration will award a grade of Satisfactory for a College of Law course in which the student has earned a 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.
the M.P.A. degree for successful completion of approved courses offered in the College of Law. All courses for credit toward the graduate degree 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 reporting purposes in the College of Law and the Department of Political Science, grades awarded in courses in the other unit will be converted to either Satisfactory or No Credit and will not be computed in determining a student's GPA or class standing. The College of Law will award a grade of Satisfactory for an approved M.P.A. course in which the student earns a grade of B or higher and a grade of No Credit for any lower grade. The Political Science Department will award a grade of Satisfactory for an approved law course in which the student earns a grade of 2.3 or higher and a grade of No Credit for any lower grade. The official academic record of the student will be maintained by the Registrar of the University shall show the actual grade assigned by the instructor without conversion.

POLICY FOR GRADUATE STUDENTS TAKING LAW COURSES

Students pursuing a graduate degree in another college may, upon approval of the College of Law and the major chairperson, take up to 8 semester hours of law courses and receive credit toward the graduate degree. The graduate student must register for the law course during regular registration at the College of Law requesting an S/NC grade only. If a 2.0 or above is earned in a law course, an S will be recorded on the transcript. If a student earns below a 2.0, an NC will be recorded, and the course cannot be used toward meeting degree requirements. Grades for law courses will not be reflected in the cumulative average. Law courses may be taken for credit only by students enrolled in a graduate degree program. Different students must be enrolled in the Dual J.D.-MBA or J.D.-M.P.A. Programs. Grades must be earned according to the grading system of the respective college, e.g., numerical grades for law courses, letter grades for graduate courses. Refer to section on Grades for the grading scale acceptable toward meeting degree requirements. Cumulative GPA for law courses only will be carried until graduation, at which time both the graduate and the law cumulative will be shown on the permanent record.

PROFESSIONAL COURSES

801 Civil Procedure 1 (3) Binding effect of judgments, selecting proper court (jurisdiction and venue), ascertaining applicable law, and federal and state practice.


803 Contracts I (3) Basic agreement process and legal protections afforded contracts; offer and acceptance, consideration and other bases for enforcing promises; the Statute of Frauds, unconscionability and other controls of promissory liability. Introduction to relevant portions of Article 2 of the Uniform Commercial Code.

804 Contracts II (3) Continuation of Contracts I. Issues arising after contract formation: interpretation, duty of good faith; conditions, impracticability and frustration of purpose; remedies; third-party beneficiaries; assignments and delegation. Considerable coverage of Article 2 of the Uniform Commercial Code with respect to remedies, anticipatory repudiation, impracticability and good faith.

805 Legal Process I (3) Lawyer-like uses of cases and statutes in prediction and persuasion. Analysis and synthesis of common law decisions; statutory interpretation; fundamentals of expository legal writing and legal research.

806 Legal Process II (3) Continuation of Legal Process I, Formal legal writing, appellate procedure, and oral advocacy.

807 Torts I (3) Intentional torts, including battery, assault, false imprisonment, infliction of emotional distress, conversion and trespass; privileges and defenses to intentional torts; negligence, including standard of care and proof of negligence; immunities and limitations on duties; cause in fact and proximate cause.

808 Torts II (3) Defenses, including contributory negligence, assumption of risk, comparative negligence, and statutes of limitations; vicarious liability; strict liability; nuisance; products liability; settlement; problems of multiple defendants; damages; non- tort alternatives for recovery for personal injury; law reform; defamation, invasion of privacy, and wrongful legal proceedings; intangibles, tortious interference with contract; contract torts.

809 Criminal Law (3) Substantive aspects of criminal law; general principles applicable to all criminal conduct; specific analysis of particular crimes; defenses to crimes.

810 Property (4) Introductory course treating issues of ownership, possession, and title in the areas of landlord-tenant relations; estates in land and future interests; co-ownership and marital property; real estate sales agreements and conveyances; title assurance and recording statutes; servitudes; and selected aspects of nuisance law, eminent domain and zoning.

812 Constitutional Law 1 (3) Judicial review, limits on judicial power; national legislative power; regulation of commerce; power to tax and spend; other sources of national power; separation of powers; state taxation and regulation of commerce; intergovernmental immunities.

813 Evidence (4) Rules regulating introduction and exclusion of oral, written and demonstrative evidence at trials and other proceedings, including relevance, competence, impeachment, hearsay, privilege, expert testimony, authentication, and judicial notice.

814 Legal Profession (3) Legal, professional and ethical standards applicable to lawyers.

815 Computer-Assisted Legal Research (0) Introductory course for students with no prior experience in using legal research software. May be repeated.

816 Computer-Assisted Legal Research (0) Introductory course for students with no prior experience in using legal research software. May be repeated.

821 Administrative Law (3) Administrative agency decisions: procedural standards for informal and formal administrative adjudication and rule-making (attention to Federal Administrative Procedure Act); constitutional issues in the process statistical setting; and availability, scope and timing of judicial review of agency actions.

822 Legislation (3) Interpretation and drafting of statutes, legislative process, and legislative power; comparison of judicial views on legislative process with realities of legislative process and applicable constitutional principles.

824 Local Government (3) Distribution of power between state and local governmental units; sources of authority for limitations on local government operations; 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.

826 Introduction to Business Transactions (2) Non-technical introduction to accounting, finance, and the functional relationships among the various actors in business transactions. Attention to banking, securities transactions with view toward needs of business clients. Not available for students with business background.

827 Business Associations (4) Legal problems associated with formation, operation, and dissolution of unincorporated business entities and incorporation of business. Offered only when available for students with business background.

828 Advanced Business Associations (2) Selected topics from law of business associations. May be repeated.

830 Securities Regulation (3) Basic structure of federal securities laws. Legal problems associated with raising of capital in new and growing enterprises; securities transactions by promoters, officers, directors and other insiders; regulation of publicly-held companies; litigation under federal securities laws. Offered only when available for students with business background.

831 Professional Responsibility (3) Professional ethical principles. Offered only when available for students with business background.

832 Business Planning Seminar (2) Selected problems on corporate and tax aspects of business planning and transactions. Prereq: 827.

833 Representing Enterprises (3-5) Capstone course for concentration in business transactions. Simulated business transactions and completion of major planning drafting project. Transactions vary: formation of new business; acquisition of existing business; development of real estate project; various financial transactions and corporate reorganization. Prereq: Completion of all courses for concentration.

834 Antitrust (3) Federal antitrust laws; monopolization, price-fixing, group boycotts, and anticompetitive practices generally; government enforcement techniques and private treble damage suits.

840 Commercial Law (4) Basic coverage of most significant provisions of Uniform Commercial Code; security interests in personal property (Arts. 9 of U.C.C. and relevant Bankruptcy Code provisions); commercial paper, including checks, notes and other negotiable instruments (Arts. 3 and 4 of U.C.C.); secured transactions; and coverage of portions of Art. 9 of U.C.C. not covered in Contracts.


842 Contract Drafting Seminar (2) Practical fundamentals of drafting contracts of different types.


846 Constitutional Law II (3) First Amendment rights to freedom of religion, expression, association and press;
Fourteenth Amendment rights against discrimination as to race, sex, etc.; rights to franchise and apportionment; substantive and procedural due process; civil rights under federal and state constitutions, pending post-Civil War Amendments to Constitution.

484 Civil Rights Actions (3) Litigation to vindicate constitutional rights in private actions against the government and its officials, as well as if rights protected by other civil rights statutes, and all actions of action under 42 U.S.C. sec. 1983, actions against federal government officials under the Eleventh Amendment; institutional and individual immunities; relationship between state and federal courts in civil rights actions; and remedies for violations of constitutional and other civil rights.

485 Discrimination and the Law (3) Comparison of race, sex and other invidious discriminatory practices as they affect political participation, education, employment, housing and other social and economic activities; legislative and lative enforcement of post-Civil War Amendments to Constitution.

851 Constitutional Law Seminar (2) Current constitutional law problems.

854 Criminal Procedure I (3) Police practices and constitutional rights of persons charged with crimes; arrest; search and seizure; identification; interrogation and confessions; electronic eavesdropping; and right to counsel.

855 Criminal Procedure II (3) Pre- and post-trial procedures in a criminal case: preliminary hearing; indictment; trial; prosecutorial discretion; discovery; speedy trial; plea bargaining; jury trial; double jeopardy; and post-conviction relief. Federal Rules of Criminal Procedure.

857 Criminal Law Theory (3) Theoretical foundations of criminal law. Prereq: 850.

859 Criminal Law Seminar (2) Advanced problems in criminal law and administration of justice. Prereq: 850.

862 Family Law (3) Survey of laws affecting formal and informal family relationships; premarital disputes; antenuptial contracts; creation of common law and formal marriage; legal effects of marriage; support obligations within family; divorce, annulment, alimony, legitimation, and property settlements; child custody and child support; abortion; illegitimacy.

863 Children and the Law (3) Legal relationship between children and their parents and the state; parental prerogatives and children's rights; rights of illegitimates; adoption; temporary and permanent removal of children from their parents by the state; juvenile court procedures.

866 Environmental Law and Policy (3) Study, through methods of public policy analysis, of regulatory system to environmental problems: environmental litigation, Clean Air Act, Clean Water Act, National Environmental Policy Act, and selected regulatory issues.

867 Environmental Law Seminar (2) Selected topics in environmental law.

869 Natural Resources Law (3) Nature of interests; conveyancing; royalties; grants and reservations, leases, and taxation of natural resources.

873 American Legal History (3) Selected topics in American legal history.

875 Empirical Studies of Legal Institutions (3) Social, economic and organizational factors that affect behavior of clients, lawyers, judges and other actors in legal institutions. Empirical studies of subjects: social structure and organization of bar; factors that affect filing, processing and disposition of claims in civil justice system; and factors that affect process of case dispositions in criminal prosecutions; plea bargaining process. Factors that sometimes cause "law in action" to operate differently than "law in books.

877 Jurisprudence (3) Critical or comparative examination of legal theories, concepts, and problems: legal positivism; natural law theory; legal realism; idealism; historical jurisprudence; utilitarianism; Kantianism; sociological jurisprudence; policy science; and critical studies.

879 Law and Economics (3) Relationship between legal and economic thought, use of economics in legal decision making and legal criticism.

881 Law and Literature (3) Systematic study of literature and its application to legal problems, and to accurate, fluent, and creative legal composition.

883 Language, Law, and Reality (3) Intermediated level jurisprudence course. Law as the mind's attempt to determine, direct, and administer human activity; exploration, through methods of epistemology, of ethical values underlying formal legal reasoning and legal concepts.

886 Public International Law (3) Law-creating processes and doctrines; principles and rules of law that regulate international behavior of states and other entities in international organizations.

887 International Business Transactions (3) Legal status of persons abroad; acquisition and use of property within a foreign country; doing business abroad as a foreign corporation; engaging in business within a foreign country; acquisition or annulment of contracts or concessions.

889 International Law Seminar (2) Current international law problems. Prereq: 886 or 887.

919 Comparative Law (3) Introduction to civil law systems of France and Germany, focusing on legal institutions, methodology, and aspects of law of obligations and commercial law.

959 Labor Relations Law (3) Political, social and economic influences in development of federal labor relations laws; employees rights of self-organization; union and management rights; strikes, lockouts, boycotts, and collective bargaining processes; enforcement of collective agreements; individual rights of employees; federal preemption and state regulation.

969 Employment Law (3) Legal regulation of employment relations; legal economic influences in an employee-employer relationship; employment discrimination; legally prescribed minimum standards of compensation and safety; restrictions on termination of employment; regulation of retirement systems.

986 Arbitration Seminar (3) Arbitration of labor agreements; judicial and legislative developments; nature of process; relationship to collective bargaining; selected arbitration problems or topics under collective agreements; and role of lawyers and arbitrators. Prereq: 965.

990 Labor Relations Seminar (2) Selected labor relations law problems. Prereq: 885.

900 Civil Advocacy (5) Supervised fieldwork, requiring students to assume primary responsibility for representing clients facing legal problems. Exploration of theory, practice and ethics of interviewing, counseling, investigating, planning strategy, negotiating, representing clients, and preparing necessary documents to provide competent representation for clients. Hearings in state and federal courts, or before state and federal administrative officers or judges. Prereq: 920 and third-year standing.

906 Criminal Advocacy (5) Supervised fieldwork, requiring students to assume primary responsibility for defending clients accused of crime in Knox County. Exploration of theory, practice and ethics of interviewing, counseling, investigating, planning strategy, negotiating, representing clients, and preparing necessary documents to provide competent representation for clients. Hearings in state and federal courts, or before state and federal administrative officers or judges. Prereq: 920 and third-year standing.

123 Conflict of Laws (3) Jurisdiction, foreign judgments, and conflict of laws.

128 Federal Courts (3) Jurisdiction of federal courts, conflicts between federal and state judicial systems.

140 Remedies (4) Judicial remedies: damages, restitution, and equitable relief; availability, limitations and measurement of various remedies; compensation of contract, tort and property-related remedies.

290 Trial Practice (3) Litigation through simulation, trial problems and preparation; basic trial strategy; professional responsibility; fact investigation and witness preparation; discovery and presentation of evidence; selection and instruction of jury; opening and closing arguments. Written work: pleadings, motions, interrogatories or memoranda. Prereq: 813.

312 Pre-Trial Litigation (3) Civil pre-trial process. Drafting of actual pre-trial documents in civil cases; complaint, motions for preliminary injunction, class certification papers, motions to dismiss and for summary judgment, and various discovery papers.

923 Complex Litigation (3) Advanced civil procedure course dealing with special problems that arise in litigation involving multiple parties, multiple classes, multidimensional problems, permissive and compulsory joinder; intervention; disposition of duplicative or related litigation; class actions; dismissal in large class actions; procedural complexities of class litigation; res judicata and collateral estoppel problems.

959 Appellate Practice Seminar (2) Federal and Tennessee Rules of Appellate Procedure, local rules of federal circuits; review of complete records of several United States Supreme Court cases; preparation of an appellate brief based on record of actual case.

927 Interviewing, Counseling and Negotiation (3) Development of conceptual and practical frameworks for understanding interviewing, counseling and negotiation, and lawyer's role in task force methods, strategies and perspectives from recent literature involving lawyering skills. Simulations and videotape critiques of interviewing of decisional issues and techniques of dispute resolution. Not open to students who have taken 904 or 906.

929 Teaching Clients the Law (3) Communication of law as basis for decision by persons other than lawyers. Development of skills by team-teaching a practical law course to high school or adult students and by writing research papers that synthesize Tennessee or federal law in plain language.

930 Gratutious Transfers (4) Nature, creation, termination, and legal implications of gift, testamentary and trust conveyances, intestate succession; execution, revocation, probate, and contest of wills; creation and construction of various types of future interests; conditions and limitations; application of the rule against perpetuities.

937 Estate Planning Seminar (2) Problems of estate planning, relationship to estate planning of law and practice of fiduciary administration, insurance, property, wills, future interests, trusts, corporations, partnerships, and gifts; drafting of estate plans and implementing documents for hypothetical clients. Prereq: 973. Prereq or coreq: 818 and 805.

940 Land Finance Law (3) Financing devices: mortgage, deed of trust, condominium, leasehold estate, subdivision development and subdivision development of land owned by the state and presented for seminar discussion. Prereq: 940. Prereq or coreq: 818 and 805.

943 Land Use Law (3) Land use planning, nuisance, zoning and eminent domain.

950 Computers and Law (3) Impact of computers on law and practice of law: expert systems; legal skills required in building expert systems; common law office uses of computers; and computerized research. Preparation of lawyers to think effectively concerning use of computers. Prior computer experience not necessary.

955 Education Law (3) Compulsory attendance laws; governmental control over curriculum and extracurricular activities; economic freedom; school social process; rights of students and teachers; religion in public schools, public aid to parochial schools, equality of educational opportunity.

956 Entertainment Law (3) Role of law and lawyer in the entertainment industry. Course content varies. Music industry; music copyright laws; artist-manager relationships; recording contract negotiations; industry labor law, and advertising and promotion. Prior experience preferred.

959 Intellectual Property (3) Intellectual property and related interests under federal and state laws; trademarks; trade secrets; copyright; right of publicity; unfair competition.

962 Law and Medicine Seminar (2) Effects of legal rules on delivery and quality of medical care; nature of physician-patient relationship; unauthorized practice of medicine; medical education, licensing and specialization; hospital staff privileges; medical malpractice liability: standard of care, proof, causation, defenses, and damages; protection of patient autonomy; consent, informed consent, conception and abortion, choice of treatment,
Leadership Studies

(College of Education)

MAJORS

DEGREES

College Student Personnel .................. M.S.
Education .......................... Ph.D.
Leadership Studies in Education ............. M.S., Ed.S., Ed.D.

Grady Gogue, Leader

Professors:

Bogue, Grady, Ed.D. .......... Memphis State University
Harris, G. W., Jr., Ph.D. .......... Michigan State University
Lovell, J. T. (Emeritus), Ed.D. .......... Florida State University
Melson, Malcolm C., Jr., Ph.D. .......... Florida State University
Roney, Robert K. (Emeritus), Ed.D. .......... Tennessee State University
Stoliar, Dewey H. (Emeritus), Ph.D. .......... Ohio State University
Trusty, Francis M. (Emeritus), Ed.D. .......... Stanford University
Ubben, Gerald C., Ph.D. .......... Minnesota State University
Venditti, Fred P. (Emeritus), Ed.D. .......... Northern Colorado State University

Associate Professors:

Brockett, Ralph G., Ph.D. .......... Syracuse University
Connelly, Mary Jane (Liaison), Ed.D. .......... VPI University
Husan, Peter M., Ed.D. .......... Stanford University
Mertz, Norma T., Ed.D. .......... Columbia University

Assistant Professor:

Aper, Jeffrey P., Ph.D. .......... VPI University

The Leadership Studies unit offers graduate programs leading to the Master of Science with majors in Leadership Studies in Education, concentrations in adult education and in educational administration and supervision, and College Student Personnel; the Specialist in Education with a major in Leadership Studies in Education, concentration in educational administration and supervision; the Doctor of Education with a major in Leadership Studies in Education, concentrations in adult education, educational administration and supervision, and School Administration; the Doctor of Philosophy with a major in Education. See Education under Fields of Study 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.

Adult Education

GRADUATE COURSES

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.

513 Special Topics in Adult Education (1-3) Specific objectives, activities, and evaluation. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

514 Individual Study in Adult Education (3) Prereq: Consent of supervising instructor. Approval form must be filed in office of unit head. May be repeated. Maximum 6 hrs.

520 Survey of Adult Education (3) Historical development, philosophies of adult education agencies, associations, programs, issues, and literature illustrating process of adult education and diversity of continuing education. Prereq: Consent of instructor. F, Su

521 Program Development and Operation in Adult Education (3) Theories and methods from research to practice in planning and operating adult education programs. Prereq: Consent of instructor. F, Su

522 Adult Development (3) Changes in characteristics of adults over life span and implications for adult education. Prereq: Consent of instructor. F, Su

523 Post-Secondary Education for Adults (3) History, evolution, philosophy, structure and functions of post-secondary sub-university institutions, their programs and client files. Prereq: Consent of instructor. Sp, Su

524 Continuing Professional Education (3) Theories and concepts supporting design and management of educational programs for adults in professions. Prereq: 520 or equivalent. Sp

525 Characteristics of Adult Learners (3) Key characteristics of adult learners, and applications to teaching and learning contexts.

527 Controversies in Adult Education (3) Controversies confronting field of adult education; development of critical analysis skills by looking at controversies from different perspectives.

620 Seminar in Adult Education (3) Issues in adult education, theories and concepts, philosophical positions, research trends and methodologies. Prereq: 510 or equivalent. F, Su

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 theoretical advances in adult problem solving and learning. Prereq: 522 or equivalent. F, Su

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, group relationship, supportive work climates, personnel motivation, conflict management skills, and role of values, attitudes, and expectations in administration. F, Su

516 Research for School Administrators (3) Descriptive, experimental, and quasi-experimental designs to help students with limited educational backgrounds to develop technical professional and educational administration and supervision.
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

535 Administrative Applications of Micro Computers (3) DOS, word processing, data based management, spreadsheets, 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 schools and administrative units. 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 for students. 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 and personnel planning, collecting and maintaining employee information, supervision of instructional and non-instructional personnel, clinical supervision, staff evaluation, and staff development. Prereq: Introductory M.S. core or consent of instructor. F/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. F/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 585. Prereq: 21 hrs in educational administration and supervision or consent of instructor. E

582 Educational Leadership and District-Level (3) Role of central office 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

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, 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/Su

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/Su

604 Seminar in Educational Administration and Supervision (1-3) Current educational issues, problems and research. Required two consecutive semesters during doctoral residency. May be repeated. S/N or letter grade. E

605 Advanced Seminar in Administrative Theory (2) Interdisciplinary seminar. Readings selected by faculty for research and scholarly value from current and classic theoretical studies and current periodical 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 practitioners and University personnel. May be repeated at discretion of student's committee. Maximum 12 hrs. S/N or letter grade. E

614 Statistical Methods for School Administrators (3) Descriptive and experimental research methods, parametric and non-parametric statistical techniques used in research in educational settings. F

615 Research Designs (3) Statistical methods through multivariate techniques and applications to various research designs. Prereq: 614 or consent of instructor. Sp/Su

616 Research Methods (3) Overview of descriptive and experimental research, hypothesis generation, 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 theory and practical procedures. Role of public school systems and higher educational institutions. Interdisciplinary discussions of community power structures and special interest groups, based on literature and research from education, sociology, and political science. Field study. Prereq: 629, 616 or equivalent or consent of instructor. F

644 Educational Finance and Business Management (3) Contemporary educational finance policies and their influence upon nation, education, and citizens. Superintendency team concept, management of school institutional services. Prereq. 544 or consent of instructor. F/Su

648 School Personnel Administration (3) Personnel administration functions for professional and supporting staff in educational organizations. Recruitment, selection, placement, personnel policies, employee wage and salary administration, fringe benefits, collective negotiations, human relations, staff development, and staff evaluation. Prereq: 548 or consent of instructor. F/Su

655 State-Federal Relations in Education (3) Interrelationship of federal, state, and local responsibilities and organization for education by analysis of traditional, legal, fiscal and functional aspects of educational partnership. Funding partnerships: discussion of grant proposals development processes. S/Su

656 Legal Foundations of Public Education (3) School law; constitutional foundations as they relate to public education at state and local levels. F/Su

658 Conflict Management (3) Social conflict and its management. Causes of interpersonal, intergroup, and organizational conflict, skills and strategies used to manage conflict, conflict management models associated with different sectors of human activity, and current organizational practices for managing destructive conflict. F

670 Values and Ethics in Educational Leadership (3) Examination of moral and ethical dimensions of work of educational administrators: assistance to current and prospective administrators to deal with dimensions in knowledgeable, reflective and principled ways. (Same as Higher Education 670.)

680 Administration of Complex Organizations (3) Concepts and theoretical formulations to understand, analyze, evaluate, and change complex educational programs and organizations. Prereq: 513 or consent of instructor. Sp/Su

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

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

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

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 perspective. Functional areas comprising field and major issues. E

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 and evaluation assessment techniques. Sp

599 Practicum in College Student Personnel (1-6) Prereq: Consent of instructor. May be repeated. S/N or letter grade. E

619 Administration and Governance of Higher Education (3) Functions, 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 terminations, students' rights, tort liability, academic due process and affirmative action in employment. F

645 Curriculum and Instruction in Undergraduate Higher Education (3) Content and organization of institutional strategies and curricular structures 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 private institutions. Sp

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

695 Practicum in Higher Education (1-6) Supervised practicum in selected areas of higher education administration. Prereq: Consent of instructor. May be repeated. S/N or letter grade. E

698 Seminar in Higher Education (3) Analysis of administrative and organizational structure, theory and practice in management of American colleges and universities. Prereq: 543 or consent of instructor. Su

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 or letter grade. E


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

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

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

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

Higher Education

GRADUATE COURSES

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

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
Life Sciences
(College of Arts and Sciences)

MAJOR DEGREES
Life Sciences M.S., Ph.D.

Howard I. Adler (Liaison), Chair
Coordinating Council:
Becker, Jeff M., Cellular, Molecular and Developmental Biology
Richard S. Saudargas, Ethology
Schwarz, O. J., Plant Physiology and Genetics
Douglas, D. K., Biotechnology
Farkas, W., Microbiology
Vaughan, Gerald, Physiology

The programs leading to the M.S. and Ph.D. degrees in Life Sciences are interdepartmental and intercollegiate programs which augment the programs of individual departments.

The Life Sciences Council supports studies and research in the following concentrations: physiology; biotechnology (M.S. only); cellular, molecular and developmental biology; environmental toxicology; ethology; and plant physiology and genetics. Students interested in any of these areas should contact either the chair of Life Sciences or the director of the area of interest. Each program is overseen by a committee and may have unique admission and graduation 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
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, bioproduction and biotransformation, liposomes, microsomes, 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 511; Microbiology 410; Botany 451; Chemical Engineering 475; and Zoology 507.

Cellular, Molecular, and Developmental Biology
The inter-departmental program in cellular and molecular developmental biology includes research in structural or functional aspects of cells or subcellular components, or the interactions between cells.
Required courses are Life Sciences 511, 512, 531, and 532.

Environmental Toxicology
The toxicology program provides intensive training in basic toxicological principles and techniques. Courses and research expose trainees to mechanisms of intended and unintended interactions between living systems and potentially toxic agents from the point of view of biochemistry, physiology, ecology, public health, environmental law and regulation, pest management, pollution control and repair, and testing and residue analysis of toxicants.
Required courses are Biochemistry 561, 562, 604; and Life Sciences 610.

Ethology
Ethology is the naturalist study of normally occurring animal and human behavior. The program provides intensive training in basic ethology with specialized studies available in the development, evolution, and physiology of behavior; comparative psychology; human ethology; and behavioral ecology and sociobiology.
Required courses for the master's are Psychology/Zoology 450, 459; Zoology 524, 583; Statistics 531-32; and Zoology/Psychology 516.

The Ph.D. requirements are the same as for the master's with the additional requirements of one additional statistics course and six semester hours of courses numbered above 600 approved by student's committee.

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 solving 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 511, 512; Plant and Soil Science 471 or Zoology 560; Plant and Soil Science 55; Microbiology 410.

GRADUATE COURSES
500 Thesis (1-15) P/NP only. E
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N/C only. E
509 Biotechnology Seminar (1-2) Topic 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 level. Membrane structure, function, and biogenesis; cellular communication; receptors and membrane flow; growth regulation and oncogenes; plant cell structure and function; plant cell wall and immunity; contractility and motility, mitosis and meiosis, blood and immune cells.
512 Advanced Molecular Biology (4) (Same as Biochemistry 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 8 hrs.
529 Biotechnology Practicum Co-operative Experience (2) Work experience in commercial organization for students undertaking non-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
(College of Business Administration)

MAJOR DEGREES
Business Administration MBA, Ph.D.

Oscar Fowler, Head

Professors:
Boling, Ronald W. (Emeritus), Ph.D. .. Stanford Dewhurst, H. Dudley, Ph.D. .. Texas Dobbs, Gregory H., Ph.D.

VPI
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 Management of Organizational Behavior (3) Integration of individual and group differences, organization theory and design, motivation, leadership, human resources planning, and career implications with strategy, planning, and decision making.

511 Organizational Theory: Integrated Structure and Behavior (3) Cases, group projects, discussion; organizational theories, organizational effectiveness; contextual factors of organizations; environment, size, technology; organizational structure configurations, organization design; social influences on organization effectiveness; motivation, leadership, group behavior, intergroup relations, organization change and development.

521 Personnel Administration (3) Personnel functions and human resources management. Community relations, recruiting, selection, training, performance evaluation, wage and salary administration, legal framework as it affects personnel.

522 Labor Relations and Collective Bargaining (3) American labor history, structure and philosophy of bargaining, dispute settlement, and contract administration. (Same as Economics 562.)

525-26 Industrial and Organizational Psychology (1-3) Readings in industrial and organizational psychology. Available only by prearrangement with supervising faculty member. May be repeated. Maximum 6 hrs. S/N or letter grade.

531 Management of Technology-Based Organizations (3) Role of technology and innovation in formulation and implementation of strategy. Management of research and development function and coordination with other functions. Management of scientists and engineers.

541 Operations Management I (3) Techniques applicable to design of systems in operations function.

542 Operations Management II (3) Operations planning and control function. Application of models to real-world 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 a business plan, case analysis.

567-68 Proseminar in Industrial/Organizational Psychology (3-3) Readings in industrial and organizational psychology. Must be taken in sequence during student’s first year of study in Industrial and Organizational Psychology program. Consent of instructor required for all non-industrial/organizational psychology program students. (Same as Psychology 517-18.)

571 International Management (3) Analysis of environment of international business firms and impact of internal and external factors on managerial decisions.

581 Environmental Management (3) Managerial frameworks for addressing environmental issues. Most pressing environmental challenges; options compatible with sustained business 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/N or letter grade.

595 Selected Topics in Current Management Issues (3) In-depth consideration of current issues. Managerial impact of emerging topics. Prereq: Consent of instructor.

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

610 Seminar in Advanced Organization Theory (3) Analysis of functioning of complex organizations. Classic and open systems models, organization growth and change, organizational effectiveness and design of complex organizations.

611 Seminar in Strategic Management I (3) Analysis of concepts (I) of 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. Prereq: 567, 568, consent of instructor. May be repeated. (Same as Psychology 625.)

626 Seminar in Industrial Psychology (3) In-depth analysis of current issues and problems; performance appraisal/criterion development, and training and development. Prereq: 567, 568, consent of instructor. May be repeated. (Same as Psychology 626.)

627 Seminar in Applied Industrial Psychology (3) In-depth analysis of the current issues, concerns, and methods: advanced quantitative psychometrics and employee selection. Prereq: 567, 568, consent of instructor. May be repeated. (Same as Psychology 627.)

638 Current Topics in Industrial/Organizational Psychology (1-3) Readings in 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 638.)

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

Management Science (College of Business Administration)

MAJORS

Management Science ............... M.S., Ph.D.

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

Charles E. Noon, Chairperson

Committee Members:

Bowers, Melissa R., Management; Bozdogan, Hamparsum, Statistics; Edirisinghe, Chanaka F., Management; Fowler, Oscar S., Management; Gilbert, Kenneth C., Management; Leitnaker, Mary G., Statistics; Noon, Charles E., Management; Rafton, 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 of 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

<table>
<thead>
<tr>
<th>Core Requirements</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>Management Science 531, 532, 533, 534</td>
<td>14</td>
</tr>
<tr>
<td>Statistics 563</td>
<td>9</td>
</tr>
<tr>
<td>Applied specialization area</td>
<td>9</td>
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<tr>
<td>Statistics elective—500 level or above</td>
<td>6</td>
</tr>
<tr>
<td>Mathematics—300 level or above</td>
<td>6</td>
</tr>
<tr>
<td>Electives selected from mathematics, statistics, computer science, and/or management science area</td>
<td>9</td>
</tr>
</tbody>
</table>

TOTAL 38

A thesis option is available to qualified students which substitutes 6 hours of thesis credit for the following 3 hours of coursework: 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 must approve a tentative overall program during the student’s first semester and must approve all courses on a semester-by-semester basis.

Recognizing the diverse backgrounds and needs of Management Science M.S. students, the Management Science Committee is prepared to waive some of the above requirements on an individual basis. 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 provide 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 may be the coursework from a master's program although a master's is not a prerequisite for the doctorate. The candidate must complete a minimum of 24 semester hours at the University of Tennessee, Knoxville, at least 6 of which must be at the 600 level. Both of these requirements are also exclusive of thesis or dissertation credits. Entering students who have completed graduate studies in applicable fields will be granted course credits for work which is equivalent to required courses in the program.

The program includes approximately 16 to 20 semester hours of coursework in the applied area.

Qualifying Examinations
The student must demonstrate mastery of probability theory and statistical inference, Statistics 563, 564, by passing a written qualifying examination.

Mastery of 12 to 14 semester hours in mathematics coursework must be demonstrated by passing a written qualifying examination. Topics normally include numerical analysis, either Mathematics 471, 472, 453, and 571, or 571-572, and real analysis, Mathematics 445-446. Other options may be approved. In exceptional circumstances, the faculty will consider waiving the mathematics and/or statistics qualifying examinations.

These requirements generally are completed by the end of the first year of the program. There is no foreign language requirement.

Comprehensive Examination
Prior to admission to candidacy for the degree, and normally after completion of the second year of the program, the student must pass a written comprehensive examination covering the theory of deterministic and stochastic management science models. Topics included in this examination are determined on an individual basis. Students will be expected to demonstrate an integrative ability that goes beyond simple mastery of course content.

Research and Dissertation
The student must complete 24 semester hours of Management Science 600: Doctoral Research and Dissertation, through which he/she is expected to make a significant contribution to the science. A final oral examination is conducted over the dissertation and such other segments of the program that the faculty deems appropriate. This effort, which is normally 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 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
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 (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or takes course work. May be used toward degree requirements. May be repeated: S/NC only, E
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. F
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-based tree methods. Prereq: 531 or equivalent.
631 Integer Programming (3) Theoretical and computational aspects of linear programming with integer variables, branch and bound, cutting planes, and group theoretic algorithms. Prereq: 531 or equivalent.
651 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.
691-92 Management Science Seminar (1,1) Subjects selected from current literature. S/NC only.

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 (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 Buyer Behavior—Analysis for Marketing (3) Consumer behavior concepts and processes developed and applied to market analysis and design, and control of marketing programs. Social psychology and demographic factors that affect consumer product, brand and patronage decisions. Prereq: Business Administration 504 and 505 or consent of instructor.
504 Analyzing Market Opportunity for Marketing Decisions (3) Major determinants of opportunity in markets, framework for finding markets and analyzing them for opportunity, application of market opportunity analysis to marketing strategy decisions. Prereq: Business Administration 504 and 505 or consent of instructor.
505 Marketing Research and Information Planning (3) Design of a rigorous marketing study from inception to implementation of results by recognizing key decision points and critically evaluating merit of research project. Prereq: Business Administration 504 and 505 or consent of instructor.
506 Marketing Strategy (3) Integration of concepts and analytical skills from each component area of marketing to formulate cohesive, well-organized marketing programs. Social psychology and demographic factors that affect consumer product, brand and patronage decisions. Prereq: Business Administration 504 and 505 or consent of instructor.
510 Principles of Marketing Management for Non-MBA Students (3) For students from other disciplines interested in obtaining knowledge of marketing discipline at graduate level.
511 MBA Marketing Concentration (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 MCA and various information sources and procedures; identify and analyze sales opportunities in markets for new product or service. Prereq: Consent of instructor.
593 Independent Study (3) Directed research and study. Prereq: MBA Core and consent of instructor. May be repeated. Maximum 6 hrs.
599 Special Topics Seminar (3) Topics vary; nonbusiness marketing applications, macroenvironmental issues, market segmentation, international marketing, services marketing, marketing channels, and related issues. Prereq: Consent of instructor. May be repeated. Maximum 8 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 (3) Research process: problem formulation, research and experimental design, measurement and implementation of results. Design: experimental design, survey research, and measurement.
603 Marketing Thought (3) Marketing literature across number of research areas. Evaluate individual works, determine state of research in each area, and identify areas that merit further study.
604 Seminar in Buyer Behavior Research (3) Behavioral study of people in their roles as buyers and users of goods and services both individual and group processes.
605 Research Methods (3) Analytical study of marketing decisions and role of quantitative methods. Models and model building in marketing: consideration of decision theory, linear programming, simulation and other mathematical representations of marketing phenomena.
606 Special Topics (3) Topics vary: marketing strategy, advanced consumer behavior, influence and persuasion theory and strategy, pricing issues, international marketing issues, and nonprofit organization marketing issues.

Logistics and Transportation

GRADUATE COURSES
501 Survey of Logistics and Transportation (3) U.S. logistics and transportation: physical, economic, social, and political environment; financing, managing, maintaining, and enhancing U.S. transport infrastructure.
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student 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 Freight Carrier Systems and Management (3) Analysis of freight carrier management’s efforts to provide services demanded by consumers in logistics and transportation marketplace.
506 Logistics Systems Management (3) Development of strategy for management of logistics systems. Executive level integration of logistics operations with marketing, production, and other decision areas. Practical applications through case approach and simulation game.
507 International Logistics and Transportation (3) Logistics strategy in the multinational firm: materials management, international sources and distribution, and importing/exporting issues; international carrier management and operations; and comparative national transport systems analysis.
508 Executive-In-Residence Seminar in Logistics and Transportation Strategy (3) Capstone, integrative case course in logistics and transportation strategy. Participation in Executive-In-Residence program that provides student interaction with top-level logistics and transportation executives.
593 Independent Study (3-6) Directed research and study. Prereq: Consent of instructor. May be repeated.
599 Special Topics in Logistics and Transportation (3-6) Seminar designed to study specific current problem areas in logistics and transportation. Topic announced prior to offering. Prereq: Consent of instructor. May be repeated.
600 Doctoral Research and Dissertation (3-15) P/NP only. E
601 Seminar in Logistics and Transportation Models (3) Analysis of contemporary models and methodologies
602 Seminar in Evolution of Logistics Thought (3) Traces evolution of logistics and transportation thought: dynamic development of principles and tools developed as organizational missions and environmental change. Economic and policy issues peculiar to transportation and other service organizations.

603 Research Methodology in Logistics and Transportation (3) Various research methods used in logistics and transportation. History and development of body of knowledge. Review of literature. Discussion of contemporary research issues. Development of student's dissertation research proposal.

Materials Science and Engineering

(College of Engineering)

MAJORS DEGREES
Metallurgical Engineering M.S., Ph.D.
Polymer Engineering M.S., Ph.D.

Joseph E. Spriuill, Head

Professors:
Bogue, Donald C., Ph.D. Delaware
Borie, Bernard S., Ph.D. MIT
Brooks, C. R., Ph.D. Tennessee
Buchanan, Raymond A., Ph.D. Vanderbilt
Clark, Edward S., Ph.D. California
Fellers, J. F., Ph.D. Akron
Lieu, P. K., 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)
Spriuill, Joseph E. (Liaison), Ph.D. Tennessee
Stansbury, E. E. (Emeritus), Ph.D. Cincinnati

Associate Professors:
Becker, William T., Ph.D. Illinois
Benson, R. S., Ph.D. Florida State
Meek, Thomas T., Ph.D. Ohio State

Graduate programs are offered leading to the degrees of Master of Science and Doctor of Philosophy in Metallurgical 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; these include physics, chemistry, chemical engineering, mechanical engineering, electrical engineering, materials engineering, and engineering science programs. Prospective students should consult materials science and engineering faculty concerning development of individual concentrations or special programs compatible with their backgrounds and goals.

Areas of concentration within the metallurgical engineering program include physical metallurgy; materials processing; welding metallurgy and materials joining; corrosion behavior; failure analysis; and mechanical and physical behavior of materials. Specializations in electronic and ceramic materials are available.

Areas of concentration within the polymer engineering program include rheology and polymer processing; polymer morphology; mechanical, physical and chemical behavior of polymers; and composite materials.

THE MASTER'S PROGRAM

Thesis Option
A total of 30 semester hours is required for the M.S. degree in either Metallurgical Engineering or Polymer Engineering. Additional requirements include:
1. A major consisting of 12 to 18 semester hours 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 meeting will consider each application individually. 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 53 hours in graduate courses in metallurgical engineering, polymer engineering and related areas. The minimum requirements are 21 hours in the Department of Materials Science and Engineering and up to 12 hours in other engineering or science courses. The candidate's degree program must be approved by the faculty committee.
2. Satisfactory completion of a critical review of the literature in an area related to metallurgical or polymer materials engineering (580).
3. Satisfactory performance in an oral examination to be conducted by the faculty committees and covering the review paper and other areas of metallurgical or polymer engineering.

THE DOCTORAL PROGRAM

Students applying for entrance into the doctoral program must display concrete evidence of ability to perform and report independent research to the satisfaction of the department. The 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 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.

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

3. The comprehensive examination, usually given in two parts, and covering such topical areas as materials science and engineering, metallurgical or polymer engineering courses, processes, thermodynamics, technology, mathematics, physics, chemistry, and other related fields.
4. Active participation in graduate seminars conducted by the department. Resident students must register for the appropriate 503 or 504 every semester offered.

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 the state of Virginia; the M.S. and Ph.D. programs in Polymer Engineering are available to residents of Arkansas, 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; microradiographic techniques.

421 Mechanical Behavior of Materials II (3) Description of stress and strain; linear and non-linear constitutive equations; superelasticity; martensitic transformation; stress, strain, and temperature; applications of linear elasticity; periodicity stresses; fatigue, creep, and fracture; surface treatments; superconductors; thin films.

422 Chemical Process Metallurgy (3) Application of chemical thermodynamics to metallurgical processing; precipitation and nucleation; pyrometallurgical refining; slag, metal equilibria, solidification, gas-melt processing.

426 Materials Joining (3) Processes for joining metals, polymers and ceramics: mechanical, adhesive, fusion-soldering/crystalization; surface characteristics necessary for joining and chemical bonding; thermal effects on structure and properties of joints; design of joints.


443 Polymer Processing (3) Rheological measurements; flow through tubes and dies, and effects and extrudate swell; selected applications; 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 identification; design and selection criteria; processing techniques; characterization laboratory.

470 Environmental Degradation of Materials (3) Mechanisms, measurement techniques and control of environmental degradation processes in metals, polymers, ceramics and composites: materials selection and design considerations.

Prep: Introduction to Materials Science and Engineering. Recommended for chemical engineering, mechanical engineering 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.
Prep: 302 or equivalent.

474 Biomaterials (3) Polymers, metals and ceramics used in orthopedic, cardiovascular, and dental surgical implant devices; corrosion and degradation problems; material properties of primary importance; tissue response to synthetic materials.
Prep: 201. Recommended for engineering science and mechanics majors.

475 Fracture-Safe Design (3) (Same as Engineering Science and Mechanics 423.)
THE DOCTORAL PROGRAM

For the Ph.D. program in Mathematics, the student must meet the following four requirements in addition to those of The Graduate School:
1. Satisfy either the standard program or the interdisciplinary mathematical ecology concentration. A student intending to work in mathematical ecology may complete either but is encouraged to complete the interdisciplinary mathematical ecology concentration. A student may elect to switch from one to the other provided the constraints for either 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, and III. At least two groups must be represented in the three written examinations. At least three groups must be represented in the five subjects.


A student's five subjects may not include both Real Analysis and Applied Linear Analysis or both Mathematical Principles of Fluid Mechanics and Mathematical Principles of Continuum Mechanics. A student may not count examinations in both Ordinary Differential Equations and Partial Differential Equations, but both may be included in a student's five subjects. With prior approval of the graduate committee, a student may utilize as a Group IV course a year-long graduate-level sequence from outside the Department of Mathematics. At most one such utilization may be made.

A student may take as many written examinations as desired at any time the examinations are given, subject to the following conditions:

a. The examinations to be taken must be approved in advance by the student's advisory committee.
b. At any one time a student may take at most only the number of examinations necessary to complete the requirements.
c. A student may take a collection of written examinations a maximum of 3 times, but no one failing 4 examinations, counting possible repetitions, will be permitted to take another examination. An exception is that a student who does not have a master's degree in mathematics and who has been enrolled in a UTK graduate program in mathematics no longer than one year may take written examinations at one time during that year without having that sitting for the examinations or any incurred failure(s) count toward the limits imposed above.
d. At least two examinations must be taken and at least one must be passed before the start of a student's fourth year. Three examinations must be passed before the start of a student's fifth year.

In lieu of earning a grade of B+ or better each semester in a sequence from Group I, II, or III, a student may demonstrate proficiency in that subject by passing the associated written examination. For this purpose, only one examination is permitted for each of up to two subjects, and this use of a written examination must be declared before the examination is taken so that the credit for the examination and any failure are not counted towards the limits in condition c.

Mathematical Ecology Concentration

The student must pass written examinations in three subjects:
1. Mathematical Ecology 581-82
2. A subject from Groups I, II, and III of the standard program
3. A subject represented by a year-long graduate-level sequence from outside the Department of Mathematics. The sequence must be approved in advance by the mathematical ecology faculty and by the departmental Graduate Committee. At least one member of the mathematical ecology faculty must be involved in the grading of the examination. The examination in this subject may be taken only twice.

The student also must earn grades of B+ or better each semester in the courses associated with two additional subjects. The two subjects 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.

461 Topology (3) Topology of line and plane, separation properties, compactness, connectedness, continuous functions, homeomorphisms, and topological invariants. Prereq: 341 or consent of instructor.

471 Numerical Analysis (3) Computation, instabilities, and roundoff errors. Interpolation, 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.)


490 Readings in Mathematics (1-3) Open to superior students with consent of department head. Independent study with faculty guidance. Prereq. Consent of faculty mentor to supervise independent work. May be repeated. 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 faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N only. E

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 algebraic equation solving. 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.


513-14 Mathematical Principles of Fluid Mechanics (3) Equations of motion of compressible and incompressible potential flow, shock waves, viscous flows, Navier-Stokes equations. Prereq: 431, 435, and 445-446 or 404, or consent of instructor.

515-16 Analytical Applied Mathematics (3) Analysis of problems generally associated with the context for applied problems: dimensional analysis and scaling, perturbation theory, variational approaches, transform theory, wave phenomena and conservation laws, stability and bifurcation, distributions, integrals. Prereq: 446 or 448, 453, and either 511-12 or both 431 and 435.

517-18 Mathematical Methods in Physics (3,3) (Same as Physics 571-572.)

519 Seminar in Applied Mathematics (1-3) May be repeated. Maximum 12 hrs.


523-24 Probability (3,3) Pertinent facts from measure theory, definition of abstract probability spaces; Kolmogorov's existence theorem, existence of independent random variables and laws of large numbers; general theory of distributions of random vectors and their characteristics; weak convergence and Levy's continuity theorem in Euclidean spaces; infinitely divisible distributions and central limit problems; general concepts of conditional expectation, martingales, Doob's martingale and optional sampling theorems. Prereq: 445-46. Recommended prereq: 423.

525-26 Statistics (3,3) Pertinent facts from probability theory: probability of sets, independence, probability models. Fisher-Neyman factorization theorem, exponential families, Bayesian models; methods of estimation and optimality theory; uniform minimum variance unbiased estimates, asymptotic efficiency and optimality, the confidence procedures and hypothesis testing; optimal tests and confidence intervals, the Neyman-Pearson lemma, uniformly most powerful tests; general linear models, estimation and tests in linear models; non-parametric models, rank methods for comparison, linear regression and independence, robust tests, topics from decision theory. Prereq: 445-46. Recommended prereq: 425.

527 Stochastic Modeling (3) Models in probability applied to real world situations: queuing theory, branching processes; Monte Carlo simulation. Prereq: 445-46 or consent of instructor.


534 Calculus of Variations (3) Necessary conditions for extreme, Euler's equation, broken extremals, Weierstrass-Erdmann conditions. Sufficient conditions for extreme Legendre's and Jacobi's conditions, conjugate points. Multiple integrals. Prereq: 431.

535-36 Partial Differential Equations (3,3) First order equations, classification of equations and properties of elliptic, hyperbolic, and parabolic equations in several variables. Prereq: 445-46 and 231 or consent of instructor.

537-38 Mathematical Principles of Continuum Mechanics (3,3) Conservation principles, equations of equilibrium for fluids, elastohydrostatic, constitutive relations and stress, convexity properties, bifurcation phenomena, existence theory. Prereq: 431, 435, 446 or 448, or consent of instructor.

539 Seminar in Differential Equations (1-3) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.


543-44 Complex Analysis (3,3) Theory of complex functions. Cauchy's theorem, Laurent series, maximum
599 Seminar in Mathematics (1-3) May be repeated. Maximum 12 hrs.

550 Matrix Algebra (3) Advanced topics in matrix theory: decompositions, singular value decomposition, and applications to mixture problems with special structure. Prereq: 453 or consent of instructor.

551-52 Modern Algebra (3,3) Groups, rings, modules and linear algebra, fields and Galois theory. Must be taken in sequence. Prereq: 455-56 or consent of instructor.

553 Linear Programming (3) Theory and applications. Prereq: Consent of instructor or 463 and programming ability.


555-56 Number Theory (3,3) Introduction to algebraic number theory. Prereq: 455-56 or consent of instructor.

559 Seminar in Algebra (1-3) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.


579 Seminar in Numerical Mathematics (1-3) May be repeated. Maximum 12 hrs.

561-62 Mathematical Geometry (3,3) Deterministic and stochastic models of populations, communities, and ecosystems. Prereq: 431, 453 or consent of instructor.

583 Mathematical Evolutionary Theory (3) Population genetics and evolutionary ecology. Prereq: 431, 453 or consent of instructor.


589 Seminar in Mathematical Ecology (1-3) May be repeated. Maximum 12 hrs.

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

598 Graduate Reading in Mathematics (3-15) May be repeated. Consent of department.

600 Doctoral Research and Dissertation (3-15) May be repeated. Consenting instructor or 463 and programming ability. Prereq: 561-62, 531, 667, or consent of instructor.

609 Seminar in Topology (3) May be repeated with consent of department. Maximum 12 hrs.


679 Seminar in Numerical Mathematics (1-3) May be repeated with consent of department. Maximum 12 hrs.

681-82 Advanced Mathematical Ecology (3,3) Selected topics in theoretical and applied mathematical ecology: population, community, ecosystem ecology and applied topics such as demography, ecotoxicology, epidemiology, environmental change, and resource management. Prereq: 581-82. May be repeated.

Mechanical and Aerospace Engineering (College of Engineering)

MAJORS

DEGREES

Aerospace Engineering....................................................M.S., Ph.D.

Mechanical Engineering..................................................M.S., Ph.D.

A. J. Edmondson, Acting Head

Professors:

Arimilli, R. V., Ph.D................................................VPI

Braun, G. W. (Emeritus) (UTSI), Ph.D..................................................Gallatin

Collins, Frank G. (UTSI), Ph.D., PE, Ph.D. ..................California

Crawford, R. A. (UTSI), Ph.D...........................Tennessee

Edmondson, A. J., PE, Ph.D.............................Texas A&M

Fiordano, Gary A. (Boiling Chair in Space Propulsion) (UTSI), Ph.D...........................Catech

Garrison, G. W. (UTSI), Ph.D........................................NC State

Hodgson, J. W. (Fisher Prof.) (UTSI), Ph.D.-----------------Georgia Tech

Holand, R. W. (Emeritus), Ph.D...........................M.S., Ph.D.

Johnson, W. S., Ph.D...............................................Tennessee

Kranes, R. J., Ph.D..................................................New Mexico

Li, H. Y., M.S......................................................New Mexico

M. A..................................Georgia Washington

Lo, C. F. (UTSI), Ph.D...........................................Cornell

Maxwell, R. L. (Emeritus), Ph.D..........................Case Western

M. S......................................................Case Western

Milligan, Mancil W., Ph.D...........................................Tennessee

Newman, M. K. (Emeritus) (UTSI), Ph.D.........................Penn State

Parang, M., Ph.D..................................................Columbia

Parr, J. R., PE, Ph.D..................................................Ohio State

Peters, C. E. (UTSI), D.A.S......................................Brussels

Pitts, Robert D. (UTSI), Ph.D.............................................GeorgeTech

Schuh, R. J., Ph.D..................................................Ohio State

Shang, H. F. (UTSI), Ph.D...........................................Ohio State

Smith, G. V., PE, Ph.D...........................................Penn State

Speckhart, Frank H., PE, Ph.D.................................Georgia Tech
Course Option

This option is restricted to those students who have had the equivalent of a thesis experience or, at the time of completion of the degree requirements, have had at least three years of full-time engineering experience since receiving the Bachelor of Science degree. The evaluation of the work experience and the final selection of the student’s program of study are left to the student’s committee. The requirements of this option are that the student must satisfactorily complete a program of study that includes:

1. A minimum of 30 semester hours of coursework that includes at least 18 semester hours of graduate (500 level or above) courses in the department with at least 12 semester hours in the major and normally 6 semester hours of coursework (400 level or above) in mathematics. No more than 3 semester hours of engineering coursework may be below the 500 level.
2. Participation in the departmental seminar program.
3. Passing a comprehensive written and oral final examination on all coursework submitted for the degree. The student’s committee will be of sufficient size to include all of the study areas reflected in the course program.

Problems Option

The requirements of this option are that the student must satisfactorily complete a program of study that includes:

1. A minimum of 24 semester hours of coursework that includes at least 12 semester hours of graduate (500 level or above) courses in the department with at least 6 semester hours in the major and normally 6 semester hours of coursework (400 level or above) in mathematics. No more than 3 semester hours of engineering coursework may be below the 500 level.
2. A minimum of 6 semester hours in 590 Selected Engineering Problems. A written report must be presented for each problem investigated.
3. Participation in the departmental seminar program.
4. Passing a comprehensive written final examination on all coursework submitted for the degree and an oral examination on all work (including problems).

THE DOCTORAL PROGRAM

Admission into the doctoral program will be granted to those applicants who have demonstrated superior achievement in their engineering backgrounds.

The student must satisfactorily complete an approved program of study that includes a minimum of 72 semester hours credit beyond the Bachelor’s degree, exclusive of credit for the M.S. theses or problems, including:

1. Twenty-four semester hours in doctoral dissertation.
2. 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.
3. A minimum of 24 semester hours in the department in courses numbered 500 and above, with at least 12 of these semester hours in the major. A minimum of 9 semester hours of courses is required at the 600 level. These are exclusive of thesis, problems, or dissertation credit. The student’s advisory committee can approve a student's petition to replace one 600-level course with one or more 500-level courses (s) that are more appropriate.
4. Participation in the departmental seminar program.
5. The passing of a written and oral comprehensive examination is required as well as a successful defense of 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 Ph.D. program in Aerospace Engineering is available to residents of the state of Kentucky, and the M.S. in Aerospace Engineering is available to residents of Kentucky. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE CREDIT FOR UNDERGRADUATE COURSES

Senior (400-level) mechanical and aerospace engineering courses may be taken for graduate credit by non-mechanical or non-aerospace engineering majors, if approved by the student’s major department. Mechanical or aerospace engineering majors may not normally use more than one 400-level engineering course to meet their advanced degree requirements. Non-mechanical or non-aerospace engineering graduate students should consult with instructors regarding prerequisites for undergraduate courses.

Mechanical Engineering

NOTE: Not all the courses listed below are available at both the UT Knoxville and the UTSI campuses.

422 Environmental Noise (3) Basic principles of acoustics: measurements and control of noise in industrial and community environments. Prereq: Senior standing in engineering or consent of instructor.


451 Systems and Controls (3) Analytical models of physical systems comprised of combinations of mechanical, fluid, electrical, and thermal components; feedback control systems, transient and frequency response; stability analysis; non-linear control systems, sampled data systems, digital filters. Prereq: Mechanical Engineering Instrumentation and Measurement, Circuits and Electro Mechanical Components. F, Sp

455 Introduction to Design (2) Engineering economy, optimization, design for automation, reliability, patents and product liability; design of mechanical engineering solid mechanics system. Participation in team design effort; design report. Prereq: Dynamics and Vibrations of Machines.

456 Introduction to Thermal Design (2) Engineering economy, optimization, design for automation, reliability, patents and product liability; design of mechanical engineering heat transfer-fluid systems. Participation in team design effort; design report. Prereq: 332, 344. F

486 Machines Design II (3) Application of strength and properties of materials, design factors, theories of failure to design of machine elements. Mini design experiences. Prereq: Materials Science and Engineering 301, Engineering Science and Mechanics 321. F, Sp

Refrigeration and Air Conditioning (3) Vapor compression and absorption cycles; heat pump systems; psychrometric processes; air washers; cooling towers; solar radiation; building heat transmission. Preq: 332, 344. F, Sp

Thermal Engineering (3) Thermal systems, turbomachinery, heat exchangers, combustion and system analysis and design; second law and economic analysis. Preq: 332, 344, F, Sp

Thermal Engineering Design (4) Design of complete thermal-fluid system, economic, technical and optimization aspects. Participation in team design effort, formal presentations and design report. Preq: 456, 466. Sp

Internal Combustion Engines (3) Thermal phenomena in combustion and propulsion engines. Combustion, detonation; equilibrium; dissociation; Analysis of internal combustion engines using ideal and real fluids. Preq: 332, 344.

494-95 Selected Topics in Mechanical Engineering (1-1,4) Problems and topics related to developments and practices in mechanical engineering. Preq: Consent of instructor. E

500 Thesis (1-1,5) P/NP only. E

502 Registration for Use of Facilities (3-15) Required Prerequisite: Consent of advisor. E

503 Application of Numerical Linear Algebra in Systems and Control Engineering (3) (Same as Chemical Engineering 507 and Electrical and Computer Engineering 507.)

508 Computational Mechanics (3) (Same as Engineering Science and Mechanics 551.)

509 Computational Mechanics Laboratory (1) (Same as Engineering Science and Mechanics 559.)


514 Phase Change Heat Transfer (3) Mechanisms and modeling of nucleate, transition and film boiling processes; critical heat flux; forced convection boiling and post dry-out; condensation processes; heterogeneous nucleation; dropwise and filmwise condensation; flow condensation; liquid-solid phase change processes; gas-solid phase change processes; mathematical modeling. Preq: 444, 511.

516 Computational Fluid-Thermal Analysis (3) (Same as Engineering Science and Mechanics 552.)

521-22 Thermodynamics I and II (3,3) Macroscopic thermodynamics, including First and Second Law analysis, availability, phase and chemical equilibrium criteria, combustion, gas mixtures, and property relations, determination of fluid properties, fundamentals of thermodynamics, real and ideal heat structures, spectroscopic data, kinetic theory, statistical mechanics, quantum physics. Schroedinger equation. Preq: 332.

523 Special Topics in Thermodynamics (3) Application of thermodynamic topics to current excitement in mechanical engineering. Preq: Consent of instructor.

525 Combustion and Chemically Reacting Flows I (3) Fundamentals: thermodynamics, chemical kinetics and combustion equation; 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. Preq: 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 flames; turbulent reacting flows with premixed and/or non-premixed reactants; spray combustion modes; fluidized bed combustion; chemically reacting boundary layer flow; gas turbine and/or rocket motor combustors; furnaces; introduction to supercritical combustion and hypersonic flows. Preq: 525.


552 Development of Superior Products and Processes (3) Case studies of recent technical developments in mechanical engineering. Preq: Consent of advisor. E


555 Computational Solid Mechanics (3) (Same as Engineering Science and Mechanics 553.)

556 Computer Aided Mechanical Design (3) Applications of matrices and computational techniques in static and dynamic analysis and re-design of complex, three-dimensional, statically indeterminate structures. Preq: 559 or consent of instructor.

557 Dynamics of Machinery (3) Kinematics and kinetics; fixed, moving and rotating coordinate systems; linear and angular momentum; energy methods; computational techniques derived from Lagrangian mechanics; variable mass; rigid body dynamics. Preq: 395, 391.

559 Vibrations (3) Free and forced vibration of single and multiple degree of freedom systems, linear and nonlinear. Preq: Undergraduate vibrations course.


575 Applied Artificial Intelligence (3) (Same as Nuclear Engineering 575 and Engineering Science and Mechanics 575.)

576 Expert Systems in Engineering (3) (Same as Nuclear Engineering 576 and Engineering Science and Mechanics 576.)

577 Neural Networks in Engineering (3) (Same as Nuclear Engineering 577 and Engineering Science and Mechanics 577.)

581 Rocket Propulsion I (3) Rocket propulsion fundamentals; thermodynamics of nonreacting and chemically reacting gases, rocket nozzle theory; ideal rocket performance parameters; rocket heat transfer, chemistry of propellants, liquid rocket engine systems; ground testing and reduction to solid propellant rockets. Preq: Consent of instructor.

582 Rocket Propulsion II (3) Solid propellant rocket performance, homogeneous and heterogeneous propellant chemistry and combustion system performance, thermal decomposition and gas phase reaction models; effect of chamber pressure and additives on solid propellant burn rates, erosive burning, analysis of two-phase solid rocket exhaust flow. Introduction to nuclear and electric propulsion; electrical resistance and electric field (ion) engine performance, magnetohydrodynamic thrusters, traveling wave thrusters, exotic propulsion systems. Preq: Consent of instructor.

584-85 Turbomachinery Systems I, II (3,3) Ideal cycle analysis of turbine engines, real cycle analysis, component performance analysis, component design and systems integration (mats, nozzles, combustors, compressors, turbines), flowthrough theory, turbine engine components, component matching, transient operation, surge and rotating stall engine control systems, structural considerations. Preq: First year graduate standing and consent of instructor.


588 Measurement Science I (3) (Same as Nuclear Engineering 588, Aviation Systems 588, Civil Engineering 588, Engineering Science and Mechanics 588, and Aerospace Engineering 588.)

590 Selected Engineering Problems (2-4) Enrollment limited to students in programs program. Preq: Consent of advisor. May be repeated. S/NC only.

595 Seminar (1) All phases of mechanical engineering, reports on current research at UTK and UTMS. May be repeated. S/NC only.

599 Special Topics in Mechanical Engineering (1-3) Preq: Consent of instructor. May be repeated. Maximum 6 hrs.

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

610 Advanced Topics in Fluid Mechanics and Heat Transfer (3) Advanced theory and application of fluid mechanics and heat transfer; natural convection, multiphase flow, high speed and nonreacting flows, advanced boundary layer techniques, combustion, perurbation and the variational methods of analysis, heat exchanger theory and design. May be repeated. Maximum 9 hrs. Preq: Consent of instructor.

611 Advanced Convection Heat Transfer, Fluid Mechanics and Mass Transfer (3) Stagnation point and high speed viscous boundary layers; problems in heat transfer at high supersonic and hypersonic speeds; laminar and turbulent boundary layer heat transfer with surface film boiling, ablation, aerothermodynamic properties from nuclear gas species recombintion; stagnation point heat transfer, Lewis's integral solution for high speed boundary layers; heat flux scaling rules, mass transfer and radiation cooling techniques. Preq: 512 and consent of instructor.

612 Numerical Modeling in Heat Transfer, Fluid Mechanics and Mass Transfer (3) Stagnation point and high speed viscous boundary layers; problems in heat transfer at high supersonic and hypersonic speeds; laminar and turbulent boundary layer heat transfer with surface film boiling, ablation, aerothermodynamic properties from nuclear gas species species recombintion; stagnation point heat transfer, Lewis's integral solution for high speed boundary layers; heat flux scaling rules, mass transfer and radiation cooling techniques. Preq: 512 and consent of instructor.

613 Advanced Radiation Heat Transfer (3) Radiation heat transfer in absorbing, emitting and scattering media;
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 of solids, vibration, and strength of materials. Prereq: Consent of instructor. May be repeated up to 9 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.

561-52 Advanced Topics in Computational Fluid Dynamics (3,3) (Same as Engineering Science and Mechanics 651-52.)

563-54 Advanced Topics in Computational Solid Mechanics (3,3) (Same as Engineering Science and Mechanics 653-54.)


671 Advanced Topics in Applied Artificial Intelligence (3) (Same as Nuclear Engineering 671 and Engineering Science and Mechanics 671.)

### 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, transonic, and supersonic airfoils. 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


425 Propulsion (3) Principles of propulsion devices: turbojet, ramjet and rocket engines. Prereq: 351. F

426 Introduction to Aerospace Design (2) Design process, synthesis, safety, reliability, patents, product liability, economic analysis, optimization, design standards, design studies. Individual design reports. Prereq: 351, 370, 363. 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 standards and specifications. Analysis of data and formation 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.

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

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

511 Inviscid Flow (3) Kinematics and dynamics of inviscid fluids; good flows about bodies of conformal mapping. Prereq: 422 or Mechanical Engineering 531, Mathematics 425 or equivalent.

512 Viscous Flow (3) Equations of viscous fluid flow; laminar and turbulent flow; transition; separation; boundary layer theory; exact and approximate solutions. Prereq: Mechanical Engineering 531 or equivalent.

513 Experimental Methods in Fluid Mechanics (3) Experimental techniques with laboratory experiments; representative experiments; hot wire anemometry and turbulence measurements, flow visualization, wind tunnel techniques, supersonic flow experiments, boundary layer 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 flight conditions. Relations among thrust, lift, and altitude, propulsion systems, vehicle performance characteristics, and trajectory optimization. Prereq: 422; 515 for 516.

521-22 Aerodynamics of Compressible Fluids (3,3) One-dimensional internal and external flow; waves; small perturbation theory; slender body theory; similarity rules; method of characteristics. Prereq: 422; 521 for 522.

525 Hypersonic Flow (3) Slender body flow; similarity; Newtonian theory; blunt body flow; 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 wind tunnels and balance ranges; propulsion test facilities or air breathing and rocket engines; space environment and space vehicle test facilities. Prereq: 521 and 522. Mechanical Engineering 513 and 522.

529 Rarefied Gas Dynamics (3) Binary elastic collisions; kinetic theory; flow regimes; Boltzmann and model equations, transfer functions, gas-surface interactions; slip boundary conditions, free molecule, slip and transition flow; Monte Carlo simulation; experimental techniques; introduction to hypercritical real gas flows. Prereq: 522. Mechanical Engineering 513 and 522.

530 Flow in Porous Media (3) Theory of moving boundary flows; convection and diffusion in porous media. Prereq: 423 or 521.

531 Magnetohydrodynamics (3) Electromagnetic flow, chemical kinetic, thermodynamic and thermal-physical properties of gas plasmas; governing equations and applications. Prereq: 422 and Mathematics 471.

532 Introduction to Turbulence (3) Microscopic effects, analogies, statistical averages, correlation functions, energy spectra, diffusion, application 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: small disturbance theory; shock wave properties; shock-free flows; strong viscous interaction phenomena. Prereq: 422 or Mechanical Engineering 513.


556 Vertical or Short Take Off and Landing Aircraft (3) Performance, stability, control of rotary wing, tilt wing, vectored lift and jet-vert lift type aircraft. Vertical and transition flight modes. High lift airfoil, Automatic control, Simulation facility types and flight testing. Prereq: 555.

557 Vertical or Short Take Off and Landing Aircraft (3) Performance, stability, control of rotary wing, tilt wing, vectored lift and jet-vert lift type aircraft. Vertical and transition flight modes. High lift airfoil, Automatic control, Simulation facility types and flight testing. Prereq: 555.


561 Fundamentals of Aeronautics (3) Generation, propagation and absorption of sound in static and moving media. Prereq: Consent of instructor.

564 Spacecraft Attitude Dynamics and Control (3) Attitude dynamics of space vehicles. Gyroscopic instruments; passive and active attitude control devices. Linear control theory and attitude stabilization. Prereq: 551, Mathematics 471.


590 Selected Engineering Problems (2-6) Enrollment limited to students in problems program. Prereq: Consent of advisor.

596 Seminar (1) All phases of aerospace engineering, reports on current research at UTK. Prereq: May be repeated. S/NC only.

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


632 Magnetohydrodynamics II (3) Alfvén and shock waves, exact solution for magnetohydrodynamic channel flow, one-dimensional model of channel flow, engineering applications of magnetohydrodynamics, propulsion and power generation. Prereq: 631 and Mathematics 562.


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 combined viscous/inviscid effects. Relationships among various regimes of fluids flows. Fundamental assumptions, limitations of approximations and consequences. Foundations of gas dynamics, applications to airplanes, rockets, 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 6 hrs.

### Medical Biology

See College of Veterinary Medicine and Comparative and Experimental Medicine

### Metallurgical Engineering

See Materials Science and Engineering.
Microbiology

(29x661) Veterinary Medicine ................................ D.V.M.
Microbiology ..................................... M.S., Ph.D.

MAJOR

Veterinary Medicine) Microbiology

Assistant Professor:

Wust, Carl J. (Emeritus), Ph.D. . . . . Indiana
Savage, Dwayne C., Ph.D. . . . . . . . . . . . . . California
Riggsby, W. Stuart (Liaison), Ph.D. . . . . Yale
Moore, R. N., Ph.D. . . . . . . . . . . . . . . . Texas
Montie, T. C., Ph.D. . . . . . . . . . . . . . . . . Maryland

thedepartment head.

the M.S. and Ph.D. Students have the option of selecting from a variety of graduate research programs. For a departmental brochure, contact the department head.

ADMISSION REQUIREMENTS

Students are expected to have completed an undergraduate program with a 3.0 or better GPA on a 4.0 system. Included in the undergraduate course credits should be (1) a full year of general biological science, (2) one year of 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. The student is to adjust smoothly to the research programs of the department, to develop a background of research procedures and concepts, and to participate in the selection of a research professor. Usually the student selects a research professor toward the end of the laboratory rotation period. The major professor assists in the selection of and carrying out of a suitable research program and in the naming of a thesis or dissertation committee.

THE MASTER'S PROGRAM

The program leading to the M.S. is designed to provide the student with broad basic knowledge, to permit acquisition of technical competence in the fundamentals of research, and to encourage creative and independent thinking. Two to three calendar years are usually needed for the course of study that has the following requirements: (1) 30 hours including 6 thesis credits; (2) a 3.0 GPA in all courses taken for graduate credit after 12 hours of credit have been earned in courses graded on the A-F system; (3) a 3.0 GPA in courses taken in the department; (4) a complete course sequence in biochemistry or molecular biology; (5) presentation of a research thesis and its oral defense.

THE DOCTORAL PROGRAM

The program leading to the Ph.D. is designed to develop the student's ability to pursue independent and original research in microbiology and allied fields, to teach both oral and written communication of the results of research to the scientific community, and to train effective teachers. Students may enter the program after receiving either a bachelor's or master's degree. Students who enter with a bachelor's degree usually receive the Ph.D. after four or five years; those with the master's degree usually take three or four years to complete the degree. Departmental requirements are: (1) a 3.0 GPA in all courses taken for graduate credit after 12 hours of credit have been earned in courses graded on the A-F scale; (2) a 3.0 GPA in courses taken in the department; (3) satisfactory performance in at least one semester as a teaching assistant; (4) one semester of physical chemistry; (5) one course in statistics; (6) two semesters of biochemistry or molecular biology; (7) satisfactory performance in a comprehensive examination that must be attempted before the end of the fifth semester in the program and passed before admission to candidacy; and (8) the presentation of a research dissertation and its oral defense.

GRADUATE COURSES

410 Bacterial Physiology (3) Modern concepts of structure and function of bacterial cell. Prereq: Introduction to Microbiology. F

411 Bacterial Genetics (3) Transmission and expression of genetic information by bacteria. Prereq: Introduction to Microbiology. F

420 Medical Microbiology (3) Disease-producing microorganisms, including bacteria, rickettsia, chlamydia and fungi. Prereq: Introduction to Microbiology. S

429 Medical Microbiology Laboratory (2) Laboratory exercises designed to accompany 420. Prereq: Introduction to Microbiology. Coreq. S

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 Zoology 430.) F

439 Immunology Laboratory (2) Laboratory exercises designed to accompany 430. Coreq. S


449 Virology Laboratory (1) Laboratory procedures for isolation, handling, and culturing of animal viruses. Prereq., Cores. 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 for the student not otherwise registered during any semester when the student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N only, E

570 Applied and Environmental Microbiology (3) Topics in applied and environmental microbiology that treat physiology, metabolism, and genetics of microorganisms: fermentations and natural and simulated ecosystems. Prereq. 470 or consent of instructor.

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

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

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

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

594 Selected Topics in Microbiological Research (2-4) Literature surveys and discussions of selected topics. Prereq. Graduate standing. May be repeated. Maximum 6 hrs. S/N only.

595 General Seminar (1) Lectures and seminars by invited speakers, faculty, and graduate students. Maybe repeated. Maximum 16 hrs. S/N only.

596 Laboratory Rotation (1) Familiarization with research areas in department through series of rotations in laboratories of individual faculty members. May be repeated. Maximum 3 hrs. S/N only.

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

601 Journal Club in Microbial Physiology (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. S/N only. E

602 Journal Club in Microbial Pathogenesis (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. S/N only. E

603 Journal Club in Immunology (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. S/N only. E

604 Journal Club in Virology (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. S/N only. E

605 Journal Club in Microbial Genetics (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. S/N only. E

610 Topics in Microbial Physiology (1-3) Prereq. 410 or consent of instructor. May be repeated. Maximum 12 hrs.

620 Topics in Microbial Pathogenesis (1-3) Prereq. 420, 430 or consent of instructor. May be repeated. Maximum 12 hrs.

630 Topics in Immunology (1-3) Prereq. 430 or consent of instructor. May be repeated. Maximum 12 hrs.

640 Topics in Virology (1-3) Prereq. 440 or consent of instructor. May be repeated. Maximum 12 hrs.

650 Advanced Topics in Microbial and Molecular Genetics (3) Prereq. 411 or consent of instructor. May be repeated. Maximum 12 hrs.

670 Advanced Topics in Environmental Microbiology (1-3) Prereq. 570 or consent of instructor. May be repeated. Maximum 12 hrs.
The Department of Music offers the Master of Music degree with concentrations in accompanying, choral conducting, composition, instrumental conducting, jazz, music education, musicology, performance (organ, piano, strings, voice, winds, and percussion), piano pedagogy and literature, sacred music, string pedagogy, and theory.

Applicants must have completed an undergraduate degree approximately equivalent in music requirements to those required in degrees conferred by UT Knoxville, appropriate to the applicant's prospective area of concentration on the master's level.

Applicants who plan to pursue the concentration in performance or music education are required to audition before the appropriate area faculty committee. Applicants for admission to the program in composition must submit scores and tape recordings of representative works. Applicants for the concentration in music education must audition in jazz improvisation and piano proficiency and interview with members of the faculty in this area. Other applicants are required to have an interview with members of the faculty of the prospective area of concentration.

All applicants are required to take the Diagnostic Examinations in music theory, ear-training, and music history/literature. These examinations are given by the Department of Music at the beginning of each semester.

THE MASTER'S PROGRAM

A minimum of 30-33 semester hours of coursework is required for the Master of Music degree. These hours are specifically distributed according to the area of concentration. All concentrations have coursework in music history/literature and music theory and allow for elective courses. Specific curricula are available from the department.

The graduate recital is given in lieu of thesis by students with concentrations in performance, pedagogy (jazz, conducting), sacred music, and music education. A performance project is given in lieu of thesis by students with concentrations in choral conducting, instrumental conducting, and sacred music. A thesis is required of students in composition, musicology, and theory. All concentrations require a written and oral final examination.

Concentration in Music Education

The concentration in music education is designed for persons who hold a Bachelor's degree in Music or Music Education and certification to teach music in public schools or who are in-school music teachers. Students seeking initial certification should consult the requirements for the Master of Science degree in the College of Education.

The program requires 510 and 520, 9 hours of music education electives at the 500 level; 6 hours of Theory 510; 6 hours of 500-level courses in music theory or history; 2 hours of applied music at either the 400 or 500 level; 2 hours of music education course at the 500 level; and 3 hours of electives at the 500 level.

A three credit research problem and three extra hours of coursework in Music Education may be substituted for Thesis. If a larger thesis problem is desired, the thesis credit may be increased to 9 hours, and 3 hours of Music Education electives may be dropped.

Diagnostic tests in theory, ear training, and music history will be required.
Music General

GRADUATE COURSES

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

501 Graduate Recital (2)

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

511 Lecture Recital (2)

521 Special Topics in Performance (1-3) Prereq: Consent of department head.

540 Secondary Applied Music (1) May be taken by music majors desiring applied study on a 2nd or 3rd instrument. May be repeated for a maximum of 4 hours credit on each instrument. Admission by audition. Required payment of Applied Music fee.

551 Church Music Performance Project (1-2) May be repeated. Maximum 6 hrs.

GRADUATE COURSES

Music History

GRADUATE COURSES

410 Music History Genre (3) Topics vary. May be repeated. Maximum 6 hrs.

420 History of Opera (3) Dramatic, vocal, and orchestral elements in opera of Italian, French, and German schools, 1600-present.

430 Symphonic Literature (3) Literature for orchestra from Baroque to present, evolution of symphony.

440 Music of North America (3) Folk and art music of U.S. and Canada from colonial times to present.

450 Composer Seminar (3) Life and works of single composer. Subject vary.

460 Music Aesthetics (3) Nature of music and musical experience, sense perception and emotions, music, and role of artist in society. Aesthetic viewpoint of individuals and historical era through selected writings.

480 Music in Christian Worship (3) Hymnody, liturgies, and historical eras through selected writings.

490 Church Music Methods and Administration (3)

510 Music Bibliography (2) Bibliographic methodology in music.

520 Music Research (1) Principles of research methodology applied to writing of research proposal and project.

530 Music in the Middle Ages (3) Gregorian and medieval chant, secular monophony, and rise of polyphony.

540 Music in the Renaissance (3) From 1400 to 1600. Mass, motet, chansons, madrigal, and other vocal and instrumental forms and genres.

550 Music in the Baroque Period (3) From c.1600 to 1750; rise of opera and oratorio; sacred and secular cantatas, instrumental forms, performance practice.

560 Music in the Classic Period (3) Evolution of classical style from pre-classic music to music of Haydn, Mozart, and early Beethoven.

570 Music in the Romantic Period (3) Nineteenth-century musical styles from Beethoven to post-romantics.

580 Music in the Twentieth Century (3) From 1900, Debussy, to present, Stockhausen and others.

590 World Music (3) Attitudes and techniques of ethnomusicology. Survey of world music cultures. Interview and transcription projects.

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

Music Jazz

GRADUATE COURSES

410 Advanced Improvisation (3) Further development of individual skills and solving individual problems in jazz improvisation. Prereq: 210 and 220.

420 Jazz Pedagogy (1) Methods and materials relating to teaching of jazz, designing and administering jazz programs, and rehearsal techniques for jazz ensembles. Prereq: Studio music and jazz major or consent of instructor.

520 Seminar in Jazz (3) Topic varies.

Music Keyboard

GRADUATE COURSES

420-30 Piano Literature I-II (1,1) From 1750 to middle 18th century; 430--Middle 19th century to present; problems of style and interpretation; pedagogical literature and methods; organ design. Prereq: 440, 450, or consent of instructor.

495-95 Suzuki Piano Method I-II (2,2) Evaluation and study of methods and materials for teaching piano at all levels. Supervised laboratory teaching. Prereq: 440, 450, or consent of instructor.

520 Piano Literature Seminar (3) Topics vary. May be repeated. Maximum 6 hrs.

531-41 Recital Project (2,2) Preparation and accompaniment of full recital for accompanying concentrations only. 531--Vocal recital, 541--Instrumental recital. Prereq: Consent of instructor.

540-50 Advanced Piano Pedagogy I-II (2,2) Evaluation and study of methods and materials for teaching piano at all levels. Supervised laboratory teaching. Prereq: 440, 450, or consent of instructor.

560 Organ Literature Seminar (3) Topics vary. May be repeated. Maximum 6 hrs.

Music Performance

GRADUATE COURSES

All performance courses require an audition and consent of instructor. May be repeated. Maximum 8 hrs toward M.M. degree.

403 Flute (1-4)

405 Oboe (1-4)

410 Bassoon (1-4)

415 Clarinet (1-4)

420 Saxophone (1-4)

425 Horn (1-4)

430 Trumpet (1-4)

435 Trombone (1-4)

440 Baritone (1-4)

445 Tubas (1-4)

450 Percussion (1-4)

460 Voice (1-4)

465 Violin (1-4)

465 Viola (1-4)

470 Cello (1-4)

475 String Bass (1-4)

476 Electric Bass (1-4)

479 Guitar (1-4)

480 Piano (1-4)

485 Harpsichord (1-4)

490 Organ (1-4)

494 Composition (1-3)

495 Composition with Electronic Media (1-3)

496 Composition for Media (2)

499 Improvisation (1-2) May not be used toward applied music requirement.

503 Flute (1-4)

505 Oboe (1-4)

510 Bassoon (1-4)

515 Clarinet (1-4)

520 Saxophone (1-4)

525 Horn (1-4)

530 Trumpet (1-4)

535 Trombone (1-4)

540 Baritone (1-4)

545 Tuba (1-4)

550 Percussion (1-4)

555 Accompanying and Coaching (1-4)

556 Voice (1-4)

560 Violin (1-4)

565 Viola (1-4)

570 Cello (1-4)

575 String Bass (1-4)

576 Electric Bass (1-4)

579 Guitar (1-4)

580 Piano (1-4)

585 Harpsichord (1-4)

590 Organ (1-4)

594 Composition (1-3)

595 Composition with Electronic Media (1-3)

599 Improvisation (1-4)
Music Theory

GRADUATE COURSES


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.

563 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 singing diction in six languages: English, French, German, Italian, Latin and Spanish. Basic instruction in International Phonetic Alphabet; development of basic diction skills; overview of diction styles and traditions in each language; survey of diction resources and reference materials. Does not fulfill deficiency requirements for graduate students in voice or accompanying.

510 Vocal Literature Seminar (3) Topics vary. May be repeated. Maximum 6 hrs.

520 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.

550-560 Advanced Vocal Pedagogy I, II (2,2) 550–Study of vocal production, examination of different methods. 560–Study of teaching materials, observation of studio teaching, analysis of vocal problems in selected students, and supervised teaching.

570 Vocal Chamber Music Performance (2) Prereq: Consent of instructor.

580-85 Choral Literature I, II (2,2) Choral music from middle ages to present with consideration of historical development of major choral genres.

590 Advanced Choral Conducting (3) Expansions and continued refinement of conducting technique; 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.
A candidate must successfully defend, in an oral examination, all work presented for the degree—all coursework and 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 Ph.D. program in Nuclear Engineering is available to residents of the states of Alabama, Kentucky, or Mississippi. The M.S. program and the Ph.D. program in Nuclear Engineering allows legal residents of some states to enroll in certain sharing graduate programs allows legal residents of some state to enroll in certain sharing graduate programs. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE CREDIT FOR UNDERGRADUATE COURSES
400-level courses in nuclear engineering may be used for graduate credit. However, students must take at least two-thirds of the minimum required hours (30) in a master’s degree program must be taken in courses numbered 500 or above.

GRADUATE COURSES
403 Nuclear Engineering Laboratory (3) Cross-section measurement, diffusion properties of neutrons, critical loading experiment, control rod calibration, statistical weight, shielding, xenon poisoning, dynamics and controls experiments. Prereq: Nuclear Engineering Laboratory or equivalent. Coreq: 471, 455.


405 Reactor Dynamics, Control and Safety (3) Reactor models, transient analysis, safety analysis, control systems and safety systems. Prereq: 470.

406 Radiation Shielding (3) Types of radiation sources, fundamentals of gamma ray and neutron attenuation, biological effects, approximate methods of shield design, concrete ordnates, and Monte Carlo. Prereq: Physics 232.

421 Introduction to Nuclear Criticality Safety (3) Fundamentals of nuclear criticality safety; criticality accidents; safety standards, overview of experiments, computational methods for shield design. 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 Radioscopy and Dosimetry Laboratory (3) Measurements of radioactivity in various materials. Characterization of radiation fields, radiochemical techniques, alpha and beta spectroscopy; radiation dosimetry.

463 Introduction to Fusion Energy I (3) (Same as Electrical and Computer Engineering 463.)

464 Introduction to Fusion Energy II (3) (Same as Electrical and Computer Engineering 464.)

470 Nuclear Reactor Theory I (3) Fundamentals of reactor physics relevant to nuclear reactors, mathematical reactor kinetics, reactor system and nuclear data. Analytical and numerical methods applicable to general criticality problems, eigenvalue searches, perturbation theory, group-diffusion equations. Prereq: introduction to Nuclear Engineering.

471 Nuclear Reactor Theory II (3) Thermal spectrum computational methods: heterogeneous effects in fast and thermal spectra; considerations in reactor core design; equations that describe thermal and neutron variables; power distribution calculations and reactivity control methods. Prereq: 470.

494 Special Topics in Nuclear Engineering (3) Problems related to recent developments and practices. 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 (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 be repeated as a requirement. 5/NP 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 two-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 System Dynamics and Control (3) Introduction to state variable methods for system dynamics and control analysis and application of these methods to nuclear plant dynamics, simulation and control problems.


543 Selected Topics in Nuclear Criticality Safety (3) Criticality safety computational and experimental methods for enrichment, fabrication, storage, reprocessing, and transport applications; overview of safety practices and regulatory requirements. Prereq: 421 or consent of instructor.

550 Nuclear Instrumentation (3) Physics and electronics associated with radiation detection, methods of data analysis, applicability of particular instrumentation measurements and fundamentals of nuclear instrumentation operation.

551 Radiation Protection (3) Interactions of photons, neutrons, beta particles, and heavy charged particles with matter and methods of protection of personnel. 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 area work and environmental monitoring; dose assessment; pathways analysis; risk projections and regulations. Prereq: 551.

561 Plasma Diagnostics I (3) (Same as Electrical and Computer Engineering 561.)


572 Nuclear System Design (3) Design and analysis of a nuclear system, interface with non-nuclear aspects of system design: system reliability and economics, class project. Prereq: 571 or consent of instructor.

575 Applied Artificial Intelligence (3) Symbolic methods for artificial intelligence applications to engineering problems. Prereq: Consent of instructor. (Same as Engineering Science and Mechanics 575 and Artificial Intelligence 575.)

576 Expert Systems in Engineering (3) Application of expert systems in engineering: logic and rationale, developing expert systems, programming, advanced topics. Prereq: 575 or consent of instructor. (Same as Nuclear Engineering Science and Mechanics 576 and Mechanical Engineering 576.)

577 Neural Networks in Engineering (3) Neural network technology for use in intelligent systems; rationale for neural computing, structure of best neural network systems, programming. Prereq: Consent of instructor. (Same as Engineering Science and Mechanics 577 and Mechanical 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 and Mechanics 578.)

581 Reactor Shielding (3) Application of analytic/deterministic solutions of Boltzmann transport equation to shield design problems. Spherical harmonics, moments method, discrete ordinates, adjoint calculations, coupled analysis, and test reactor shield design. Prereq: 496 or equivalent.


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.)


589 Measurement Science II (3) Modern industrial measurement systems, advanced topics in measurement. Prereq: 588. (Same as Aviation Systems 589 and Engineering Science and Mechanics 588.)

597 Special Topics in Nuclear Engineering (3) Lectures and recitation on recent advances in nuclear engineering. Prereq: Consent of instructor. May be repeated with consent of department.

598 Nuclear Engineering Practice (3-9) Experience in solving and reporting on engineering problems. Prereq: Approval of department. May be repeated limited to alternative plan students. S/NC only.

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

611-12 Selected Topics in Reactor Theory (3,3) Transport theory, control rod theory, stochastic methods. Selected topics from literature. Prereq: 572.

621 Selected Topics in Radiation Protection (3) Prereq: 551, 552. May be repeated with consent of department.

635 Theory of Information Processing (3) Modern system theoretical methods for evaluating system performance from dynamic measurements. Prereq: 522 or equivalent.

571 Advanced Topics in Applied Artificial Intelligence (3) Recent advances in engineering applications of artificial intelligence. Prereq: 571. (Same as Engineering Science and Mechanics 571 and Mechanical Engineering 571.)

579 Special Topics in Nuclear Engineering (3) Investigation of new developments. Prereq: Consent of instructor.
Nursing
(College of Nursing)

**MAJOR**
Nursing ................................................................. M.S.N., Ph.D.

Joan E. Uhl, Dean
Mildred M. Fenske, Associate Dean for Academic Programs
Santha Thomas, Director of Ph.D. Program
Inez Tuck, Director of MSN Program

**Degree**

<table>
<thead>
<tr>
<th>Professor</th>
<th>Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allgood, Martha R., Ph.D.</td>
<td>New York</td>
</tr>
<tr>
<td>Goodfellow, Darla E., Ph.D.</td>
<td>Peabody</td>
</tr>
<tr>
<td>Mozingo, Johnie N., Ph.D.</td>
<td>Walden</td>
</tr>
<tr>
<td>Thomas, Sandra P., Ph.D.</td>
<td>Tennessee</td>
</tr>
<tr>
<td>Uhl, Joan, Ph.D.</td>
<td>Utah</td>
</tr>
</tbody>
</table>

**Associate Professors:**

| Bowen, Sheila, Ph.D.             | Tennessee                       |
| Davis, Itzi, Ph.D.               | Pennsylvania                    |
| Droppleman, Patricia G., Ph.D.   | Tennessee                       |
| Dyer, Theresa, Ed.D.             | Tennessee                       |
| Fenske, Mildred M. (Liaison), Ph.D.| Vanderbilt                     |
| Jolly, Mary Lou, Ed.D.           | Kentucky                        |
| McGuire, Sandra E., Ph.D.        | Tennessee                       |
| Modcrin-McCarthy, 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:**

| Branson, Janice O., M.S.N.       | Tennessee                       |
| Brown, Allie J., M.S.N.          | Tennessee                       |
| Conlon, Kathleen P., M.S.N.      | Tennessee                       |
| Evans, Ginger W., M.S.N.         | Tennessee                       |
| Evans, Maude M., M.S.N.          | Tennessee                       |
| Helton, Sally M., M.S.N.         | Tennessee                       |
| Kollar, Mary, Ph.D.              | Tennessee                       |
| Phillips, Kenneth D., Ph.D.      | Tennessee                       |
| Pierce, Margaret, M.S.N.         | Tennessee                       |
| Pullon, 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, parent-child nursing, mental health nursing, family nurse practitioner, and nursing administration.

**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.

**Special Requirements**

1. Each student must hold personal professional liability insurance.
2. Registered nurses must be licensed to practice nursing in Tennessee.
3. Each student must present proof of hepatitis B vaccination and rubella and rubeola immunization or sufficient titer for immunity; TB status.
4. Each student must present evidence of current 2-person CPR certification.
5. Non-registered nurse students must have completed courses in chemistry, nutrition, microbiology, anatomy, and physiology plus 12 semester hours of behavioral science courses.

**Thesis and Non-Thesis Options**

The thesis option is available for interested students and is especially encouraged for those who are considering pursuit of doctoral degrees sometime in the future. Students who choose the non-thesis option must register for 580 Nursing Project or 582 Supervised Research.

**Program Requirements**

All students must complete a minimum of 36 semester hours distributed as follows:

<table>
<thead>
<tr>
<th>Course (12 credits)</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>503-04 Holistic Nursing</td>
<td>6</td>
</tr>
<tr>
<td>510 Theoretical Foundations of Nursing</td>
<td>3</td>
</tr>
<tr>
<td>520 Nursing Resource Management</td>
<td>3</td>
</tr>
</tbody>
</table>

**Research (9-12 credits)**

- Graduate level statistics course
- 501 Nursing Research: Methods, Design & Analysis
- 500 Thesis
- 580 Nursing Project
- 582 Supervised Research

**Concentration (12 credits) -- choose one**

<table>
<thead>
<tr>
<th>Course (12 credits)</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>530-31 Adult Health Nursing</td>
<td>12</td>
</tr>
<tr>
<td>540-41 Family Nurse Practitioner</td>
<td>12</td>
</tr>
<tr>
<td>550-51 Parent-Child Nursing</td>
<td>12</td>
</tr>
<tr>
<td>560-61 Mental Health Nursing</td>
<td>12</td>
</tr>
<tr>
<td>590-91 Nursing Administration</td>
<td>12</td>
</tr>
</tbody>
</table>

**Elective (3 credits) -- waved for those who choose thesis option**

Students who enter the program as non-RNs must complete the following undergraduate nursing courses in addition to meeting the requirements listed above:

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>301 Clinical Pharmacology</td>
<td>3</td>
</tr>
<tr>
<td>302 Introduction to Professional Nursing</td>
<td>5</td>
</tr>
<tr>
<td>304 Nursing Assessment and Health Promotion</td>
<td>4</td>
</tr>
<tr>
<td>306 Health Deviation Concepts</td>
<td>3</td>
</tr>
<tr>
<td>311 Acute Care Nursing</td>
<td>10</td>
</tr>
<tr>
<td>316 Health Deviation Concepts</td>
<td>4</td>
</tr>
<tr>
<td>324 Nursing of Children and Adults</td>
<td>6</td>
</tr>
<tr>
<td>414 Community Mental Health Nursing</td>
<td>6</td>
</tr>
<tr>
<td>415 Family/Community Health Nursing</td>
<td>6</td>
</tr>
</tbody>
</table>

Registered nurses whose bachelor's degrees are not in nursing must have complete courses in chemistry, nutrition, microbiology, anatomy, and physiology plus 12 hours of behavioral science courses. They must also complete 304, 305, 313, 315, and 403 and complete or successfully challenge the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>301 Clinical Pharmacology</td>
<td>3</td>
</tr>
<tr>
<td>306 Health Deviation Concepts</td>
<td>4</td>
</tr>
<tr>
<td>316 Health Deviation Concepts</td>
<td>4</td>
</tr>
<tr>
<td>325 Nursing of Children and Adults</td>
<td>6</td>
</tr>
<tr>
<td>402 Family Health Nursing</td>
<td>3</td>
</tr>
<tr>
<td>412 Psychosocial Long Term Nursing Theory</td>
<td>3</td>
</tr>
</tbody>
</table>

**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, educators, and/or administrators. Specifically, the graduate of this program should be able to:

1. Analyze, test, refine, and expand the theoretical basis of nursing practice.
2. Conduct nursing research that generates knowledge and advances nursing as a discipline.
3. Provide leadership as nurse researchers, educators, and/or administrators in current and emerging health care settings.
4. Collaborate with members of other disciplines in health-related research of mutual concern.
5. Analyze, develop, and recommend health care policy at various levels.

**Admission Requirements**

1. Meet requirements for admission to The Graduate School.
2. Hold a master's degree in nursing from a program accredited by the National League for
Nursing. Some outstanding applicants who are prepared at the bachelor's level in nursing may be considered. In such cases, graduate level courses in nursing theory, concentration specialty, and/or research will be integrated into the formal program of doctoral degree requirements.

3. Have a minimum cumulative 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 of at least 550 if native language is not English.

7. Complete Graduate Program Data Form, College of Nursing.

8. Submit Graduate School Rating Forms from three college level instructors and/or nurses and administrators who have supervised applicant's professional work.

9. Submit a sample of scholarly writing (e.g., thesis, published paper).

10. Submit an essay describing personal and professional aspirations.

11. Submit Graduate Application for Admission, academic transcript(s), Graduate Record Examination scores, and, if required, TOEFL scores to the Graduate School. Submit three Graduate School Rating Forms, sample of scholarly writing, and Graduate Program Data Form with essay to the Director of the PhD program prior to February 15.

12. Schedule a personal interview with the College of Nursing PhD Student Admissions Committee prior to March 15 of the year preceding Fall admission.

Program Requirements

The following courses are required for all students:

- 620 Directed Research 3
- 601-6 Theory Analysis & Construction I, II 6
- 605-6 Nursing Research Seminar 4
- 607 Qualitative Nursing Research 3
- 608 Quantitative Nursing Research 3
- 610 Nursing Science Seminar 2
- 611 Advanced Nursing Seminar 2
- 614 Nursing Preceptorship 3

- Statistics 3
- Electrocardiography 12
- 600 Dissertation 24

TOTAL 68

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 advisor will chair the student's comprehensive examination committee which 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.

MINOR IN GERONTOLOGY

Graduate students in the College of Nursing 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 certain 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 or Arkansas. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records.

GRADUATE COURSES

501 Thesis (1-15) P/INF only, E
511 Nursing Research: Methods, Design, and Analysis (2) Methodology, design, and data analysis issues and their interrelationships in planning, implementation, and evaluation of nursing and health-related research. Investigation of computer applications to data analysis. Prereq or coreq: Graduate level statistics course, 510. F,Sp
512 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester. Students use University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N only. E
503 Holistic Nursing: Wellness (3) Examination of philosophy of holistic nursing and new paradigms for nursing assessment, diagnosis, and intervention. Exploration and application of principles of health promotion, education, and innovative strategies for achievement of wellness. Roles of health habits, genetics, psychological factors, and culture in lifestyle diseases. F
504 Holistic Nursing: Illness (3) Exploration, analysis, and application of principles of illness in nursing of clients with acute and chronic pathophysiological disease. Mind-body influences and interactions. Prereq: Nursing Assessment and Wellness Promotion and Physiological Principles or equivalents. Prereq or coreq: 503. F
505 Advanced Clinical Pharmacology (3) Pharmacological agents related to therapeutic interventions, recent interactions, and data and animal effects of commonly prescribed drugs. Prereq: 301 or equivalent or consent of instructor. F
509 Graduate Seminar in Public Health (1) (Same as Public Health 509, Exercise Science 509, Nutrition 509, and Social Work 509.)
510 Theoretical Foundations of Nursing (3) Historical evolution of nursing science, examination and critical analysis of nursing's metaparadigm and selected conceptual models, philosophies, and theories; contemporary ethical theories and application to nursing practice dilemmas. F,Sp
520 Nursing Resource Management (3) Selected organizational, conflict management, decision-making, leadership, professional development, and administrative principles, and concepts applicable to advanced clinical nursing practice. F,Sp
530 Adult Health Nursing I (6) Exploration and application of advanced nursing in physiological, developmental, and psychosocial theories to nursing care and management of clients and their families who are experiencing episodes of acute and chronic illnesses and related crises; role of clinical nurse specialist in hospitalizing clients and families suffering optimal wellness. Prereq: 504. Prereq or coreq: 501, 520, 2 hrs and 4 labs. Sp
531 Adult Health Nursing II (6) Further emphasis on role of clinical nursing specialist in providing and managing nursing care for acutely and chronically ill adults across life span; exploration, analysis, and application of selected advanced management, supervisory, organizational, and leadership theories; application of health related concepts and research to implementation of clinical nurse specialist role. Prereq: 530. 2 hrs and 4 labs. F
540 Family Nurse Practitioner I (6) Exploration and application of holistic nursing theories to nursing management of common chronic health problems. Role refinement and exploration of major issues in delivery of holistic primary nursing care. Clinical experiences vary depending on student's intent to pursue certification as family nurse practitioner. Prereq or coreq: 501, 520. 2 hrs and 4 labs. Sp
541 Family Nurse Practitioner II (6) Continuation of 540. Seminar in advanced management, supervision, and interactive effects of common health problems of individuals and their families; opportunities for clinical practice in role of nurse practitioner in variety of settings. Prereq or coreq: 540. 2 hrs and 4 labs. F
543 Nurse Practitioner (9) Exploration and application of holistic nursing concepts to nursing management of common and chronic health problems. Role refinement and exploration of major issues in delivery of holistic primary nursing care. Clinical experiences vary depending on student's intent to pursue certification as nurse practitioner. Prereq or coreq: 540. 6 hrs and 6 labs.
550 Parent Child Nursing I (6) Exploration and application of selected advanced nursing, physiological, psychological, developmental, environmental, cultural, and other theories, principles, and concepts to child-bearing or child-rearing families in acute care or community settings; family wellness; interventions designed to recognize and respond to childbearing or child-rearing families in community, hospital, or other health care settings. Prereq: 550. 2 hrs and 4 labs.
552 Parent Child Nursing Field Work and Seminar (5) Seminar and clinical practicum designed to facilitate further development of specialized knowledge and skills used for advanced practice. Role refinement of clinical nurse specialist or nurse practitioner, as well as childbearing or child-rearing families in community, hospital, or other health care settings. Prereq or coreq: 550. 1 hr and 4 labs. Sp
555 Parent Child Nursing II (6) Continuation of 550. Seminar and clinical practicum designed to facilitate further development of specialized knowledge and skills used for advanced practice. Role refinement of clinical nurse specialist or nurse practitioner, as well as childbearing or child-rearing families in community, hospital, or other health care settings. Prereq or coreq: 550. 4 hrs and 4 labs. Sp
551 Parent Child Nursing III (6) Exploration of selected advanced nursing, physiological, psychological, developmental, environmental, cultural, and other theories, principles, and concepts to child-bearing or child-rearing families in acute care or community settings; family wellness; interventions designed to recognize and respond to childbearing or child-rearing families in community, hospital, or other health care settings. Prereq or coreq: 550. 2 hrs and 4 labs.
557 Parent Child Nursing Seminar I (3) Concentration of 550. Seminar and clinical practicum designed to facilitate further development of specialized knowledge and skills used for advanced practice. Role refinement of clinical nurse specialist or nurse practitioner, as well as childbearing or child-rearing families in community, hospital, or other health care settings. Prereq or coreq: 550. 1 hr and 4 labs. Sp
556 Parent Child Nursing Seminar II (3) Concentration of 551. Seminar and clinical practicum designed to facilitate further development of specialized knowledge and skills used for advanced practice. Role refinement of clinical nurse specialist or nurse practitioner, as well as childbearing or child-rearing families in community, hospital, or other health care settings. Prereq or coreq: 551. 1 hr and 4 labs. Sp
558 Parent Child Nursing Seminar III (3) Exploration of selected advanced nursing, physiological, psychological, developmental, environmental, cultural, and other theories, principles, and concepts to child-bearing or child-rearing families in acute care or community settings; family wellness; interventions designed to recognize and respond to childbearing or child-rearing families in community, hospital, or other health care settings. Prereq or coreq: 551. 1 hr and 4 labs. Sp
559 Parent Child Nursing Seminar IV (3) Exploration of selected advanced nursing, physiological, psychological, developmental, environmental, cultural, and other theories, principles, and concepts to child-bearing or child-rearing families in acute care or community settings; family wellness; interventions designed to recognize and respond to childbearing or child-rearing families in community, hospital, or other health care settings. Prereq or coreq: 551. 1 hr and 4 labs. Sp
560 Mental Health Nursing I (6) Exploration and application of advanced theories of therapeutic nursing intervention to clients experiencing mental health problems. Options for clinical practice with clients of various age groups in acute or community facilities. Prereq or coreq: 504 or 505. 2 hrs and 4 labs. Sp
561 Mental Health Nursing II (Continuation of 560) Groups and families with mental health problems. Seminar and clinical practicum designed to focus on advanced practice and development of specialized knowledge and skills. Prereq or coreq: 560. 2 hrs and 4 labs. F
566 Teaching Practicum (1-6) Individually designed teaching experience in collegiate nursing program or nursing practice setting. Options for clinical practice with clients of various age groups in acute or community facilities. Prereq or coreq: 504 or 505. 2 hrs and 4 labs. Sp
564 Education Principles and Strategies (3) Exploration and analyses of selected education, curriculum, teaching-learning, measurement, and evaluation prin-
Nutrition (College of Human Ecology)

MAJORS

Nutrition ............................................................. M.S.
Foodservice and Lodging Administration ... M.S.
Human Ecology .......................................................... Ph.D.

Michael B. Zemel, Head

Professors:

Beauchamp, Roy E. (Emeritus), Ph.D. ......... Kansas State
Bittis, Betty Ruth, Ph.D. .................. Missouri
Sachan, Dileep S., Ph.D. .......... Illinois
Skinner, Jean D., Ph.D. .............. Oregon State
Smith, John T. (Emeritus), Ph.D. .... Missour
Zemel, Michael (Liaison), Ph.D. .......... Wisconsin

Associate Professors:

Allam, Youssri, Ph.D. .......... Tennessee
Bailey, James W., Ph.D. ........ Iowa State
Brooks, M. D. (Memphis), M.S. .......... Alabama
Costello, Carol Ph.D. .......... Tennessee
Haughton, B., Ed.D. ................ Columbia
Stevens, Fote, Ph.D. ............ Michigan State

Assistant Professors:

Bittle, Joyce (Memphis), Ph.D. ......... Tennessee
Chencherick, Janet (Memphis), M.S. .... Maryland
McGrath, M. (Liaison), Ed.D. .......... Tennessee
Moustaid, Naima, Ph.D. .......... Paris
Powell, J. A. (Memphis), M.P.H. ......... North Carolina
Whelan, Jay, Ph.D. ................ Penn State
Young, Catherine A., J.D. ........ California Western School of Law
Zemel, Paula, Ph.D. .......... Wayne State

Instructor:

Jones, K., MBA ......................... East Texas State

Master of Science programs are available in Nutrition and in Foodservice and Lodging Administration. Within the Nutrition program, a student may choose a concentration in nutrition science or public health nutrition.

A graduate degree combined with an approved professional practice experience (AP4) beyond the baccalaureate degree qualifies the graduate to apply for the Registration Examination to become a Registered Dietitian (R.D.). Students may request more information from the department about the AP4 program. Students may also select an interdisciplinary minor in gerontology.

ADMISSION REQUIREMENTS

A file of review includes the Graduate School application form, completed departmental application form, Graduate Record Examination (GRE) scores for the general section, and three Graduate School Rating Forms completed by individuals who can attest to the applicant's potential for graduate education. Forms may be obtained from the Department Office, 229 Jesse 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, physiology, psychology, and statistics. Students must take 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 33 hours with at least 16 hours of coursework in the department. NTR 511, 512, 540, 541 and 3 hours of graduate level statistics are required. Students in public health nutrition must take 511, 512, 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.

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, 548, 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.

A written 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, 548, NTR 541 and 3 hours of graduate-level statistics are required. Six hours in one area outside the

DEGREES
Nutrition

GRADUATE COURSES

414 Nutrient-Drug Interactions (2) Nutrient effects on efficacy and toxicity of drug agents on absorption, metabolism, and evaluation of nutritional status. 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/NC 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

509 Graduate Seminar in Public Health (1) (Same as Public Health 509, Exercise Science 509, Nursing 509 and Social Work 509.)

511 Advanced Physiological Chemistry (4) Bioenergetics, flux control and hormonal interrelationships. Prereq: Advanced Nutrition or equivalent. F


513 Community Nutrition I (3) Orientation to community; assessment of nutrition problems, needs, and resources. Community roles of the 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 assessment of state or regional community nutrition program. Location of in-depth study to be selected in consultation with instructor. Prereq: 513, 514 and consent of instructor. S/NC only. 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 diseases on growth and health maintenance; 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. F

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

524 Nutrition Education: Principles, Implementation, and Evaluation (3) Conceptual models, principles, application, and evaluation models in nutrition education research. Prereq: 520 or consent of instructor. Su, A

540 Seminar in Nutrition (1) May be repeated. S/NC only. E

541 Research Methods (1) Basic principles of planning, conducting, and interpreting nutrition and foodservice systems administration research. Prereq: 6 graduate hrs in nutrition and food system administration and statistics. Sp

542 Advanced Experimental Nutrition (2) 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) Experiences in food-related industry or agency under supervision of faculty member. Prereq: Consent of instructor. S/NC 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: 506 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/NC only. E

530 Computer-Assisted Foodservice and Lodging Management (3) Application of computer technology to foodservice and lodging industry, inventory, cost accounting, production, nutrient analysis, room management, and rate plan analysis and pricing. Prereq: Quantity Food Procurement, Production and Service, Microcomputer Applications or consent of instructor. F

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

532 Advanced Human Resource Management (3) Identifying labor needs; development and maintenance of work force. Prereq: Food and Lodging Personnel Development or consent of instructor. F

533 Advanced Food Production and Delivery Systems (3) Management of hotel organizations. Theoretical and applied literature on formulation and implementation of strategyternal and internal factors relevant for business and corporate level decisions. Consideration of role of marketing in hotel firms. Analysis of industry and case studies. Prereq: 531, 532, Sp, A

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

535 Directed Study in Foodservice and Lodging Administration (1-3) Project under the direction of the instructor for the student with guidance of the faculty mentor. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

537 Seminar in Foodservice and Lodging Administration (1) May be repeated. S/NC only. F

542 Advanced Hotel Administration (3) Strategic management of hotel organizations. Theoretical and applied literature on formulation and implementation of strategyternal and internal factors relevant for business and corporate level decisions. Consideration of role of marketing in hotel firms. Analysis of industry and case studies. Prereq: 531, 532, Sp, A

544 Experimental Study of Quantity Food Production (3) Design and preparation of food products applicable to foodservice industry. Market research, sensory evaluation, production techniques, and microbiological evaluation of food. Prereq: Quantity Food Procurement, Production and Service with lab, or Observation, Hospitality Sales and Marketing, 545 and Nutrition 413, or equivalents. F

The "THE P.H.D. CONCENTRATIONS" section is not visible in the image provided.
Ornamental Horticulture and Landscape Design
(College of Agricultural Sciences and Natural Resources)

MAJOR                  DEGREE
Ornamental Horticulture and Landscape Design ...................... M.S.

G. Douglas Crater, Head

Professors:
Callahan, L. M., Ph.D. .......... Rutgers
Crater, G. Douglas, Ph.D. .......... Ohio State
Graham, E. T., Ph.D. .......... Penn State
Grasso, Peter M. (Racheff Chair).
Ph.D. .......... Australian National
McDaniel, G. L., Ph.D. .......... Iowa State
Williams, Don B., Ph.D. .......... Penn State

Associate Professors:
Augé, Robert M., Ph.D. .......... Washington State
Day, J. W., Ph.D. .......... Mississippi State
Rogers, S. M., M.L.A. .......... Georgia
Trigiano, R., Ph.D. .......... NC State
Witte, Willard T. (Liaison), Ph.D. .......... Maryland

Assistant Professor:
Starman, Teri W., Ph.D. .......... Texas A&M

The Department of Ornamental Horticulture and Landscape Design offers the Master of Science with concentrations in floriculture science and technology, nursery science and technology, or turfgrass science and technology. Various interests may be emphasized in any of these commodity areas, including 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 the minimum 30 hours can be below the 500 level. The academic program must be approved by the master's committee which may require additional course work if the student's progress or background indicates such need.

3. All students are required to include 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 coursework is required.

Non-Thesis Option

1. A master's committee of no fewer than 3 faculty members will be selected. Thirty-four hours of graduate coursework are required of which 22 hours must be at the 500 level or above.

2. Thirteen hours of graduate coursework are required of which 22 hours must be at the 500 level or above.

3. All students are required to include 2 hours of 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 retail and wholesale nurseries and landscape contracting firms. Methods of producing liners, container and field-grown woody ornamental plants. Prereq: 220, 330, and Plant and Soil Science 210, or consent of instructor. 2 hrs and 1 lab. Sp

420 Advanced Floriculture Science and Technology (3) Physiology and greenhouse production of floriculture crops. Cultural practices: propagation, planting, spacing, fertilization, temperature and daylength regimes, harvesting, shipping, marketing, and pest control. Prereq: Greenhouse Production and Management or consent of instructor. 8-9 hrs lab. Sp

440 Advanced Turfgrass Management (4) Principles and scientific basis of turfgrass culture: adaptation, ecology, physiology, soil fertility, and nutrient management, climatic influences on grass culture; physiology of clipping and watering, management design, construction, and management of golf courses; and physiological influences of pest infestation and control measures. Prereq: 340 or consent of instructor. 3 hrs and 1 lab. Sp

451 Plant Tissue Culture (3) (Same as Botany 451.)

460 Professional Practices in Landscape Construction and Management (2) Professionalism, salesmanship, proposal bidding, estimating, specifications, and contract management in landscape services industry. Interaction with industry representatives through special presentations. Prereq: 350 or consent of instructor.

480 Advanced Landscape Design (4) Comprehensive application of landscape design skills. Design applications involving site layout, landscape grading, applied landscape construction, planting design. Analysis, programming, design, detailing, estimating, and specifying applicable to various landscape projects. Prereq: 280, 350, and 380, or consent of instructor. 1 hr and 2-3 hr labs. 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 LANDSCAPE software. Prereq: Fundamentals of Landscape Design. Microcomputer Applications to Problem Solving or consent of instructor. 3 hrs. F, Sp

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

501 Special Topics in Ornamental Horticulture and Landscape Design (1-3) Topics to be assigned. May be repeated. Maximum 6 hrs. Prereq: Consent of Instructor. 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 completion. May not be used toward degree requirements. May be repeated. S/N only. E

510 Research Methods in Ornamental Horticulture and Landscape Design (2) Literature retrieval, research proposal writing, use of computers for word processing, data entry, statistical analysis, and graphics production. Required of all students in thesis option. Prereq: Plant and Soil Science 471. F

511 Plant Disease Fungi (4) (Same as Entomology and Plant Pathology 510.)

550 Microtechnique (3) Methods of investigating histostucture, histochemistry, ploidy, and pathological structures in ornamental and crop plants. Light microscopy. Prereq: 8 hrs biological science, 8 hrs chemistry, and consent of instructor. 1 hr and 2 labs. Sp

570 Physiology and Development of Ornamental Plants (3) Basic and applied physiology of ornamental plants related to growth and development in production and utilization. Critical review of literature and discussion of juvenile and phase change, flowering, phytoperiodism, vernalization, cold acclimation, hardiness, dormancy, growth regulators, environmental stress, and post-harvest considerations. Prereq: Botany 321 and consent of instructor. Sp, A

590 Seminar (1) Current literature and developments. May be repeated. Maximum 3 hrs. E

593 Problems in Ornamental Horticulture and Landscape Design (1-3) Independent study. Current topic related to technology and science. May be repeated. Maximum 6 hrs. E

Pathology

See College of Veterinary Medicine and Comparative Experimental Medicine

Philosophy

(College of Arts and Sciences)

MAJOR                  DEGREES
Philosophy ........................................ M.A., Ph.D.

George G. Brenkert, Head

Professors:
Aquila, Richard E., Ph.D. .......... Northwestern
Brenkert, George G., Ph.D. .......... Michigan
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 and West Virginia; Kentucky, Texas, or Virginia; the M.A. program to residents of Arkansas (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 (3) May be repeated when topic varies. Maximum 6 hrs.

411 Modern Religious Philosophies (3) (Same as Religious Studies 411.)

412 Classical Indian Systems of Philosophy: The Moksha Tradition (3) (Same as Religious Studies 412.)

420 Topics in History of Philosophy (3) May be repeated when topic varies. Maximum 6 hrs.

435 Intermediate Formal Logic (3) Metatheory of formal logic and philosophy of logic. Prereq: Consent of instructor.

440 Contemporary Ethical Theory (3) Topics in metaethics or ethics. Prereq: 6 hrs of philosophy or consent of instructor.

445 Theoretical Issues in Medical Ethics (3) Prereq: 240 or 345 or consent of instructor. (Same as Religious Studies 445.)

460 Philosophy of Science (3) Methodological and conceptual issues in natural and social sciences; patterns of theory modification and replacement, nature of explanation and causation, status of theoretical entities. Prereq: 360 and 1 yr of natural or social science, or consent of instructor.

465 Philosophy of History (3) Speculative and critical aspects of philosophy of history. Prereq: 6 hrs of philosophy or consent of instructor.

473 Philosophy of Mind (3) Problems of mind and body in relation to conscious, personal identity. Prereq: 8 hrs of philosophy or consent of instructor.

475 Analytic Metaphysics and Epistemology (3) Topics in metaphysics and epistemology in recent Anglo-American tradition. Prereq: 6 hrs of philosophy or consent of instructor.

478 Studies in Recent Continental Philosophy (3) Selected thinkers or topics: existentialism, phenomenology, hermeneutics, structuralism, post-structuralism. Prereq: 6 hrs of philosophy or consent of instructor. May be repeated when topic varies. Maximum 6 hrs.

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

502 Registration for Use of Facilities (3-15) Required of non-thesis students when student uses University facilities and/or pays tuition before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

520 Topics in Ancient or Medieval Philosophy (3) Intensive critical work on major philosopher or school. May be repeated. Maximum 9 hrs.

522 Topics in Modern Philosophy (3) Intensive critical work on major philosopher or school. May be repeated. Maximum 9 hrs.

524 Topics in Twentieth-Century Philosophy (3) Intensive critical work on themes in late 20th-century philosophy. May be repeated. Maximum 9 hrs.

540 Topics in Ethics or Value Theory (3) May be repeated. Maximum 9 hrs.

542 Topics in History of Ethics (3) May be repeated. Maximum 9 hrs.

544 Topics in Applied Ethics (3) Single author, tradition, or topic in ethical theory, application to issues in health, business, technology, ecology, and other practical fields. May be repeated. Maximum 9 hrs.

546 Orientation to Medical Ethics (3) Survey of ethical theories in application to issues in medical ethics.

547 Ethical Issues in Mental Health (3) Values in "mental health" and "mental illness," informed consent in psychiatric competence, patient rights, involuntary hospitalization and treatment, and behavior control therapies.

548 M.A. Clinical Practicum (3) Series of clinical rotations at one or more local health care institutions. Open only to graduate students concentrating in medical ethics. Prereq: 547 and consent of Medical Ethics Committee and the UTMCK Graduate Education Committee.

553 Philosophical Topics in Literature and the Arts (3) Aesthetics, criticism, art, and society. May be repeated. Maximum 9 hrs.

560 Topics in the Philosophy of Science (3) Nature of subject matter and method of science. May be repeated. Maximum 9 hrs.

569 Topics in Empirical Science (3) Topics in scientific methodology, philosophy of science, and philosophy of empirical science. May be repeated. Maximum 9 hrs.

573 Topics in Philosophy of Mind (3) Relation of mental to physical and of mind to body in discourse for mental activities, thinking and feeling. May be repeated. Maximum 9 hrs.

585 Special Topics (3) May be repeated. Maximum 9 hrs.

587 Advanced Clinical Medical Ethics (3) Critical concepts in medical ethics, relationships of theory to practice, and professional roles and responsibilities for health care ethics consultant. Open only to Ph.D. students concentrating in medical ethics. Prereq: Consent of Medical Ethics Committee.

590 Topics in the History of Political Thought (3) Topics in the history of political thought, including political theory, political institutions, and political philosophy. May be repeated. Maximum 9 hrs.

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

(College of Arts and Sciences)

MAJOR

DEGREES

Physics ........................................ M.S., Ph.D.

William M. Bugg, Head

Professors:

Bingham, C. R., Ph.D. ........................... Tennessee
Bliss, W. E., Ph.D. .............................. Michigan State
Breazeale, M. A., Ph.D. .......................... Michigan State
Breing, M. Ph.D. ............................... Oregon
Bugg, W. M., Ph.D. ............................. Tennessee
Burgdoerfer, J., Ph.D. ........................... Frie Universitat Berlin
Callcott, T. A., Ph.D. ........................... Purdue
Childers, R. W., Ph.D. .......................... Vanderbilt
Christophorou, L. G., Ph.D. ..................... Manchester
Condon, G. T., Ph.D. ............................ Illinois
Crater, H. W. (UTSI), Ph.D. ................. Yale
Deeds, W. E. (Emeritus), Ph.D. ............ Ohio State
Duckett, K. E., Ph.D. ........................... Tennessee
Eguluz, Adolfo G., Ph.D. ..................... Brown
Elston, S. B., Ph.D. ............................. Massachusetts
Fox, K. D., Ph.D. ............................... Michigan
Galair, N. M. (Emeritus), Ph.D. ............ Ohio State
Georgiou, S., Ph.D. ............................ Manchester
Gulidy, W. M., Ph.D. ............................ Tennessee
Hawker, R. H., Ph.D. ........................... Rutgers
Harris, E. G. (Emeritus), Ph.D. ............. Tennessee
Hart, E. L. (Laison), Ph.D. .................... Cornell
Jacobson, H. C., Ph.D. ........................ Yale
King, E. T. (Emeritus), Ph.D. ............... Bristol
Lewis, J. W. L. (UTSI), Ph.D. ............... Mississippi
Macek, J. (Distinguished Scientist), Ph.D. ........................................ Rensselaer
Mahon, G. D. (Distinguished Scientist), Ph.D. ....................................... California
Mason, A. A. (UTSI), Ph.D. .................... Tennessee
McGregor, W. K. (UTSI), Ph.D. .......... Tennessee
Nazarovesh, W., Ph.D. ........................... Warsaw
Obenshain, E. F., Jr., Ph.D. .................. Pittsburgh
Painter, L. R., Ph.D. ............................ Tennessee
Pegg, D. J., Ph.D. .............................. New Hampshire
Plummer, E. W. (Distinguished Scientist), Ph.D. ....................................... Cornell
Quinn, J. J. (Lincoln Chair), Ph.D. ........ Maryland
Riedlinger, L. L., Ph.D. ....................... Vanderbilt

Selbin, I. A. (Chancellor's Research Scholar), Ph.D. ........................................ Chicago
Shih, C. C., Ph.D. ............................... Cornell
Sorensen, P. S., Ph.D. ........................... Copenhagen
Strayer, M. R., Ph.D. ........................... MIT
Thompson, J. R., Ph.D. ........................ Princeton
Thompson, J. O. (Emeritus), Ph.D. ......... Illinois
Ward, B. F., Ph.D. .............................. Princeton
Wheeler, G. W. (Emeritus), Ph.D. ........ Yale
White, J. W. (Emeritus), Ph.D. ............. North Carolina

Associate Professors:

Muhsenauer, J. W. (UTSI), Ph.D. .......... Tennessee
Sheeh, S. Y., Ph.D. ............................ Maryland

Assistant Professors:

Canrig, G., Ph.D. ................................. Tennessee
Daunt, S. J., Ph.D. ............................. Queens
Harmatz, R., Ph.D. ............................. Ohio State
Levin, J. C., Ph.D. .............................. Oregon
Menzel, R. (UTSI), Ph.D. ...................... Tennessee
Pinfiger, C. (UTSI), Ph.D. .................... New Zealand
Phillips, W. (UTSI), Ph.D. ................... Pennsylvania
Read, K. F., Ph.D. .............................. Cornell
Sanders, A. J., Ph.D. ........................... Tufts
Siopsis, G., Ph.D. ............................... Cal Tech
Weitling, H. H., Ph.D. ........................ Groningen (Netherlands)

Research Professors:

Kamykhov, I., Ph.D. ............................ ITEP (Russia)
Zhang, J. N., Ph.D. ............................. Lanzhou

Research Associate Professors:

Du, Yuan-cai, Ph.D. ............................ Beijing
McCorkle, D. L., Ph.D. ........................ Tennessee
Saini, Sherendah, Ph.D. ....................... Bombay

Research Assistant Professors:

Chen, X., Ph.D. ................................. Purdue
Datskov, P. E., Ph.D. ........................... ITEP (Russia)
Zamaczapova, A. Ph.D. ....................... Texas
Ormand, R. W., Ph.D. ........................ Michigan State
Penningtuggaue, L., Ph.D. .................... Pittsburgh
Reinhold-Larsen, O. C., Ph.D. ............. Buenos Aires
Rost, 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 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.

A student who enrolls in The Graduate School with the intention of obtaining an advanced degree in Physics will have completed an undergraduate major in Physics or its equivalent.

A student who seeks to present Physics as a graduate minor will have completed an undergraduate major in Physics or its equivalent.

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 industry 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, 521-22, 531-32, 541-42, or 571-72. Each candidate must present an acceptable thesis, 6 hours of 500, and pass an oral examination on course material and thesis.

Non-Thesis Option

This program is designed primarily for students intending to teach in colleges or universities on the elementary or intermediate level, or for students specifically intending to work toward a Ph.D. Students seeking the non-thesis option must apply to the department's graduate committee for permission to enroll under this program. The requirements are the satisfactory completion of 30 semester hours of coursework composed of 18 semester hours from Physics 511-12, 521-22, 531-32, 541-42, or 571-72, 6 semester hours in a minor field; and 6 semester hours from other courses numbered above 400 (preferably of advanced laboratory nature). At least 20 hours must be taken at the 600 level or above. In addition, the candidate must pass a written examination administered by the department.

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 621-22 of students in nuclear physics; Physics 626-27 of students in elementary particle physics; Physics 663-64 of students in plasma physics; Physics 661-62 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.
### Astronomy

#### GRADUATE COURSES

**411** Astrophyics (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 232 and consent of instructor.

**490** Special Topics in Astronomy (1-3) Topics of current interest. May be repeated with consent of department. Maximum 5 hrs.

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

**501** Graduate Research Participation (3) Advanced research techniques under supervision of staff research director whose research area coincides with interests of student. Open to all graduate students in good standing. Prereq: Consent of department and research director. May be repeated with consent of department. Maximum 18 hrs. S/NC only. E

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

**506** Experimental Methods (3) Principles, real operational behavior, and hazards of laser types, radiation detectors, photomultiplier tubes, image intensifiers, image converters, image diodes, streak cameras, and fast framing cameras; high-vacuum systems including cryogenic-based devices, data acquisition techniques including synchronous detection, digital electronics methods and micro-computer data acquisition and registration methods.

**507** Contemporary Optics (3) Topics in geometrical, physical, Fourier, and nonlinear optics and introductory laser physics. Extensive use of computer calculations and design of practical and sophisticated optical systems.

**508** Laser Physics (3) Mode analysis, stable and unstable resonators; rate equations and population inversion, saturation, relaxation oscillations, fluctuations and noise, laser 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** Classical Mechanics (3) Classical theoretical physics, with limited use of mathematics. Prereq: 502, 512, advanced calculus, differential equations, and vector analysis.


**531** Classical Mechanics (3) Classical particle dynamics, Lagrange's and Hamilton's equations, moving coordinate systems, normal coordinates, rigid body motion. Prereq: 513.

**532** Advanced Classical Mechanics (3) Variational principles, canonical transformations, Hamilton-Jacobi theory, nonlinear mechanics, elasticity, fluid mechanics. Prereq: 531.


**611** Advanced Quantum Physics & Field Theory (3) Advanced and detailed treatment of quantum mechanics and field theory. Prereq: 541-572 or 571-72.

**621** Nuclear Structure (3,3) General properties of nucleus; two-body scattering problems; saturation and saturation models; nuclear continuum; quantum chromodynamics; grand unified theories; and advanced topics in nuclear physics and quantum physics. Topics vary according to interest of instructor. Prereq: 561 or 511 or consent of instructor.

**622** Nuclear Structure (3,3) General properties of nucleus; two-body scattering problems; saturation and saturation models; nuclear continuum; quantum chromodynamics; grand unified theories; and advanced topics in nuclear physics and quantum physics. Topics vary according to interest of instructor. Prereq: 561 or 511 or consent of instructor.

**641** Advanced Topics in Classical Theory (3) To meet special needs of students. Advanced dynamics and
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 susceptibilities, high energy processes, scattering and collision processes, or theory of fields. Prereq: 522. May be repeated with consent of department. Maximum 9 hrs.

643 Computational Physics (3) Developing computer algorithms for solving representative problems in various fields of physics, celestial dynamics in astrophysics, boundary value problems in 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 capture, collective excitations, Compton scattering, and stopping power. Prereq: 522.

663 Advanced Plasma Physics I (3) (Same as Electrical and Computer 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.

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, two letters of reference from faculty familiar with their prior academic work, and a statement describing personal career objectives. 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.

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, 515, 520, 521, 523, 530, 531, 532, 540, and 545.

Students should plan to enter the program in the fall term to take the 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 taking additional elective courses in the subject and 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, information systems in planning, economic development planning, real estate development planning, transportation planning, environmental planning, historic preservation planning, and international planning.

Students have the latitude to propose an alternate specialization consisting of at least 9 hours of coursework, subject to approval of a faculty committee.

Each student is required to demonstrate competence in individual research. This may be done in one of two ways:

- Thesis Option—Complete a thesis for 6 hours credit.
- Non-Thesis Option—Complete a major study with acceptable documentation. To be eligible for the major study option, the student must have completed at least 12 hours of graduate coursework in planning with at least a 3.5 cumulative grade-point average. The student meeting these criteria may present a proposal to his/her committee for a major study that will include at least 6 hours of subsequent coursework. The proposal shall justify the selection of the topic, describe the approach to the study, and describe the nature of the final product. The topic will normally be expected to reinforce or complement the student's concentration.

Student academic progress is monitored by the faculty. A student failing to maintain an acceptable grade-point average may be placed on probation or dismissed from the program.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S.P. program is available to residents of the states of Arkansas, Kentucky, 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 early city development and of planning; U.S. experience in urban and other levels of planning. State of the art, processes, comprehensive plan, implementation devices. Planning issues in society. Not for credit for M.S.P. degree.


500 Thesis (1-5) P/NP only. E


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

510 Fundamentals of Planning (2) History of planning, structure and development of urban areas, operations of contemporary planning, trends and issues.

511 Graphic and Oral Communications in Planning (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) Research techniques in subject areas associated with city and regional planning. Research tools, data collection and analysis as basis for planning and decision-making.

521 Computers in Planning (3) Basic computer concepts, hardware and software, use of mainframe and microcomputers in planning and government.

523 Statistics for Planners (3) Applications of basic descriptive and inferential classical and non-parametric techniques in planning research. Data organization and display, measures of location, dispersion and association; data transformations; some basic probability theory; selected one and two sample tests; correlation and regression analysis. Prereq: 522 or consent of instructor.

Plan and Soil Science

(College of Agricultural Sciences and Natural Resources)

MAJOR

Plant and Soil Science ................................ M.S., Ph.D.

John E. Foss, Head

Professors:
Allen, Fred L., Ph.D. .................. Minnesota
Boll, Frank F. (Emeritus), Ph.D. .... Iowa State
Boswell, 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
Howard, D. D., Ph.D. .................. Auburn
Josephson, L. M. (Emeritus), Ph.D. .... Wisconsin
Lewis, R. J. (Emeritus), Ph.D. .... NC State
Luxmoore, 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
Skold, L. N. (Emeritus), M.S. .... Kansas State
Springer, M. E. (Emeritus), Ph.D. .... California
Swingle, H. D. (Adjunct). Ph.D. ........ Louisiana State
Tylor, D. D., 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
Roch, V. H., Ph.D. ............... Iowa State
Wright, 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. ............ NC 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 503, 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 faculty members. The advisory committee approves the student's research problem and coursework and conducts the final oral examination integrating the thesis and coursework.

A student having started on the thesis option is not eligible to transfer to the non-thesis option after the end of the first semester of graduate study or after having received a Graduate Research Assistantship stipend for more than one semester. A student having started on the non-thesis option may transfer to the thesis option upon approval by a potential major professor and the Department Head.

Non-Thesis Option

A student desiring the non-thesis option should declare this intention at the beginning of the first semester of graduate study, and must declare it before the beginning of the second semester. In lieu of thesis, students are required to complete 3 hours of 593 for satisfactory participation in a single research program for a period of 12 weeks and the writing of an original, creative and well-written report, both to be conducted by the major professor and approved by the advisory committee. In addition to the 3 hours of 593, a minimum of 30 hours of graduate coursework is required, of which at least 20 must be taken in courses numbered 501 or above, for a total of 33 hours.

The student's advisory committee may require additional coursework if the student's progress or background indicates such need. Each student is required to take 1 hour of 501 and 2 hours of 503.

The student's advisory committee consists of the major professor, who acts as chairperson of the committee, and a minimum of two other faculty members. The advisory committee approves the student's coursework and the report on participation in a research program for 593. Students are required to take a written comprehensive examination integrating the coursework.

THE DOCTORAL PROGRAM

A minimum of 72 hours beyond the Bachelor's degree, exclusive of credit for Thesis 500, is required. Of this number, 24 hours must be Doctoral Research and Dissertation 600. A minimum of 26 hours must be completed in courses numbered above 500 exclusive of doctoral research and dissertation, of which 6 must be in courses numbered above 600.

A.
471 Statistics for Biological Research (3) Application of statistical interpretation to biological research. Notation, descriptive statistics, probability, distributions, confidence intervals, and chi-square tests, analysis of variance, mean separation procedures, linear regression and correlation. Prereq: Mathematics 121 or equivalent. F

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

501 Seminar Preparation (1) Application of speaking, writing, and organizational skills in preparation and presentation of scientific material to both scientific and general audiences. Preparation of abstracts for scientific presentations. Required of all entering graduate students during their first year of graduate study. F,Sp

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

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

511 Advanced Soil Fertility (3) Concepts of soil chemistry as related to nutrient movement and adsorption by plant roots. Fertilizer use efficiency as measured by plant response factors. Prereq: 413. Sp,A

520 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 of water and heat in unsaturated soil. F,Sp

530 Integrated Pest Management (3) (Same as Entomology and Plant Pathology 530.)

532 Advanced Crop Ecology (3) General and specific relations 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: 417 or equivalent. 43 or equivalent, or Agricultural Climatology or equivalent. 2 hrs and 1 lab. F

551 Advanced Plant Genetics (3) Discovery of genetic controlling elements, induced mutations, growth regulation, polyploidy, tetrasomic inheritance, chromosomal inheritance, aneuploids, 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 organic matter, soil chemical weathering, soil microbiology, water movement and use by plants, soil structure, soil thermal properties, soil fertility. Prereq: 417. May be repeated. Maximum 6 hrs. F

603 Special Topics in Crop Physiology and Ecology (1-3) Microclimatology of agroecosystems, crop dormancy and responses to stress, physiology of crop growth and reproduction. Prereq: 417. May be repeated. Maximum 6 hrs. E

605 Special Topics In Plant Breeding and Genetics (1-3) Gene flow by environmental interactions, estimation of quantitative parameters, mutations, chromosome dynamics, polyploidy, genetic engineering, interspecific hybridization, linkage, screening methods, genome organization. May be repeated. Maximum 6 hrs. E

613 Advanced Soil Chemistry (Surface and colloid chemistry of soil minerals; recent developments in ion exchange, radiation chemistry, and soil colloids. Prereq: 417. 2 hrs and 1 lab. F,A

631 Advanced Crop Physiology (3) Principles of photosynthesis and respiration, photosynthesis, and auxin biosynthesis and regulation. Prereq: 417. 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 uses of plant growth regulators. Prereq: Botany 21 and 212 or equivalent. F,A

635 Advanced Plant Breeding (4) Development and utilization of concepts of quantitative parameters, breeding, heterosis, methods of selection, intra-breeding, interspecific hybridization, stability parameters, genetic resistance and vulnerability to pests and environmental stresses. Prereq: 453 and 571 or equivalent or consent of instructor. 3 hrs and 1 lab. Sp,A

671 Advanced Research Planning (3) Development of agricultural research proposals utilizing prescribed resources and emphasizing experimental design and statistical techniques. Prereq: 571, Animal Science 572, Statistics 401, or equivalent. F,A

MAJORS

DEGREES

Political Science ........................................ M.A., Ph.D.

Public Administration ................................. M.P.A., J.D.-M.P.A.

Michael Gant, Head

Professors:

Carlisle, D. H. (Emeritus), Ph.D. .................. North Carolina

Cunningham, Robert B., Ph.D. ................... Indiana

Fitzgerald, Michael R., Ph.D. ...................... Oklahoma

Gant, Michael M., Ph.D. ........................... Michigan State

Germann, Robert A., Ph.D. ........................ New York

Iredell, Vernon R., Ph.D. .......................... Chicago

Lyons, William, Ph.D. .............................. Oklahoma

Peters, John, Ph.D. ................................. Utah

Robinson, Nelson M. (Emeritus), Ph.D. ....... Syracuse

Scobie, John M., II, Ph.D. ........................ Florida

Smith, T. Alexander, Ph.D. ....................... Ohio State

Stephens, Otis H. (Distinguished Prof.), Ph.D. Oregon

Wohls, Stephen E. (Distinguished Prof.), Ph.D. ... Johns Hopkins

Ungs, Thomas D., Ph.D. ........................... Iowa

Welborn, David M., Ph.D. ........................ Texas

Poteticoot, Assistant Professors:

Evans, Gill C., Ph.D. ............................... Columbus

Folz, David H. (Liaison), Ph.D. ................. Tennessee

Freeland, Patricia K. (Liaison), Ph.D. ............... Wisconsin (Milwaukee)

Peterson, Robert L., Ph.D. ........................ Yale

Assistant Professors:

Houston, David J., Ph.D. ........................ SUNY (Binghamton)

Nownes, Anthony J., Ph.D. ........................ Kansas

Richardson, Lillard, Ph.D. ........................ Texas
ADMISSION REQUIREMENTS

Three departmental recommendation forms must be submitted to The Graduate School, at least two of which must be completed by instructors at the institution most recently attended. In addition, scores on the general portion of the Graduate Record Examination must be submitted.

THE MASTER OF ARTS PROGRAM

A Bachelor's degree or its equivalent is required for admission. Normally an overall average of 3.0 is also required together with an average of 3.2 in the last two years of political science or social science. In addition, a composite score of at least 1100 on the verbal and quantitative parts of the GRE is normally required.

Students pursuing the Master of Arts degree may choose one of two options:

1. Core - 21 hours.
   1. b. Analytical skills (6 hours): 512 Quantitative Political Analysis; 514 Research and Methodology in Public Administration.
   1. c. Management skills (6 hours): 560 Public Budgeting; and either 562 Public Management or 564 Human Resources Management in Public Administration.

2. Specialization - 9 hours.
   A specialization is designed by the student in consultation with the coordinator of the Master of Arts 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 Master of Arts program.

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 conferment of both the Doctor of Jurisprudence and Master of Public Administration degrees. In this program, a student may earn the M.P.A. and J.D. degrees in about four years rather than the five years that otherwise would be required. Students pursuing the dual degree program should plan to be enrolled in coursework or an internship for one summer term in addition to taking normal course loads for four academic years.

Admission

Applicants for the J.D.-M.P.A. program must make separate application to, and be independently accepted by, the College of Law for the J.D. degree and the Department of Political Science and the Graduate School for the M.P.A. degree. Applicants must also be accepted by the Dual Degree Committee. All applicants must submit a Law School 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 and 600 level) offered in the Department of Political Science. The M.P.A. program will award a maximum of 9 semester hours of credit toward the M.P.A. degree for successful completion of approved courses offered in the College of Law. All courses for which such cross-credit is awarded must be approved by the J.D.-M.P.A. coordinators in the College of Law and the Department of Political Science. All candidates for the dual degree must successfully complete their dual program before they may graduate. The College of Law and the Department of Political Science provide an opportunity for students to take advanced law courses in a coordinated dual degree program. Students may be concurrently enrolled in both the College of Law and the Department of Political Science.

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 B+ or higher and a grade of No Credit for any lower grade. The official academic record of the student maintained by the Registrar of the University shall show the actual grade assigned by the instructor without conversion.

THE DOCTORAL PROGRAM

The Ph.D. program prepares students for careers in college teaching, as well as careers in other occupations related to service in the public or private sectors. Applicants for admission to the program should normally have completed a master's degree in political science or a related field with a 3.5 GPA and have earned a composite score of at least 1100 on the verbal and quantitative parts of the Graduate Record Examination.

Doctoral students admitted to the program must complete 84 hours beyond the bachelor's degree, including 24 hours of coursework beyond the master's degree, graded A-F, must successfully pass written and/or oral examinations in three broad subfields of political science, and must pass a final oral examination on the dissertation.

In addition, students must satisfy a research tool requirement. Usually, students meet this requirement by completing courses in the College of Arts and Sciences, coursework numbered above 500 in empirical theory and research methodology. However, if a student's advisor and program committee certify that competency in a foreign language is a more appropriate research tool, a foreign language can be used instead.
In addition to the total hours required for the degree, the following requirements must also be met:
1. At least 69 hours must be in political science courses.
2. At least 54 hours in political science must be in courses numbered above 500.
3. Completion of Political Science 510, 511, and 512.
4. Completion of at least three courses or seminars at UTK in each of the three broad subfields in which the student takes examinations.
5. Completion of at least one course or seminar in each of six broad subfields available for graduate instruction in the department.
6. At least 6 hours must be earned in political science courses numbered above 600.
7. A total of 24 hours must be earned by writing the dissertation.

MINOR IN ENVIRONMENTAL POLICY
The department participates in a program designed to give 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 powers of President and Congress, federalism, sources of regulatory authority, and constitutional protection of political and economic rights.
431 U.S. Constitutional Law: Civil Rights and Liberties (3) Analysis of current issues in civil rights and liberties including affirmative action, equal protection, privacy and rights of accused.
442 Administrative Law (3) Legal dimensions of administrative power and procedures, and constitutional controls over administrators.
452 Black African Politics (3) Recent evolution and current political environment of Black African nations. (Same as Afro-American Studies 452.)
454 Government and Politics of China and Japan (3) Examination of the political setting, structure and political processes in China and Japan.
455 Latin American Government and Politics II (3) Selected topics on Latin American political dynamics, consideration of leading theoretical explanations. (Same as Latin American Studies 455.)
459 Government and Politics of the Soviet Union (3) Origins and development of Soviet political system, and study of selected policy areas.
461 Policy Making in Democracies (3) Comparative approach to theory and process of making public policies.
463 Contemporary Middle East Politics (3) Governments and movements in Middle East, their characteristics, bases, and interrelationships.
470 International Law (3) Nature and development of international law and compliance. Function of international law in context of international conflict.
475 Ancient and Medieval Political Thought (3) Survey of major western political thinkers from Socrates to Marsili of Padua.
476 Modern Political Thought (3) Survey of major western political thinker from Machiavelli to Marx.
500 Thesis (1-15) P/NP only. 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 being devoted to degree completion. 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 inferences.
512 Quantitative Political Analysis (3) Methods and techniques in quantitative political analysis: univariate and bivariate statistics.
513 Qualitative Political Analysis (3) Methods and techniques in quantitative political 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 literature, approaches to research and analysis, critical examination of major works, and overviews of research in various subfields. May be repeated with consent of department. Maximum 9 hrs.
532 Presidency (3) Systematic examination of the structure, functions and powers of the American presidency as they have evolved from the founding to the present.
533 Congress (3) Formal, empirical and theoretical approaches to and models of the institutional workings of Congress and the behavior of legislators.
535 Mass Political Behavior (3) Theoretical and empirical analyses of public opinion, political socialization, political attitudes and behavior, especially voting behavior.
537 Political Parties and Interest Groups (3) Theoretical and empirical examination of the structure, functions and operations of political parties and interest groups.
539 State and Local Government and Politics (3) Theoretical and empirical analysis of government, politics, policymaking and public administration at the state and local levels.
540 Public Law (3) Selective examination of published research and current approaches in subfields of constitutional law, judicial process, and judicial behavior. May be repeated with consent of department. Maximum 9 hrs.
548 Public Policy Process (3) Theoretical, formal and empirical analysis of the roles, decisions and action making processes of public policymakers, including legislative, executive and judicial actors.
550 Public Administration (3) Overview of public administration theory and function.
552 Organization Theory (3) 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, and training for management information technology.
556 Policy Analysis (3) Strategies and techniques for identification and analysis of public problems and policy solutions. May be repeated with consent of department. Maximum 9 hrs.
558 The Politics of Administration (3) Examination of public administration as a subsystem of American political system, policy making and policy roles of public administrators and agencies. May be repeated with consent of department. Maximum 9 hrs.
560 Public Budgeting and Finance (3) Technical and political aspects of preparing and adopting public 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 public sector. May be repeated with consent of department. Maximum 9 hrs.
566 Ethics, Values, and Morality in Public Administration (3) Moral-ethical-value dilemmas confronting administrators in American political system.
569 Internship in Public Administration (3-9) Open to students participating in approved internship programs. May be repeated with consent of department. Maximum 9 hrs. S/NC only.
570 Comparative Government and Politics (3) Selected topics in modern governments. May be repeated with consent of department. Maximum 9 hrs.
572 The Politics of Development (3) Selected topics dealing with political problems of less developed countries. May be repeated with consent of department. Maximum 9 hrs.
574 Area Seminar in Comparative Government and Politics (3) Selected topics in areas studies: African, Asia, Latin America, Middle East, Soviet Union and Eastern Europe or Western Europe. May be repeated with consent of department. Maximum 9 hrs.
580 International Politics (3) Survey of literature and major aspects of international politics. May be repeated with consent of department. Maximum 9 hrs.
591 Foreign Study (1-15) See College of Arts and Sciences.
592 Off-Campus Study (1-15) See College of Arts and Sciences.
593 Independent Study (1-15) See College of Arts and Sciences.
595 Readings and Special Problems in Political Science (1-3) Prereq: Consent of instructor. May be repeated. Maximum 15 hrs.
600 Doctoral Research and Dissertation (3-15) P/NP only. E
610 Special Topics in Empirical Theory and Methodology (3) Advanced methods and procedures of analysis in political science. May be repeated with consent of department. Maximum 9 hrs.
615 Formal Political Analysis (3) Assumptions, methods and applications of formal political models, including game theory, rational choice theory, and mathematical modeling. May be repeated with consent of instructor. Maximum 9 hrs.
628 Topics in Political Theory (3) Selected issues and problems in normative political theory. Specific content determined by instructor. May be repeated with consent of instructor. Maximum 9 hrs.
639 Special Topics in American Government and Politics (3) Advanced study of selected topics. May be repeated with consent of instructor. Maximum 9 hrs.
640 Special Topics in U.S. Constitutional Law (3) Systematic analysis of published research and judicial decisions on development of constitutional law as major component of public policy. May be repeated with consent of department. Maximum 9 hrs.
642 The Politics of Criminal Justice (3) Selective examination of contemporary problems of research and public policy formulation: criminal process, law enforcement administration; criminal court administration; and prison administration. May be repeated with consent of department. Maximum 9 hrs.
654 Contemporary Public Policies (3) Problems in one or more public policy areas: international, political and administrative perspectives. Topics selected by instructor. May be repeated with consent of department. Maximum 9 hrs.
660 Contemporary Perspectives on Public Administration (3) Development of theory in public administration; contemporary critiques and alternatives. May be repeated with consent of instructor. Maximum 9 hrs.
667 Comparative Public Administration (3) Comparison of policy-making structures and public policies in
selected countries. May be repeated with consent of department. Maximum 9 hrs.

668 Special Topics in Public Administration (3) Analysis of selected issues and problems in public administration. May be repeated. Maximum 9 hrs.

670 Special Topics in Comparative Government and Politics (3) Research into selected topics. May be repeated with consent of department. Maximum 9 hrs.

882 Theory and Analysis of U.S. Foreign Policy Processes (3) Theoretical approaches to decision making in foreign policy area and analysis of policy-making process. May be repeated with consent of department. Maximum 9 hrs.

888 Special Topics in International Politics (3) Selected issues and problems in international politics. Specific content determined by instructor. May be repeated with consent of instructor. Maximum 9 hrs.

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### Polymer Engineering

See Materials Science and Engineering

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### Psychoeducational Studies

(Studes of College)

**MAJORS DEGREES**

<table>
<thead>
<tr>
<th>Education</th>
<th>Ph.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educational Psychology</td>
<td>M.S., Ed.D.</td>
</tr>
<tr>
<td>Educational Psychology and Guidance</td>
<td>Ed.S.</td>
</tr>
</tbody>
</table>

K. Greenberg, Leader

Professors:

Bellon, Jerry J., Ed.D. .......... UC Berkeley
Cameron, Walter A., Ph.D. ........ Ohio State
Dickinson, Donald J., Ed.D........ Oklahoma State
George, Thomas W., Ed.D......... Tennessee
McClure, Ronald W., Ph.D......... Georgia
Peters, John M., Ed.D............... NC State
Williams, R. L., Ph.D............... George Peabody

Associate Professors:

Greenberg, Katherine H., Ph.D. .......... George Peabody
Kindall, Luther M., Ed.D........... Tennessee

The Psychoeducational Studies unit offers graduate programs leading to the following: Master of Science with a major in Educational Psychology, 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. 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 educational psychology and school psychology. 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 life-long 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 programs is February 1, and to the Ed.S. and M.S. programs, February 1 and 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 etiology, psychological behavior and appropriate interventions.

450 Self-Management in the Helping Professions (3) Applications of self-management strategies to career, social, emotional, and health domains for both helping professionals and their clientele. Prereq: Introductory course in psychology or consent of instructor. S/NC or letter grade. Sp, Su

500 Thesis (1-15) P/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 be used toward degree requirements. May be repeated. S/NC only. E


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

510 Psychological Theories of Human Development Applied to Education (3) Theory and research regarding etiology, emotional, social, and intellectual development over life span with applications to educational and therapeutic settings. F, Su

511 Cognitive Development: Implications for Education (3) Applications of theory and research related to human development. Prereq: 510 or consent of instructor. F

513 Reflective Practice in Education and Psychology (3) Concepts, theories and processes of reflective practice applied to educational settings.

515 Educational Applications of Behavioral Theories of Learning (3) Behavioral theories and research, conditioning, observational learning, and ethological learning as systems applying to student motivation, discipline and learning. F, Su

516 Educational Applications of Cognitive Learning Theories (3) Cognitive theory and research, social learning, attribution and information processing as systems applied to education. Prereq: 515 or consent of instructor. F, Su

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

526 Informal Methods of Assessment (3) Development and use of rating scales, checklists, observation, tests and case reports in assessment and counseling of children and adults. Prereq: 525. Sp


541 Psychoeducational Assessment (3) Applications of assessment skills to clients in educational environments. Coreq: 540 or consent of instructor. May be repeated. Maximum 6 hrs. S/NC only. F, Sp

542 Practicum in Psychoeducational Assessment (3) Application of assessment skills to educational settings. Coreq: 540. F, Sp

549 Internship in School Psychology (1-4) Supervised employment in unit approved school psychology internship site. Prereq: Enrollment in school psychology program and consent of instructor. May be repeated. Maximum 12 hrs. S/NC only. E

551 Issues and Theories in Cognitive Education for Disabled Learners (3) Informal and formal assessment approaches, data collection, instructional programming and decision-making related to nature and needs of disabled learners. Prereq: 550 or consent of instructor. F

552 Instructional Systems in Cognitive Education for Disabled Learners (3) Informal and formal assessment approaches, data collection, instructional programming and decision-making related to nature and needs of disabled learners. Prereq: 551 or consent of instructor. 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


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

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

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

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

609 Advanced Seminar in Curriculum and Learning (4) Teacher research on interdisciplinary issues, and issues in curriculum and learning. Reading and discussion based on significant research and scholarly publications. E

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

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. Social and mental health settings for intervention, consultation, prevention, and assessment services. May be repeated. Maximum 9 hrs. S/NC only.

663 Scale Construction (3) Development, pilot testing, and revision of attitude inventories, rating scales, and other paper-and-pencil techniques for assessing beliefs, personality characteristics, and opinion. Prereq: 525, and two-course sequence in statistical analysis. A

665 Analysis of Research in Instructional Technology (3) Research on human learning, design of learning environments. Analysis of teacher behavior, text development, computer software design and video presentations. A

668 Practicum in Instructional Planning (3) Development and management of course or program of instruction in educational psychology. Prereq: 665, or consent of instructor. E

669 Internship in Educational Psychology (1-6) Supervised employment in unit approved educational psychology internship sites. May be repeated. Maximum 12 hrs. S/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 only.

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**Psychology**

*(College of Arts and Sciences)*

**MAJOR**

**DEGREES**

Psychology ................................ M.A., Ph.D.

Warren H. Jones, Head

Professors:

Burghardt, Gordon M., Ph.D. .......... Chicago
Burstein, Alvin G., Ph.D. .......... Chicago
Calhoun, William H., Ph.D. .......... California
Cohen, Charles P., Ph.D. .......... Kansas
Fine, Harold J. (Emeritus), Ph.D. .......... Syracuse
Handel, Stephen J., Ph.D. .......... Johns Hopkins
Hendler, Leonard, Ph.D. .......... Michigan State
Jones, Warren H., Ph.D. .......... Oklahoma State
Lawler, James E., Ph.D. .......... North Carolina
Lounsbury, John W., Ph.D. .......... Massachusetts
Lawson, Thomas C., Ph.D. .......... Duke
Newton, Kenneth R. (Emeritus), Ph.D.

Polito, Howard R. (Distinguished Prof.), Ph.D. .......... Michigan
Samejima, Fumiko, Ph.D. .......... Keio
Saudargas, Richard S., Ph.D. .......... Florida State
Shadrav, Raymond R. (Emeritus), Ph.D.

Sundstrom, Eric D., Ph.D. .......... Utah
Travis, Cheryl B., Ph.D. .......... California (Davis)
Verplanck, William S. (Emeritus), Ph.D. .......... Brown
Weber, Robert G. (Liaison), Ph.D. .......... Washington
Wiberley, J. Albert (Emeritus), Ph.D. .......... Syracuse

Associate Professors:

Johnson, Michael G., Ph.D. .......... Johns Hopkins
Mcktyre, Anne, Ph.D. .......... Yale
Morgan, Wesley G., Ph.D. .......... Tennessee
Nash, Michael R., Ph.D. .......... Ohio

Assistant Professors:

Baldwin, Deborah R., Ph.D. .......... Kent State

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Hopson, Ronald E., Ph.D. .......... Michigan Stae
Welsh, Deborah, Ph.D. .......... Massachusetts

**THE MASTER'S PROGRAM**

Graduate study leading to the M.A. degree in psychology is available with a concentration in experimental psychology. This program is appropriate for students who desire a master's degree as part of their progress toward a doctorate or for those who wish to complement a degree in a different field.

Admission

Any student with a B.A. or B.S. may apply to the Department of Psychology for admission to the master's program. All students must also submit scores from the Graduate Record Examination (general and subject).

Major Advisor and Committee

Initially, the Director of Experimental Psychology will advise the student. As soon as possible, the student must select an advisor and obtain his or her approval for registration. Subsequently, the advisor and student will select two additional faculty members to comprise the student's master's committee. Final committee approval comes from the Graduate Dean, upon recommendation by the Department Head.

Program Requirements

All students must complete 30 semester hours of graduate level courses in psychology. These must include 504-05, or Statistics 531-32 or an equivalent sequence, 585 or 420, six semester hours of Thesis 500; and twelve hours of 500-600 level foundation courses. Students must earn a grade of B or better in all courses that are to count toward the 30-hour total. Students must also propose, conduct and successfully defend an original piece of research in the form of a master's thesis.

**THE DOCTORAL PROGRAM**

A student with a B.A. or B.S. may apply to the Department of Psychology for admission to the doctoral program with a concentration in experimental psychology or clinical psychology. The doctoral program with a concentration in clinical psychology is offered through the Life Sciences program. Doctoral study in industrial and organizational psychology is offered through the Intergovernmental Office in the Industrial and Organizational Psychology, to which application is made through the Department of Management.

Experimental Psychology

The Ph.D. program in Psychology with a concentration in experimental psychology is designed to allow students to select from a variety of specializations oriented toward careers in research, teaching, and application of psychology in academic, institutional, or industrial settings. The program is flexible, individualized, and emphasizes a professional apprenticeship model of training. A full description of the program is given in the "Handbook for Students in Experimental Psychology," available from the department. The basic requirements are:

1. Twelve semester hours of statistics and research (504-05 or Statistics 531-32 or equivalent and six additional hours of research methods or design).

2. Fifteen semester hours in experimental psychology (565 or equivalent and 4 courses from the following: 510, 511 or 512, 513, 543, 546 or 547, 550, 560, and 570 or 571).

3. Six semester hours of research practicum (509).


5. Two 600-level graduate seminars.

6. Six semester hours of graduate level courses outside the Psychology Department.

7. Predissertation research project involving the collection of original data or the original analysis of existing data, reported in publishable form and accepted by the student's advisory committee.

8. An integrative review or theoretical paper, accepted by the student's advisory committee.

9. Comprehensive examination, determined and evaluated by the student's doctoral committee.

10. Twenty-four hours of dissertation research (600).

11. An original piece of research in the form of a doctoral dissertation, proposed, conducted, and defended.

**Clinical Psychology**

This program is designed to lay the groundwork for a career as a clinical psychologist capable of working in both academic and applied settings. The program emphasizes the theoretical foundations of psychology as well as supervised experience oriented toward the development of practical skills. The program embodies a model of clinical psychology in which practice and research are integrated. Clinical program students must 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 submit two satisfactory papers, one addressing a topic of the student's choice and the second addressing an understanding of one individual's personality and cognitive functioning. All doctoral students must complete a minimum of 78 hours of graduate level courses; at least six hours in courses outside of psychology and at least 24 hours of dissertation research (600). Finally, students must complete an acceptable doctoral dissertation and conduct a satisfactory oral defense of this 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. Satisfactory completion of listed courses (or equivalents) in the following seventeen categories:

   a. Foundations of Psychology; Biological Factors, Perception, Learning, Thinking, Motivation (513);

   b. Interviewing and Observation (556) and Laboratory (559);

   c. Research Practicum (509) (4 hrs.);

   d. Life-Span Development (512) or Developmental Psychology (511);

   e. Personality: Theory and Research I and II (570-71);

   f. History and Systems of Psychology (565);

   g. Research Questions and Designs (580);
482 Topics in Psychology (3) Intensive analysis of special topics: Afro-American psychology or evaluation of programs in community. Prereq: Preceptor, Biological Basis of Behavior or Behavior and Experience. Human 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 (1-9) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs in 395, 495, 497, 498, and 499 combined may apply toward undergraduate major.

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


503 Research Design (3) Techniques for planning and conducting research in controlled and natural settings: experiments, quasi-experiments, observatory studies, surveys, and program evaluations. Development of questions and hypotheses for study. Design of studies to maximize validity. Prereq: Consent of instructor. SNC only. E


505 Research Practicum (1-3) Required of first-year graduate students in psychology. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. SNC 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 9 hrs.

512 Life-Span Development (3) Theories and research concerning normal human development throughout life, adulthood, and old age. Prereq: Consent of instructor.

513 Foundations of Psychology: Biological Factors, Perception, Learning, and Memory (4) Intensive survey. Prereq: Consent of instructor.

516 Colloquium in Ethology (1) Current research and theory, May be repeated. Maximum 9 hrs. (Same as Zoology 516.) SNC only. E

517-18 Proseminar in Industrial and Organizational Psychology (3,3) (Same as Management 517-18.)

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 analyzing data using microcomputers. Prereq: Consent of instructor. Maximum 9 hrs.

526 General Vertebrate Neuroanatomy (3) Lecture and laboratory. Structure and functioning of central and peripheral nervous system. Prereq: 461, 463, or equivalent. Consent and consent of instructor. (Same as Zoology 526.)

527 Behavioral Neurology (3) Disorders of nervous system, organic brain dysfunctions. Diagnosis and treatment. Prereq: Consent of instructor.

528 College Teaching in Psychology (3) Concepts, techniques, and materials for teaching psychology at college and university level. Supervised practice. Prereq: Consent of instructor. SNC only.


542 Advanced Animal Behavior (3) (Same as Zoology 542.)

546 Ethological Psychology (3) Basic ethology and comparative psychology. Implications for human behavior. Prereq: Consent of instructor.

571 Personality: Theory and Research II (3) Advanced survey of humanistic and behavioral approaches to personality. Prereq: Admission to doctoral program in clinical psychology or consent of instructor. Coreq: 558.

579 Laboratory in Interviewing and Observation (1) Prereq: Admission to doctoral program in clinical psychology or consent of instructor. Coreq: 559.

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-campuse, or Foreign Study (1-15) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/N only.

594 Psychological Assessment I (3) Basic concepts and techniques of adult assessment; intelligence tests and personality tests. Prereq: Admission to doctoral program in clinical psychology or consent of instructor. Sp

595 Psychological Assessment II (3) Basic concepts and techniques of adult assessment; intelligence tests and personality tests. Prereq: Admission to doctoral program in clinical psychology and 584 or consent of instructor. Fall

596 Laboratory in Psychological Assessment (1) Prereq: Admission to doctoral program in clinical psychology or consent of instructor. May be repeated. Maximum 4 hrs. S/N 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 (3-15) P/NP only. E

601 Seminar in Psychology (3) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

610 Seminar in Applied Psychology (3) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

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 psychology or consent of instructor. (Same as Counselor Education and Counseling Psychology 635 and Psychosocial Studies 635.) S/N 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/N only.

675 Special Techniques 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 12 hrs.

683 Seminar in Behavioral Medicine (3) Current research and theory concerning relationships between behavior and health. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

684 Neuropsychology (3) Investigation of brain-behavior relationships in adults and children. Introduction to administration of RBTAN neuropsychological battery, Luria battery, and other tests of brain dysfunction. Prereq: Consent of instructor.

690 Field Work in Industrial and Organizational Psychology (1-12) (Same as Management 690.)

695 Field Placement in Clinical Psychology (3) Prereq: Admission to doctoral program in clinical psychology and consent of instructor. May be repeated. Maximum 24 hrs. S/N only. E

696 Advanced Psychology Clinic Placement (1-3) Prereq: Admission to doctoral program in clinical psychology or consent of instructor. May be repeated. Maximum 24 hrs. S/N only. E

Rehabilitation and Deafness

(College of Education)

MAJORS DEGREES

Education

Ph.D.

Rehabilitation Counseling

M.S.

Special Education

S. Wayne Mulkey, Leader

Professors:

Doll, E. E. (Emeritus), Ph.D. ................................ Pennsylvania
Frey, Roger M. (Emeritus), Ed.D. ................................ Illinois
Miller, James H. (Liaison), Ed.D. .............................. Auburn
Woodrick, William E., Ed.S. ................................. Mississippi

Associate Professors:

Cassell, Jack L., Ph.D. .......................................... Kansas
Colvin, Craig R., Ed.D. ........................................... Virginia
Mulkey, S. Wayne, Ph.D. ...................................... Florida State
Welch, Olga, Ed.D. ................................................ Tennessee

Assistants Professors:

Warden, K., Ph.D. ............................................... Tennessee

The Rehabilitation and Deafness unit offers graduate programs leading to the Master of Science with a major in Rehabilitation Counseling or in Special Education, concentration in hearing impaired. The unit also participates in the Doctor of Philosophy program in Education as described under Education. See Education under Fields of Instruction for full description of all degree requirements.

The vision of the Rehabilitation and Deafness unit is full inclusion of persons with disabilities in a multicultural nation. Faculty and staff pursue, as a common mission, improvement in the quality of life for persons with disabilities and focus research interests on the development of new knowledge and technology to meet the unique educational, social, and employment needs of this population. A major goal of the unit is the preparation of graduates for future leadership and professional roles in business and industry, education, and community and government service.

The Rehabilitation and Deafness unit includes several educational programs sponsored by the U.S. Department of Education, Office of Special Education and Rehabilitation Services, Rehabilitation Services Administration, including: Regional Rehabilitation Continuing Education Program, Orientation to Deafness, Southeastern Regional Interpreter Training Consortium, National Interpreter Training Center, and the Educational Interpreter program.

GRADUATE COURSES

415 Language Development of Hearing Impaired (3) Language problems of hearing impaired contrasted with scope and sequence of normal language development. Formal linguistic systems used to describe language development problems.


419 Speech Development of Hearing Impaired (4) Theories of speech development, approaches in training perception and production of speech, and aural habilitation. Practice experiences.

423 Communication Processes for the Hearing Impaired (3) Expressive and receptive vocabulary development in sign communication. Fingerspelling and educational applications of sign language.

424 Nature of Hearing Impairments (3) Basic principles of audiology, anatomy and physiology of hearing; nature and causes of hearing loss; methods and instrumentation for assessment of hearing level; interpretation of audiologic services to medical and other rehabilitative disciplines.

425 Introduction to the Psychology and Education of the Hearing Impaired (3) Primarily for those planning to teach hearing impaired. Overview of research related to psychology, social adjustment, communication methodology, language development and education of hearing impaired. Survey of literature. Visits to programs.

482 Speech and Language Services in the Schools (3) Organization and implementation of speech and language programs in schools. IEP process as it affects assessment, case-selection, and programming for students age 4-21. Procedures and materials, group intervention, and classroom consultation.

483 Clinical Practice in Communication Disorders in Schools (3) Supervised practice with children with communication disorders. Prereq: 433, 434 (80-100 clinical contact hrs), 482.

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

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

563 Problems In Lieu of Thesis (2-3) May be repeated. Maximum 9 hrs. S/N only. E

584 Clinical Experience in Teaching an Supervising of Exceptional Children (3-9) (Same as Inclusive Early Childhood Education 504.)

596 Internships in Teaching in Special Education and Rehabilitation (3-15) Placement in professional settings in public schools or agencies under supervision of master practitioners. Enrolment limited to those in fifth-year program. S/N only.

599 Vocational Guidance and Career Planning With Hearing Impaired (3) Utilization of psychological, educational, vocational, and vocational, diagnostic and resources appropriate for hearing impaired persons to provide guidance in career decisions and individualized rehabilitation plan.

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

523 Practicum in Hearing impairment (3) Receptive and expressive language capabilities of hearing impaired student. Designing, teaching, and post-testing unit of instruction for remediation of specific language deficits.

525 Manual Communication (3) American Sign Language (ASL) and culture of American deaf community. Acquisition of basic linguistic properties of ASL, cultural differences between hearing and deaf community, and
Religious Studies

(College of Arts and Sciences)

Charles H. Reynolds, Head

Professors:

Associate Professors:
Fitzgerald, James L., Ph.D. Chicago Gwynne, Rosalind W., Ph.D. Washington Hackett, Rosemary D., Ph.D. Aberdeen Hodges, John O., Ph.D. Chicago Levering, Miriam L., Ph.D. Harvard

Assistant Professors:
Hulsether, Mark, Ph.D. Minnesota Schmidt, G. Gerda, Ph.D. Pittsburgh

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 nineteenth-century German idealists. (Same as Philosophy 411.)

412 Classical Indian Systems of Philosophy: The Mahabharata Tradition (3) Investigation of selected writings and philosophical problems of traditions of Sanakha, Yoga, Vedanta, Buddhism, or Jainism. Prereq: 374 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 of 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.

435 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 Prospective in Religious Studies (3) For advanced students in religious studies; requires a major. Selected specific topics: nature and function of myth in religion, problem of evil, transcendence, theories of religion, charismatic, 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) See College of Arts and Sciences.
Romance and Asian Languages

(Majors of Arts and Sciences)

MAJORS

French .......................................... M.A.
Spanish ........................................... M.A.
Modern Foreign Languages ............... Ph.D.

John B. Romeiser, Head

Professors:
Barrette, Paul E., Ph.D. .................. California
Brady, Patrick, D.U.P. ................... Sorbonne
Cobb, Carl W., Ph.D. ..................... Tulane
Elliott, Jacqueline C. (Emeritus), M.A. . Illinois
Handelman, Michael H. (Liaison), Ph.D. Florida
Heffin, William H., Ph.D. ............... Florida State
Irving, Thomas B. (Emeritus), Ph.D. .... Princeton
Lovy, Karen D., Ph.D. ................... North Carolina
Maurino, Ferdinando D. (Emeritus), Ph.D. Columbia
Petrovska, Marija (Emeritus), Ph.D. .... Kentucky
Pinsky, Clara (Emeritus), Ph.D. ........ California
Rivera-Rodas, Oscar, Ph.D. .............. California
Romeiser, John B. (Liaison), Ph.D. ... Vanderbilt
Vazquez-Bigi, A. M. (Emeritus), Ph.D. . Minnesota
Wallace, Albert H. (Emeritus), Ph.D. .... North Carolina
Washburn, Yulan M., Ph.D. .............. North Carolina

Associate Professors:
Brizzo, Flavia, Ph.D. ...................... Washington
Campion, Edmund J., Ph.D. ............ Yale
Cazenave, Odile, Ph.D. .................. Penn State
Creel, Bryant, Ph.D. ...................... California
De Rycke, Robert M., Ph.D. ............ Illinois
Di Maria, Salvatore, Ph.D. .............. Wisconsin
DiPuccio, Denise M., Ph.D. ............. Kansas
Duncan, Cynthia K., Ph.D. .............. Illinois
Holmund, Christine (Liaison), Ph.D. ... Wisconsin
Young, Dolly, Ph.D. ...................... Texas

Assistant Professors:
Beauvais, Margaret, Ph.D. ............. Texas
Ehrlich, Linda, Ph.D. ...................... Hawaii
Essif, Les, Ph.D. .......................... Brown
LaCure, Jon, Ph.D. ......................... Indiana
Lewis, Elizabeth F., Ph.D. .............. Virginia
Nakuma, Constancio, Ph.D. ............. Sorbonne
Silvallilo, Euclidis, Ph.D. ............... North Carolina
Wilkinson, Douglass, Ph.D. ............ Yale

The Department of Romance and Asian Languages offers two advanced degrees: the Major 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 coordinator of Spanish and French, will make available additional 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 600 Thesis. In French, 501 is required; in Spanish, 550. A maximum of 6 hours may be taken at the 400 level. The rest of 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, 5 in the minor.
2. A thesis, with a minimum of 6 semester hours in course 500.
3. A written examination covering the coursework and selected items from a master reading list.
4. A final oral examination covering the thesis.

Non-Thesis Option
1. Completion of at least 30 semester hours, with a maximum of 9 at the 400 level, the rest at the 500 level, including 501 (French) or 550 (Spanish). Under certain conditions, the student may take 600-level seminars. If the student chooses to have a minor (such as Italian or Portuguese), at least 24 hours must be taken in the major, 6 in the minor.
2. Three term papers that have been accepted by the student's advisory committee.
3. A written examination covering the coursework and selected items from a master reading list.
4. A final oral examination to discuss the papers (French M.A. only).

THE DOCTORAL PROGRAM

The Ph.D. in Modern Foreign Languages is offered jointly by the Department of Germanic and Slavic Languages and the Department of Romance Languages and requires advanced training in at least two foreign 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.

Requirements for the Ph.D.
Candidates must complete a minimum of 63 semester hours of coursework beyond the Bachelor's degree in addition to 24 hours of doctoral research and dissertation. Two tracks are available.

The coursework for Track I must be distributed as follows:
1. First Concentration: French, German or Spanish. It consists of a minimum of 39 semester hours beyond the Bachelor's degree, distributed as follows:
   - A maximum of 6 hours of coursework beyond the Bachelor's degree for the major language (French, German or Spanish)
   - A minimum of 21 hours at the 500 level (exclusive of thesis hours) including French 594 (3), German 560 (3), or Spanish 550 (3); German 512 (3), French 512 (3), or Spanish 512 (3); French 515-16 (2,2) or German 520 (3).
   - At least 12 hours at the 600 level (exclusive of dissertation hours).

2. Second Concentration: French, German, Italian, Russian, or Spanish (different from the first concentration). It consists of at least 18 hours of courses beyond the Bachelor's degree, at least 12 of which must be at the 500 or 600 level.

3. Cognate Field: Six hours must be in graduate courses numbered 400 and above in a field outside the department. The first concentration but related to the student's principal area of research. If the cognate field is not yet a third foreign language, a reading proficiency exam will be administered after completion of the 6 cognate hours by the language section concerned.

The coursework for Track II must be distributed as follows:
1. First Concentration: French or Spanish. It consists of 45 semester hours beyond the Bachelor's degree, distributed as follows:
   - A minimum of 27 hours at the 500 level (exclusive of thesis hours) including French 584 (3) or Spanish 550 (3); French 512 (3) or Spanish 512 (3); and French 516 (2) or the appropriate Spanish course.
   - At least 12 hours at the 600 level (exclusive of dissertation hours).

2. Second Concentration: French, German, Italian, Portuguese, Russian, or Spanish (different from the first concentration). It consists of at least 12 hours with a minimum of 3 hours at the 500 level. Students are encouraged to take classes that complement the primary area of expertise in the first concentration, so that this second concentration will be a useful research tool for the dissertation and future professional activities. (Because Track II students will have taken graduate hours instead of 18 hours in the second concentration, they will normally not be eligible to take that language at institutions which follow SACS guidelines for college foreign language teaching.)

3. Cognate Field: Six hours must be in graduate courses numbered 400 and above in a field outside the candidate's first concentration but related to the student's principal area of research. If the cognate field is yet a third foreign language, a reading proficiency exam will be administered after completion of the 6 cognate courses by the language section concerned.

4. Additional requirements for both tracks: A student must demonstrate competence in the languages of both the first and second concentrations by taking a test in each language. 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 the National Teacher Examination, the MLE Examination for Teachers and Advanced Students, or the proficiency standards of the United States Foreign Service Institute (FSI).

If the 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) is a part of the first and second language requirements. The student should be chosen from another foreign language family.
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 in the program should have the opportunity and will be strongly encouraged to instruct at least two foreign languages, subject to staffing needs. Doctoral students are strongly encouraged to reside and study abroad and will be assisted in identifying potential sources of financial support (e.g., Fulbright, McClure, Rotary fellowships).

For additional courses, see Germanic and Slavic Languages.

ACADEMIC COMMON MARKET

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

Asian Languages

GRADUATE COURSES

431 Readings in Chinese Literature (3) Prereq: Mastery of intermediate-level Chinese or consent of instructor. May be repeated. Maximum 9 hrs.

451 Readings in Japanese Literature (3) Prereq: Mastery of intermediate-level Japanese or consent of instructor. May be repeated. Maximum 9 hrs.

471 Selected Topics in Asian Studies (3) Content varies. May be repeated. Maximum 9 hrs.

French

GRADUATE COURSES


411 French Literature of the 18th Century (3) Highlights of 18th-century France literature. Excerpts from Rabelais and Montaigne; readings of poems from writers from Lyon and members of Pléiade. Prereq: 212, 218 or equivalent.


413 French Literature of the 16th Century (3) Major works of Enlightenment. Prereq: 212, 218 or equivalent.


416 Survey of Francophone Literature (3) Examination of French literature outside metropolitan France, particularly Africa and Caribbean. Prereq: 212, 218 or equivalent.

420 French Cinema (3) French cinema from earliest days through New Wave directors. Prereq: 212, 218 or equivalent. May apply toward major.


422 Advanced Grammar (3) Improving one's written French by studying basic and more refined structures of French. Writing creative free-style compositions. Prereq: 342 or 345.

423-24 Advanced Conversation (1,1) Informal conversation with native speaker on contemporary topics. Stresses in-class contact rather than outside preparation. Prereq: 342 or 345. 2 hrs weekly.

425 Introduction to Descriptive Linguistics (3) Phonetics and phonemics, morphology and syntax. Types of languages, linguistic groups, dialects, and dialect geography. Application of descriptive linguistics—field linguistics, dialect study; its practical use in learning languages and in language teaching. Introduction to transformational grammar. Prereq: 6 hrs of upper-division English or 6 hrs of upper-division courses in a modern or ancient language (exclusive of German and French 201-02 courses in literature in translation). Prereq: 342 or 345.

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 Spanish 429 and Linguistics 429.)

430 Theatrical French (3-6) Performance in one or more French plays. Prereq: 212, 218 or equivalent and consent of instructor. 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 arts. Prereq: 212, 218 or equivalent.

432 Contemporary French Culture (3) French contemporary civilization and culture since World War II. Problems, trends, and organization of French society today. Prereq: 212, 218 or equivalent.

434 Literature of Quebec (3) Survey of literature of Quebec as well as French literature connected with North America. Readings include explorer and missionary works, such as Voyages of Champlain and Journals of Jesuits, and literature of contemporary Quebec. Prereq: Intermediate French or equivalent.

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.

501 Techniques in Literary Analysis (3) Required for M.A. program. Intensive course in explication de texte, a close stylistic analysis of typical works representative of different areas and of different genres.

502 Registration for Use of Facilities (3-15) Required for use of University facilities and/or faculty time before degree is completed. May be used toward degree requirements. May be repeated. S/NC.

512 Teaching a Foreign Language (3) Practical application of methods for teaching and evaluating basic language skills and foreign language skills, and cultural aspects through seminars, demonstrations, peer teaching, and observation of foreign language classes. Required of all M.A. and Ph.D students holding Graduate Teaching Assistantships, except those whose previous training or experience warrants their being excused by department.

516 Bibliography and Methods of Research (2) Critical research tools and scholarly contributions in French literature and language. Practical exercises on compiling of scholarly data using computer-based and non-computer sources.

521-22 Old French (3,3) Medieval French literature and language. Introduction to history and development of Old French. Close reading of major texts from medieval genres, hagiography, epic, romance, lyric poetry, drama.

531 French Literature of the 16th Century (1) Literature of first half of 16th century. Rabelais and other prose writers, humanists, and poetry of Marot, Lyonnais group, and young Pléiade poets.

532 French Literature of the 16th Century II (3) Literature of second half of 16th century. Mature works of Pléiade writers and such poets as d’Aubigné and Sponde, Montaigne, writers of scientific works and memoirists; drama.

541 French Literature of the 17th Century (3) French poems and prose works of 17th century.

542 French Literature of the 17th Century II (3) Classical French theatre of 17th century.

551-52 French Literature of the 18th Century: the Philosophes (3,3) Textual analysis of works of Voltaire, Diderot, Rousseau, and other major French 18th-century writers.

561 Lyric Poetry of the 19th Century (3) Reading and interpreting great French romantic poets, "lart pour lart" movement, Parmassians, Charles Baudelaire and Symbolists.

571-72 Trends in Modern French Literature (3,3) In-depth study of some of most important, challenging poets, novelists, dramatists of 20th century.

581-82 The French Novel (3,3) French Novel from 17th through 20th centuries.

583 Problems in Style (3) Survey of comparative English-French stylistics. Development and improvement of one's written French.

584 Literary Criticism: the Foundations of Romance Criticism (3) Survey in some of most important, challenging critics. Textual analysis and application to various types of literature.

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

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

593 Independent Study (1-15) See College of Arts and Sciences. Letter grade or S/NC.

594-95 French Directed Readings (3,3)

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

621-22-23 Seminar in French Literature (3,3,3) Seminar in 16th, 17th, and 18th century. 623—17th Century. May be repeated with consent of department. Maximum 6 hrs each.

632-33 Seminar in French Literature (3,3) 632—19th Century; 633-20th Century. May be repeated with consent of department. Maximum 6 hrs each.

Italian

GRADUATE COURSES

401 Dante and Medieval Culture (3) Introduction to significance of great Italian writer. Prereq: 212 or consent of instructor.

402 Petrarch and Boccaccio (3) Prereq: 212 or consent of instructor.

403-04 Literature of the Rinascimento (3,3) From Pucci to Tasso, Quatrocento and Cinquecento. Prereq: 212 or consent of instructor.

405 Modern Italian Poetry (3) From Pascoli to Montale. Prereq: Italian 212 or consent of instructor.

406 The Modern Italian Novel (3) From Manzoni to Calvino. Prereq: 212 or consent of instructor.

409 Directed Readings (3)
410 Italian Theatre (3) Survey of Italian theatre from Renaissance to present. Prereq: Intermediate Italian or consent of instructor.

421 Topics in Italian Literature and Cinema (3) Italian literature and cinema from 1500 to present focusing on literary works translated into English and adapted into film. Investigation of relationship between literature and cinema and achievement of greater understanding of Italian culture since 1700. Films in Italian with English subtitles. May be repeated. Maximum 6 hrs. (Same as Cinema Studies 421.)

510 Readings in Italian Literature (3) Topics vary. May be repeated with consent of department.

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

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

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

Portuguese

GRADUATE COURSES

431-32 Topics in the Literature & Language of Portuguese-speaking World (3,3) Outstanding works of literature and culture from Portuguese countries. Topics vary. Prereq: At least one course at the 300 level or 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) Piner points of grammatical structures. Required of all majors. Native speakers must receive consent of instructor. Prereq: Intermediate Conversation and Composition or consent of instructor.

423-24 Advanced Conversation and Composition (3,3) Advanced conversational and written skills in Spanish for pre-professionals. Native speakers must receive consent from instructor to take course. Prereq for 423: Intermediate Conversation and Composition or consent of instructor. Prereq for 424: 423 or consent of instructor.

425 Introduction to Descriptive Linguistics (3) (Same as French 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.)

431 Spanish Civilization (3) Major social, political, and cultural achievements of Spanish people from origins of their civilization until today. Prereq: Aspects of Spanish and Spanish American Literature or equivalent.

435-36 Survey of Spanish Literature (3,3) Survey of Spanish literature 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.

552 Special Topics in Spanish or Spanish American Literature (3) May be repeated. Maximum 6 hrs.

552 Directed Readings (3)

571 Spanish American Novel: Mexico and the Caribbean (3) Critical study of major novels from Mexico, Central American, Caribbean and Venezuelan modern period. 

573 The Spanish American Novel: Chile and the River Plate Nations (3) Novels from Chile, Argentina, Uruguay and Paraguay. Modern world.


577 Contemporary Spanish American Poetry (3) Major poets in Spanish American from post-modernismo to present day.

578 Spanish American Drama (3) Major playwrights of 20th-century Spanish America.


589 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. Letter grade or S/NC.

621 Seminar in Spanish Literature (3) May vary in field of Peninsular literature. May be repeated with consent of department. Maximum 9 hrs.

631-32 Seminar in Spanish American Literature (3,3) Topics vary. May be repeated with consent of department. Maximum 9 hrs.

Russian

See Germanic and Slavic Languages

Small Animal Clinical Sciences

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

(College of Social Work)

Major Degrees

Social Work ........................................ M.S.S.W., Ph.D.

Eunice Shatz, Dean

Professors:

Bloch, M. H. (Emeritus), M.S. .... Ohio State
Cetingok, M., Ph.D. .......... Washington (St. Louis)
Faver, C., Ph.D. ................. Michigan
Frey, Gideon W., (Emeritus), Ed.D. ... Columbia
Glaason, C. A., Ph.D. ...... Washington (St. Louis)
Granger, Ben P. (Emeritus), Ph.D. .... Brandeis
Hirayama, H., D.S.W. .... Pennsylvania
McLarnan, G. (Emeritus), M.S.S.W. .. Tennessee
Mullins, M. Kate (Emeritus), Ph.D. .. Chicago
Nooie, Roger M., D.S.W. ...... Tulane
Orten, J. D. (Emeritus), D.S.W. .. Alabama
Rubenstein, H., Ph.D. .... Chicago
Shatz, Eunice, Ph.D. .... Brandeis

Associate Professors:

Bell, W. J., D.S.W. .......... Tulane
Combs-Orme, Terri, Ph.D. ... Washington (St. Louis)
Cruthirds, C. Thomas, D.S.W. .... Tulane
Drevenka, Judith, Ph.D. .... Tennessee
Jennings, J., Ph.D. .... Michigan
Moses, A. E., D.S.W. ...... California
Nugent, W., Ph.D. ................ Florida State
Orme, J. D., Ph.D. .......... Washington (St. Louis)
Spicuzza, Frank, M.S.S.W. .... Tennessee
Thompson, J., Ph.D. .......... Rutgers
Vaughn, H., Ed., D.D. ......... Memphis State

Assistant Professors:

Campbell, P. M., D.S.W. ....... Alabama
Collorge, C., M.S.W. .......... Tulane
Crawford, S., M.S.W. ....... Tulane
Jones, J., Ph.D. ............... Bryn Mawr
Knox, Karen, Ph.D. .......... Texas
Marley, Marsha, D.S.W. ........ Tulane
Patterson, D., Ph.D. ......... Utah
Rocha, Cynthia, Ph.D. ......... Washington (St. Louis)
Spaulding, E., Ph.D. .......... Smith-Vickerstaff, Susan, Ph.D. ......... Alabama

Field Practice Coordinators:

Betz, Phyllis (Knoxville), M.S.S.W. ... Tennessee
Davis, Joyce (Nashville), M.S.S.W. ... Tennessee
Pomerantz, Edward (Memphis), M.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.

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.

2. Students may select a thesis or non-thesis option. Students pursuing the thesis option receive six credit hours for successful completion.

3. Successful completion of a comprehensive exam or thesis defense.

4. An overall GPA of 3.0 or better on all graded courses and satisfactory performance in field.

The Professional Foundation Curriculum

The foundation curriculum consists of 30 semester hours in five basic knowledge and skill areas required of all students before entering either of the concentrations. As the initial phase of the educational program, the foundation curriculum contributes to the process of professional identification and presents a comprehensive and broad base of theory, knowledge, and skills from which to operate in the future as practitioners, supervisors, managers, planners, and program developers.

Upon completion of the foundation curriculum (at the end of the second semester), students select a concentration in either clinical social work practice or management and community practice.

Clinical Social Work Practice: The clinical social work practice concentration focuses on students’ developing expertise in providing services to individuals, couples, families, and small groups who are experiencing, or who are likely to experience, serious threats to their personal and social well-being. The concentration emphasizes students’ developing theoretical and empirical knowledge and practice skills in differential assessment and intervention directed towards the prevention and amelioration of complex personal, interpersonal, and environmental problems; understanding of, and ability to practice ethically and effectively with, and socially and culturally diverse populations; and understanding of, and skills in influencing, the organizational context of practice towards the development of new services that may be needed and improvement in the provision of existing services.

Management and Community Practice: The management and community practice concentration focuses on students’ developing skills directed toward the management and analysis of complex service delivery needs within organizations and communities; knowledge and skills in the development of service intervention strategies to address such related needs; and the organizational and management skills that enable practitioners to work in a variety of challenging and turbulent environments. The concentration emphasizes theory and skills related to leadership and administration, and permits flexibility in tailoring a program to fit the student’s individual interests, capabilities, and career goals.

Field Practice

Field instruction is a critical component of the student’s first and second-year programs. Through cooperation with a wide range of social agencies and human service programs throughout Tennessee, the college is able to provide field placements in a variety of social work practice areas. The faculty works closely
with the placement agencies and the field instructors to ensure that students have quality field practice experiences, meeting the objectives of the core curriculum and the concentration.

The college uses a concurrent class and field plan. Students are in field two days per week during the first year and three days per week in the second year. First-year agency placements are selected to provide 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 coursework taken for graduate credit and passed with a grade of B or better. An S (earned on an S/NC system) for the student is otherwiseregistered during any semester when student uses University facilities and/or resources. May be repeated. S/NC

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/special welfare experience. Applicants who do not meet these requirements, but believe they have equivalent credentials should contact the Chair of Ph.D. program for further information regarding admissions criteria.

General Requirements
1. A minimum of 60 semester hours beyond the master’s degree including a) completion of 21 credits of required coursework, b) completion of 15 credits of advanced electives, at least 12 of which are taken outside the department, and c) 9 of those 12 related to the dissertation, and d) completion of at least 24 credits of dissertation research.
2. Successful completion of qualifying and comprehensive examinations.
3. Completion and defense of the dissertation.

Curriculum
The curriculum of the Ph.D. program consists of foundation coursework, electives, and dissertation research. The foundation curriculum consists of 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,trailing the foundation curriculum is completed and elective coursework begins during the first year of study; the elective requirement is completed and dissertation research begins in the second year of study, and dissertation research is continued in the third year of study. While it is generally expected that the coursework will be completed on a full-time basis, dissertation research can be completed on a part-time basis.

Specific courses required are 601, 602, 612, 613, 640, and Statistics 531 and 532 or any two graduate level statistics courses approved by the Doctoral Program Chair.

Examinations
All doctoral students are required to pass a qualifying examination and a comprehensive examination. The qualifying examination covers the foundation curriculum. The comprehensive examination is administered by members of the doctoral committee and is designed for the student to demonstrate comprehensive knowledge of the major and cognate areas and the dissertation topic. In case of failure of either examination, the student may request a retake. The result of the second examination is final.

Financial Aid
Financial aid is available to qualified students in the form of fellowships, scholarships, and teaching and research assistantships. Graduate assistantships and other financial aid are awarded on the basis of merit and interest to applicants who are accepted into the Ph.D. program.

MINOR IN GERONTOLOGY
Graduate students in the College of Social Work may pursue a specialized minor in gerontology. This interdepartmental/ interdisciplinary minor gives the student an opportunity for combining the knowledge about aging in American society with 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.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) E, P/NP only

501 Foundations of Social Work Practice I (3) Survey of history, mission, and identity to profession. Basic theory, values, and methods genericto social work practice at various systems levels. Assessment, planning, implementation, evaluation, and utilization skills. Prereq: Admission to College or consent of instructor.

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

503 Foundations of Social Work Practice II (3) Generalist practice with individual, family, and small group systems. Ecological theory to frame understanding of such systems and their adaptation to environments. Various social work roles and intervention strategies pertaining to each client system. Prereq: 501 or consent of instructor.

504 Foundations of Social Work Practice III (3) Basic theory, methods, problems, and strategies in implementing planned change within and among larger social systems: task groups, human service organizations, and community systems. Various practice roles: planner, program developer, supervisor, administrator, advocate and task group leader. Prereq: Completion of first semester of foundation or consent of instructor.

506 Social Work Research (3) Research methodologies with respect to evolution and application to social work theory and practice. Probability, theories of science; problem formulation; research design; ethics; instrument use and construction; data collection; analysis and reporting; and evaluation and utilization of research.

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.
508 Practicum in Social Work Research (3-8) Supervised practice in application of research methods to social work, Prereq: 510 and consent of faculty conducting the investigation. May be repeated. Maximum 6 hrs. S/NC only. E

509 Graduate Seminar in Public Health (1) (Same as Public Health 509, Exercise Science 509, Nutrition 509, and Nursing 509.)

510 Social Work Research (3) Research methodology applied to problems in social welfare. Problem formulation, research design, data collection and analysis, writing and presenting research findings.

514 Human Behavior in the Social Environment I (3) Theories pertaining to individual, family, and group development while emphasizing relationships among biological, social psychological, and cultural systems. Dynamics of behavior in context of social structures: race, ethnicity, social class, gender roles. Prereq: Admission to College of consent of instructor.

515 Human Behavior in the Social Environment II (3) Theories, developmental concepts, and empirical research findings relevant to clinical perspective on adaptive and psychopathological development of individuals. Relationships among biology, social/cultural structures, environment, and perceptual mechanisms. Application of the ego developmental model to psychiatry. DSM-IV used to provide information regarding descriptive diagnostic categories. Prereq: 514 or consent of instructor. F

516 Social Welfare Policy and Services (3) Development of contemporary social policy at local, state, national, and international levels. Contribution of social work professionals to formal policy-making process through which problems are reflected and through which aggregate social welfare services are proposed, authorized, financed, and programmed. Theories of complex organization 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 impact of oppression in U.S. society as manifested in both theoretical systems and personal experience. Connections among various forms of oppression: racism, sexism, classism, and heterosexism. Forces which perpetuate such conditions. Prereq: Admission to College of consent of instructor.

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 foundation or consent of instructor.

523 Clinical Social Work Practice with Families (3) Concepts related to understanding and analyzing family dynamics and interpersonal patterns, and their impact on major family therapy models. Techniques of treatment in terms of application to families with varied system and individual problems and to families from varied and cultural backgrounds. Prereq: Completion of foundation or consent of instructor.

525 Clinical Social Work Practice with Groups (3) Theoretical and historical approaches to social work with groups and clinical supervision of practice with groups. Group work used in clinical practice and associated leader interventions. Prereq: Completion of foundation or consent of instructor.

526 Research for Assessment of Social Work Treatment (3) History and philosophy, conceptual approaches, techniques and methods, and issues in practice and evaluation of research as applied to development and evaluation of social work programs and policies. Issues pertaining to ethical and research design and utilization of evaluation research. Prereq: Consent of instructor. E

534 Social Work Treatment with Children and Adolescents (3) Examination of various treatment modalities for assessing and treating children and adolescents. Prereq: 520 or 522, or consent of instructor. Prereq: Foundation of consent of instructor. Prereq: Completion of foundation or consent of instructor.

541 Leadership and Management in Human Services (3) Management practices and leadership skills required in development and management of human services delivery systems, issues regarding human resources management, resource allocation, strategic planning, and organizational dynamics. Prereq: Completion of foundation or consent of instructor.

543 Computer Technology, Information Systems, and Resource Development in Human Services (3) Analysis of role of computer technology in automation of human services information and financial planning and budgeting services. Technical aids to budgetary choice and other aspects of financial and information management for decision making. Prereq: Completion of foundation or consent of instructor.

547 Evaluation Research (3) History and philosophies, conceptual approaches, techniques and methods, and issues in practice and evaluation of research as applied to development and evaluation of social work programs and policies. Issues pertaining to ethical and research design and utilization of evaluation research. Prereq: 514 or consent of instructor. F

550 Seminar in Social Welfare Administration and Planning (2-3) Areas and issues relating to methods and techniques of social welfare administration and planning. Prereq: Foundation or consent of instructor. May be repeated. Maximum 6 hrs. F

555 Seminar in Social Welfare (2-3) Social welfare problem areas or field of practice. Prereq: Foundation or consent of instructor. May be repeated. Maximum 6 hrs. F

556 Social Policy Analysis (3) Techniques for assessing social, political, and economic implications of social policy proposals. Prereq: Foundation or consent of instructor.

561 Supervision and Consultation in Social Work (3) Roles, techniques, and professional interchanges. Theory and consultation. Prereq: Foundation or consent of instructor.

562 Social Work and Black Families (3) Historical and contemporary theories about black family systems. Development of frameworks to assess and plan for black families within service delivery systems. Prereq: Foundation or consent of instructor.

563 Social Aspects of Illness (3) Social, economic, and emotional problems arising from or related to illness and disability and their implications for social work. Prereq: Foundation or consent of instructor.

564 Substance Abuse (3) Survey and analysis of social, cultural, medical, and psychological factors underlying alcoholism and drug abuse and addiction: recent research and treatment innovations. Prereq: Foundation or consent of instructor.

566 Social Gerontology (3) Physical, psychological and social aspects of aging. Major social policies and programs. Prereq: Foundation or consent of instructor.

580 Field Practice (3) Instruction and supervision in social work practice. Prereq: Foundation or consent of instructor.

581 Field Practice (3) Instruction and supervision in social work practice. Prereq: Foundation or consent of instructor.

582 Field Practice (6) Instruction and supervision in clinical social work practice or community practice. Prereq: Foundation or consent of instructor.

583 Field Practice (6) Instruction and supervision in clinical social work practice or community practice. Prereq: Foundation or consent of instructor.

584 Field Practice (2-6) Instruction and supervision in social work practice. Prereq: Foundation or consent of instructor.

585 Seminar in Gerontology (1) (Same as Human Ecology 585, Counselor Education and Counseling Psychology 585, Exercise Science 585, Nursing 585, Public Health 585, Psychosocial Developmental Studies 585, and Sociology 585.)

599 Independent Study (1-6) Individualized study, student selected, designed, and completed examination of special issue or problem. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. F,Sp

600 Doctoral Research and Dissertation (3-15) F

601 Research for Social Work Practice (3) Historical and methodological considerations for both qualitative and qualitative research for social work practice. F

602 Research for Social Work Practice (3) Epistemological and methodological considerations for both qualitative and quantitative research for social work practice. Sp

604 Research in Social Service Settings (3) Advanced research, under faculty supervision, of practice issues in community agency. Prereq: First year required Ph.D courses or consent of instructor. May be repeated. Maximum 9 hrs. F,Sp

608 Evaluative Research for Social Work Practice, Programs and Policy (3) Techniques and strategies for quantitative and qualitative analysis for social policy's impact on individuals and groups and for evaluating processes and outcomes of social work practice. F


613 Social Work Practice and Its Social Context II (3) Critical analysis of knowledge bases of major practice modalities in administration and planning. Sp

640 History of American Social Work (3) Social, cultural, economic and political contexts for development of social work profession, development of education for profession, and modern welfare system. F

660 Issues in Social Work Knowledge Building (3) Advanced seminar in theory and model building in direct intervention, administration and planning. Prereq: First year required Ph.D. courses or consent of instructor. May be repeated. Maximum 9 hrs. F,Sp

693 Directed Study in Social Work Research (3) Advanced individual study, under faculty guidance, of social work practice issues. Prereq: First year required Ph.D. courses or consent of instructor. May be repeated. Maximum 9 hrs. F,Sp

699 Directed Study in Social Work Research (3) Advanced individual study, under faculty guidance, of social work practice issues. Prereq: First year required Ph.D. courses or consent of instructor. May be repeated. Maximum 9 hrs. F,Sp

Sociology

(College of Arts and Sciences)

MAJOR

DEGREES

Sociology.................................M.A., Ph.D.

Michael L. Benson, Head

Professors:

Betz, D. Michael, Ph.D. .........Michigan State
Black, James A., Ph.D. ..........Iowa
Hastings, Donald W., Ph.D. ......Massachusetts
Perrin, Robert G. (Liaison), Ph.D. ....North Carolina
Plonch, Donald R., Ph.D. ......Illinois
Wallace, Samuel E., Ph.D. ......Minnesota

Associate Professors:

Benson, Michael L., Ph.D. ........Illinois
Cable, Sherry, Ph.D. ............Penn State
Gaventa, John P., Ph.D. ........Oxford
Kurth, Suzanne B., Ph.D. ......Illinois (Chicago)
Perrin, Robert G. (Liaison), Ph.D. ....British Columbia
Admission Requirements

1. Acceptable scores on the general Graduate Record Examination. 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 8 hours of Thesis 500, is required. Students must complete Sociology 521, 531, Statistics 532, 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 must 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. Students are encouraged to prepare a paper synthesizing their knowledge of the concentration(s). Students who incorporate supervised work 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.

Subjects to be taken by the student’s committee, up to 12 hours may be taken in courses outside the department for either program.

The Doctoral Program

Coursework
Twenty-four hours of coursework beyond the master’s degree are required (exclusive of S/N/NC credits). Twelve hours of course credit in Sociology at the 600 level are required. Students who enter the program without the courses required for the M.A. degree (521, 531, Statistics 531) or their equivalents must take them as remedial work which does not apply to their residence. Students must complete Sociology 622, 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 individualized course of study subject to the approval of the student’s doctoral committee and the Graduate Program Committee.

Sociology courses at the 400 level may not be taken without the consent of the student’s advisor and the Graduate Program Committee. Six hours may be taken in related fields without petitioning the Graduate Program Committee for approval. The student’s program may include a minor or cognate field.

Comprehensive Examinations
Written examinations in four areas are required (sociological theory, research methodology, and two substantive areas). Doctoral students are eligible to take the theory and methodology examinations whenever offered. Substantive examinations may be taken upon completion of theory and methodology examinations. Detailed information on examinations and examination options (generalist, specialist, and collateralist) 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 interdepartmental interdisciplinary minor gives the student an opportunity for combining the knowledge about aging in American society with his/her major concentration. Please refer to Human Ecology for specific requirements.

Graduate Courses

405 Sociology of Sport (3) Social meaning, organization, and process of sport. Prerequisite: 281 or consent of instructor.
414 Sociology of Health Care (3) Organization of health-care facilities, staff-patient relationships, demographic characteristics, and prevalence of disease.
415 Sociology of Aging (3) How roles and statuses change with age in relation to major social institutions; impact that rapidly increasing number of older people has on society, effect of society on older people.
446 The Modern World System (3) Critical examination of capitalist world-systems as social systems, its coherence, boundaries, regions, member groups, cleavages, and patterns of conflict. Analysis of who gets what, why, and how in global political economy.
455 Sociology and Law (3) How laws and social processes are created 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, sources of corporate crime, 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 for class or at any time before degree is completed. May not be used toward degree requirements. May be repeated. S/N/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. Prerequisite: 350 or equivalent.
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, qualitative and quantitative 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 545.)

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 on responsibility and punishment.

560 Environmental Sociology (3) Systematic treatment of current research in environmental sociology. Social impact analysis and conflicts over environmental issues.

563 Demographic Techniques (3) Standard rates and measures of demographic variables, life table analysis, increments-decimals models, and survey techniques of analysis population analysis.

580 Advanced Rural Sociology (3) (Same as Rural Sociology 580.)


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 Social Theories of Sport (3) (Same as Physical Education 515.)

595 Special Topics in Rural Sociology (1-3) (Same as Rural Sociology 593.)

599 Readings (3) Selected topics. May be repeated. Maximum 6 hrs.

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

622 Sociological Theory II (3) Distinct schools of sociological theory and contributions of their principal exponents. Prereq: 521 or consent of instructor.

629 Supplementary Readings in Sociological Theory (3) Individual guidance. Preparation for comprehensive examination. Prereq: Consent of instructor. S/NC only.

633 Survey Design and Analysis (3) Systematic exploration of survey problems through student participation in design and analysis of surveys. Prereq: 531 or consent of instructor. (Same as Child and Family Studies 633.)

636 Field Research (3) Research experience in selected field sites using techniques of interviewing, participant observation, and other methods of field research. Prereq: 531 or consent of instructor.

639 Supplementary Readings in Methodology (3) Individual guidance. Preparation for comprehensive examination. Prereq: Consent of department. S/NC only.

643 Class Analysis (3) Critical analysis of theories and research on class structure and conflict.

644 Political Sociology (3) Critical examination of theories of state and political processes.

645 Advanced Studies in Political Economy (3) Topical seminar. Prereq: 504 or consent of instructor. May be repeated. Maximum 6 hrs.

649 Supplementary Readings (3) Prereq: Consent of department. May be repeated. Maximum 6 hrs. S/NC only.

580 Advanced Rural Sociology (3) (Same as Rural Sociology 580.)

653 Sociology of Law (3) Intensive examination of selected topics in sociology of law. Prereq: 505 or consent of instructor.

655 Advanced Studies in Criminology (3) Intensive examination of selected topics in criminology. Recommended prereq: 505. May be repeated. Maximum 6 hrs.

661 Theory and Methods of Human Ecology (3) Historical and contemporary studies of interaction between humans and their environment. Prereq: Consent of instructor.

662 Urban and Regional Sociology (3) Historical and contemporary studies of South and Appalachian region with comparisons to other regions.

665 Advanced Studies in Energy, Environment and Natural Resources Policy (3) Seminar covering particular lines of research and theory within area. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

673 Advanced Studies in Social Psychology (3) Selected contemporary research issues related to social psychological theories. Prereq: 541 or consent of instructor. May be repeated. Maximum 6 hrs.

695 Advanced Special Topics (3) Topic of special interest or student-initiated courses that will not be regularly offered. Prereq: Consent of department. May be repeated. Maximum 6 hrs.


**Spanish**

*See Romance and Asian Languages*

## Special Programs

### 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)*

**Faye D. Julian, Head**

Professors:

Julien, Faye D. (Liaison), Ph.D. ........................................ Tennessee

Lester, Lorayne W., Ed.D. ........................................ Tennessee

Yeomans, G. Allan (Emeritus), Ph.D. ................................ Louisiana State

Associate Professors:

Ambrester, M. L., Ph.D. ........................................ Ohio

Buckley, J. E., Ph.D. ........................................ Northwestern

Cook, N. C., M.A. ........................................ Alabama

Glenn, Robert W., Ph.D. ........................................ Northwestern

Assistant Professors:

Ambler, R. S., Ph.D. ........................................ Ohio State

Arnold, Christa L., Ph.D. ........................................ Florida

Haas, John W., Ph.D. ........................................ Kentucky

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 (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 organizations.

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 466.)

476 Rhetoric of the Contemporary Feminist Movement (3) Historical and critical study of rhetoric in campaign for women's rights in United States from 1940's to present. (Same as Women's Studies 476.)

480 Ensemble Interpretation (3) Study and presentation of literary 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.

### Sport and Physical Activity

*(College of Education)*

#### MAJORS

**DEGREES**

Human Performance and Sport Studies ................................................. M.S.

D. Kelley, Leader

Professors:

Lay, Nancy E., Ph.D. ........................................... Florida State

Watson, Helen B. (Emeritus), Ph.D. ................................ Michigan

Associate Professor:

Jones, Ralph E., Ph.D. ........................................ Toledo

Assistant Professors:

Borovjak, Patricia C., M.S. ........................................ Tennessee

Kelley, Dennie E., Ph.D. ........................................ Georgia State

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 (an interdisciplinary concentration with Health, Leisure and Safety Sciences). See Education under Fields of Instruction for full description of degree requirements.

Elective courses are offered in dance. These courses are appropriate for students interested in management of dance studios, teaching dance, or dance performance.

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.

The following retention policy applies to all graduate students seeking a degree in this unit:
1. Graduate students are required to maintain an overall 3.0 GPA.
2. Any student who falls below this standard will be advised in writing by the unit leader of the need to discuss the matter with his/her advisor.
3. If a student's overall GPA remains below 3.0 for a second semester, the student will have his/her degree status revoked.

GRADUATE 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 program. Students interested in these opportunities should file their applications before February. Letters should be addressed to Graduate Assistantships Coordinator, Sport and Physical Activity unit, The University of Tennessee, Knoxville, TN 37996-2700.

Sport Management

GRADUATE COURSES

415 Managing Leisure/Sport and Related Facilities (3) (Same as Recreation and Leisure Studies 415.)

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

501 Special Project (3) Culminating experience for non-thesis major. Research study suitable for publication, or praxicum: requiring special written work. Pre: M.S. in field. May be repeated. E

502 Registration for Use of Facilities (3-15) Required for students not otherwise registered during any period of practical experience in sport facility. E


511 Administrative and Supervisory Processes in Sport (3) Organizational concepts, administrative strategies, and supervisory techniques related to sport administration at all levels of participation in profit and non-profit settings. F

512 Application of Legal Concepts to Sport Settings (3) Application of contract law, breach of contract, and monetary damages within sport settings: risk assessment and development of effective risk management strategies; development of contracts in sports; and analysis of cases involving discrimination based upon gender, race, and age as well as protection of rights at amateur and professional levels of sport. Sp

532 Research Techniques in Sport (3) Evaluate, compare, and contrast research techniques in sport with consideration for and experiences in appropriate review, design, and analysis procedures, and proposal development. F

533 Sport Administration (3) Development of knowledge and analytic skills desirable for middle and upper level managers/administrators in sport business/organization. F

541 Management and Operation of Recreation and Sport Related Facilities (3) (Same as Recreation and Leisure Studies 541.)

544 Theories of Leadership and Behavior in Sport (3) Development of various theoretical approaches to leadership styles in sport administration within cultural contexts, research, and field experiences. Sp

553 Case Studies in Sport Administration (3) Current issues and problems in sport administration at all levels of amateur and professional sport. Sp, Su

554 Readings in Sport Administration (3) Survey of pertinent literature in refereed and applied journals and texts. E

555 Assessment of Sport Programming Needs (3) Development and assessment of approaches and/or instruction for purpose of evaluation, research, feasibility studies, and needs assessment in sport administration/management: qualitative and quantitative techniques. Pre: 532. E

570 Event Management (3) Survey of current research related to theory and practice in event management and involvement in management capacity with one or more special events. Su

580 Special Topics (1-3) Advanced study in selected disciplinary or professional areas of physical education and/or sport. May be repeated. E

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

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

595 Internship (3) Full-time application of previous theoretical and applied knowledge and skills in appropriate sport setting. E

Dance

GRADUATE COURSES

415 Teaching Creative Dance for Children (2) Theory, methods, materials and practical experience in presentation and integration of creative dance in grades K-6. Mini-teaching experience. E

480 Dance Through the 19th Century (3) Dance of various societies and culture from pre-historic through 19th century. E

490 Dance in the 20th Century (3) History and philosophy of dance. E

495 Dance Pedagogy (3) Principles and methods of teaching dance with practical application in mini-teaching experience. Pre: 590. Letter grade or S/NC. E

Statistics

(College of Business Administration and Intercollegiate Program)

MAJORS

Business Administration M.B.A.

M.A.

Statistics

M.S.

DEGREES

Statistics

M.S.

Business Administration

M.B.A.

William C. Parr, Head

Professors:

McLean, Robert A. (Emeritus), Ph.D. .......... Purdue Parr, William C., Ph.D. .......... Southern Methodist Phlipot, John W., Ph.D. .......... VPI


Associate Professors:


Lecturer:

Schmidhammer, James L., Ph.D. .......... Pittsburgh

Additional Intercollegiate Program Faculty:

Bunting, Dewey, Arts and Sciences; Chatterjee, Arun, Engineering; Dessart, Don, Education; Fitzpatrick, Bruce, School of Science; Fribourg, Henry, Agricultural Sciences and Natural Resources; Gant, Michael, Arts and Sciences; Glisson, Charles, Social Work; Gross, Louis, Arts and Sciences; Huck, Schuyler, Education; Ladd, R. T., Business Administration; Lounsberry, John, Arts and Sciences; Lyons, William, Arts and Sciences; McLeMord, Dan, Agricultural Sciences and Natural Resources; Miller, Mark, Communications; Orme, John, Social Work; Ploch, Donnald, Arts and Sciences; Rajput, Bairam, Arts and Sciences; Richardson, Jr., Lillard, Arts and Sciences; Rosinski, Jan, Arts and Sciences; Saxton, Arnold, Agricultural Sciences and Natural Resources; Singletary, Michael, Communications; Smith, Julius, Arts and Sciences; Wagener, Carl, Arts and Sciences.

THE MASTER'S PROGRAM

The M.S. program in Statistics provides students with the foundations in theory and practice required for careers in applied statistics. In addition to the education traditionally offered in such a program, the department offers a concentration in industrial statistics, which provides unique opportunities for experiences in practical applications of statistics. Through involvement in The University of Tennessee, the Computing Center and the Medical Center. Statistics graduate students may gain consulting experience by working with faculty involved in these consulting activities. All students are encouraged to participate in supervised internships or consulting activities as part of their graduate program.

Individuals with undergraduate or graduate degrees in other disciplines are encouraged to enter the program. The candidate's mathematics background should include differential and integral calculus of several variables, individuals with limited mathematics background should seek departmental guidance regarding specific ways in which they may prepare themselves for
Admission Requirements

General admission requirements for The Graduate School are stated beginning on page 12. Applicants for Statistics must submit results of the Graduate Record Examination (GRE) general portion, although GMAT exam scores may be substituted. Applicants for the statistics program must have completed at least two years of college-level mathematics, including the calculus of several variables and matrix algebra, and be proficient in a computer language. Applicants whose native language is other than English must submit results of the Test of English as a Foreign Language (TOEFL).

Curriculum

A minimum of 30 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 advanced 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 two different comprehensive examinations covering: theory and 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 IGSP is 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 approved minor and/or M.S. joint major curriculum offered through the program. The program is administered by an Executive Committee, consisting of college representatives from all colleges with approved programs, with advisory input from the program faculty.

Degree Program  Hours in Approved IGSP Courses

Master's in home department, minor in Statistics  24
Doctorate in home department, minor in Statistics  15

*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 Examining 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 IGSP. That program will specify the sequences of courses, chosen from the IGSP approved list, that are considered appropriate for the student's 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 must submit a list of courses taken at the rank of Assistant Professor or above. The student must complete a minimum of 21 hours in approved statistics courses, exclusive of consulting, internship, independent study, or thesis.

3. The student's Admission to Candidacy form must contain all courses required for the chosen degree program. It is labeled "Statistics Courses Required for the Minor in Statistics." Students should not 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 department and assist the student in obtaining a Department of Statistics faculty member to serve on the student's graduate committee. Successful completion of the Statistics M.S. or minor is recognized by appropriate documentation on the student's transcript. Students who do not complete the Statistics M.S. or minor will still receive academic credit for the statistics courses they have successfully completed.

BUSINESS ADMINISTRATION CONCENTRATION

For complete listing of MBA program requirements, see Business Administration.

MBA Concentration: Statistics

Minimum course requirements are 571, 566, 572 with prereq or coreq of 561.

ACADEMIC STANDARDS

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

GRADUATE COURSES

411 Introduction to Statistical Computing (3) Use of computer operating system and packaged programs for statistical analysis and file management. Not acceptable for credit for statistics majors. Prereq: 251 or 257.

461 Applied Regression Analysis (3) Multiple regression, analysis of variance. Credit not given for both 461 and 561.

462 Analysis of Variance and Experimental Design I (3) Analysis of variances for simple and multifactor experiments. Credit not given for both 462 and 562.

471 Random Processes and Probability Models (3) Functions of random variables, multivariate distributions, central limit theorem. Credit not given for both 471 and 571.

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 University facilities and/or faculty are otherwise engaged. Not used toward degree requirements. May be repeated. Prereq: 251. F

511 Statistical Thinking for Decision Making I (3) Concepts: interpreting, organizing, and drawing conclusions from data. Credit not given for both 511 and 511A.

531 Survey of Statistical Methods I (3) Univariate and bivariate data collection and organization, statistical estimation and hypothesis testing, analysis of relationships for categorical and numerical data, including Chi-square tests and simple linear and quadratic regression. Use of computer facilities required. Credit not given for both 531 and 531A. Prereq: 1 yr. college mathematics. E

532 Survey of Statistical Methods II (3) Multiple linear regression analysis, including use of dummy variables; analysis of variance and covariance, issues in experimental design and analysis. Use of computer facilities required. Prereq: 531. E

537 Statistics for Research I (3) Principles and application of statistical methodology, integrated with considerable use of major statistical computer programs. Probability and distribution, estimation and hypothesis testing, analysis of variance, analysis of covariance, multiple factor analysis of variance and covariance, and regression analysis. Prereq: 531 and 537. Prereq: 1 yr. undergraduate mathematics. F

539 Statistics for Research II (3) General linear model as applied to multiple regression and analysis of variance. Credit not given for both 539 and 539A. Prereq: 537. F

411 Introduction to Statistical Computing (3) Use of computer operating system and packaged programs for statistical analysis and file management. Not acceptable for credit for statistics majors. Prereq: 251 or 257.

461 Applied Regression Analysis (3) Multiple regression, analysis of variance. Credit not given for both 461 and 561.

462 Analysis of Variance and Experimental Design I (3) Analysis of variances for simple and multifactor experiments. Credit not given for both 462 and 562.

471 Random Processes and Probability Models (3) Functions of random variables, multivariate distributions, central limit theorem. Credit not given for both 471 and 571.

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 University facilities and/or faculty are otherwise engaged. Not used toward degree requirements. May be repeated. Prereq: 251. F

511 Statistical Thinking for Decision Making I (3) Concepts: interpreting, organizing, and drawing conclusions from data. Credit not given for both 511 and 511A.

531 Survey of Statistical Methods I (3) Univariate and bivariate data collection and organization, statistical estimation and hypothesis testing, analysis of relationships for categorical and numerical data, including Chi-square tests and simple linear and quadratic regression. Use of computer facilities required. Credit not given for both 531 and 531A. Prereq: 1 yr. college mathematics. E

532 Survey of Statistical Methods II (3) Multiple linear regression analysis, including use of dummy variables; analysis of variance and covariance, issues in experimental design and analysis. Use of computer facilities required. Prereq: 531. E

537 Statistics for Research I (3) Principles and application of statistical methodology, integrated with considerable use of major statistical computer programs. Probability and distribution, estimation and hypothesis testing, analysis of variance, analysis of covariance, multiple factor analysis of variance and covariance, and regression analysis. Prereq: 531 and 537. Prereq: 1 yr. undergraduate mathematics. F

539 Statistics for Research II (3) General linear model as applied to multiple regression and analysis of variance. Credit not given for both 539 and 539A. Prereq: 537. F
561 Introduction to Computing for Data Management and Analysis (1) UTCC computing environment for beginning statistics graduate students. Use of operating system commands, system editor, utility programs and SAS statistical package for data entry and editing, file management and statistical analysis. Use of UTCC computing facilities required. Coreq: 531, 537 or 571; or consent of instructor.

563 Introduction to Mathematical Statistics (3) Basic probability models and theory of distributions of random variables. Prereq: 573 or consent of instructor.

564 Theory of Statistical Inference (3) Introductory theory underlying common statistical procedures of hypothesis testing and estimation. Prereq: 563 or Mathematics 425.

566 Statistical Techniques in Industrial Processess (3) Applications of control charts and other statistical techniques in industrial setting. Attributes and variables control charts, process capability analysis, aspects of sampling, statistical tolerancing, estimation of variance components, problems of measurement, special industrial applications. Prereq: 571 or equivalent.


572 Applied Linear Models (3) Simple and multiple linear regression using matrix algebra and general linear model; polynomial regression, weighted least squares regression, variable selection techniques, multicollinearity, regression diagnostics; general linear model approach to analysis of data from designed experiments. Use of standard computer packages. Prereq: 571 and matrix algebra.

573 Design of Experiments (3) One-way ANOVA, multiple range tests, equal and unequal variances, transformations; factorial experiments, completely randomized designs, analysis of covariance, split-plot and nested designs, fractional factorials, sequential designs. Prereq: 571.

575 Categorical Data Analysis (3) Log-linear analysis of multidimensional contingency tables, Logistic regression. Theory, applications, and use of statistical software. Prereq: 1 yr graduate-level statistics, regression analysis and analysis of variance, and familiarity with CMS or VAX; or consent of instructor.

579 Applied Multivariate Methods (3) Multivariate statistical modeling; mixture experiments; optimization; response surface methodology; factor analysis, principal factor analysis model, covariate analysis model, canonical correlations, partial least squares, multiple regression, mixture models and cluster analysis. Prereq: Matrix algebra and 564, or matrix-based linear models with experience in interactive computing, or consent of instructor.

681 Special Topics in Probability (1-3) Presentation of specialized topics in probability and stochastic processes. May be repeated. Maximum 6 hrs.

683 Special Topics in Statistics (1-3) Presentation of specialized topics in statistics. May be repeated. Maximum 6 hrs.

Textiles, Retailing, and Interior Design (College of Human Ecology)

MAJORS

Interior Design............................................. M.S.
Textiles, Retailing and Consumer Sciences M.S. Human Ecology............................................. Ph.D.

Nancy B. Fair, Head

Professors:

Bickmore, R. G. (Emeritus), Ph.D. Florida State
De Jonge, Jacqueline O., Ph.D........... Iowa State
DeLong, A. J. (Liaison), Ph.D............. Penn State
Drake, Mary Fran, Ph.D. ................. Penn State
Duckett, Kermot E., Ph.D. ............... Tennessee
Wadsworth, Larry C., Ph.D. ............. NC State

Associate Professors:

Bresse, Randall R. (Liaison), Ph.D. Florida State
Dyer, C. L. (Liaison), Ph.D. .............. North Carolina
Fair, Nancy B., Ph.D. ...................... NC State
Rabun, Josette, Ph.D. ..................... Tennessee

Assistant Professors:

Bhat, Gajanan, Ph.D. ...................... Georgia Tech
Gupta, Millend, Ph.D. ..................... Missouri
Kupritz, Virginia, Ph.D. ................. VPI

Research Assistant Professors:

Dever, Molly, Ph.D. ...................... Kansas State
Hassenboehler, Charles, Ph.D. ........... Tennessee
Khan, Ahamad, Ph.D. ..................... Tennessee
Ko, Wen-Chien, Ph.D. ..................... Pennsylvania
Malkan, Sanjiv, Ph.D. ...................... Pennsylvania
Tsai, Peter, Ph.D. ......................... Tennessee

The Department of Textiles, Retailing, and Interior Design and the College of Human Ecology: The master’s program in Interior Design offers appropriate career preparation for students who wish to pursue advanced work in interior design. This program is designed to provide a balance between academic preparation and practical experience. The curriculum is structured to give students the opportunity to develop a body of work that is both creative and professional in scope.

Admission Requirements

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

In addition to specified entrance requirements stipulated by The Graduate School, admission to the particular programs in the department is based on the following requirements:

Interior Design

Admission to the master’s degree program with a major in Interior Design requires: 1) a background in interior design, 2) a cumulative GPA of 3.0 or above (or a 4.0 scale), and 3) a portfolio of undergraduate studio work (and professional work, if applicable) submitted to the department. The portfolio may include slides or original work. It is recommended that deficiencies in preparation, as identified in the admission process, be removed prior to full admission to the graduate program.

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 courses that give the necessary background for success in the graduate program. For the concentration in Retail and Consumer Science, students should have an adequate background in 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.
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 S90 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 beyond the core curriculum. Emphases may include historic preservation and/or adaptive use or environmental-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).

**Thesis Option:** Complete a thesis for 6 hours credit. An oral examination will occur upon completion of the program.

**Non-Thesis Option:** Complete a comprehensive design project with acceptable documentation or a 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 criterion, 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/or paper and explain the methodological approach. 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 Sciences. Requirements are listed below. A comprehensive oral examination, administered by the committee, will be given upon completion of the thesis research. A non-thesis option is not available.

**Retail and Consumer Sciences**

Major (Required courses: 510, 511, 553, 562, 590) 19 hours

Cognate Area 6 hours

Statistics 3 hours

Thesis 6 hours

TOTAL 34 hours

**Textile Science**

RCS 552 3 hours

Research Methods 3 hours

TS 590 1 hour

Textile Science courses 12 hours

Cognate Area 6 hours

**Academic Standards**

1. Evaluation of student progress will normally occur prior to enrollment for thesis hours (or the non-thesis option) and during the second semester of full time enrollment in the program. The review of the student will be undertaken by the faculty with consideration given to factors such as: GPA (minimum 3.0), portfolio evaluation, and demonstrated research capability.

2. If progress or performance is deemed insufficient, the faculty may recommend probation with specific goals set for a specified time or termination.

**ACADEMIC COMMON MARKET**

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S. program in Interior Design is available to residents of the states of Louisiana, Mississippi, or Virginia. The M.S. program in Textiles, Retailing and Consumer Sciences is available to residents of the state of Mississippi. Additional information may be obtained from the Admissions Specialist in the Office of Graduate Admissions and Records. For the Ph.D., see Human Ecology.

**Interior Design**

**GRADUATE COURSES**

400 Proxemics (3) Space and behavior within cultural contexts. Application to design and design process. Theoretical foundations and concepts from environment and behavior. Simulation techniques and methods for identifying behavioral design requirements. Prereq: Human Environment Systems and Micro Computer for Interior Design or consent of instructor. F

450 Advanced Interior Design II (5) Comprehensive studio problems of advanced complexity; integration and extension of experiences utilizing systematic design methodologies. Prereq: Advanced Interior Design or consent of instructor. 2 hrs and 3 labs. Sp

470 History of Contemporary Interior Architecture (2) Interior architecture, furniture, design philosophies, nineteenth century roots for twentieth century developments. Prereq: graduate standing. Capacity limited by movements in fine arts, technological advances, cultural context. Prereq: History of Interior Architecture 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. May be repeated. S/N only. E

510 Needs Assessment and Design Programming (3) Systematic methodology and multidisciplinary research methods as part of design problem solving experience. Appropriate for evaluating various environments: commercial, corporate, hospitality and retail. Seminar. May be repeated. Maximum 6 hrs. Prereq: Admission to graduate program. F

520 Integrative Interior Design Studio (3) Identification, integration, synthesis of multidisciplinary data input. Advanced programming techniques and design evaluation. Lecture and studio. Prereq: 510, 564, or consent of instructor. Sp

531 Research Methods in Historic Preservation (3) Methodology for historic preservation problems in interior design. Prereq: Architecture 403 or consent of instructor. Sp

555 Micro-computer Research Applications in Interior Design (3) Advanced micro-computer concepts an applications for research and interior design. Project design and management, optimization of design criteria, programming, schematic design, computer-aided design, automated spreadsheet and database analysis, and desktop presentation. Prereq: Consent of instructor. F

564 Environmental Factors in Interior Design (3) Human factors and associated research techniques and design methodologies related to interior architectural environment. Prereq: 6 hrs behavioral science and 6 hrs natural science, or consent of instructor. Sp

573 Applied Research Strategies in Interior Design (3) Synthesis of research methods, statistics, and design research issues within framework of creating viable research proposals. F

575 Environment and Aging (3) Seminar on design of physical environment and relationship to aging process. Concepts and theories from design, and social and
lighting design and theatre technology. Not all areas of concentration accept applicants every year.

Applicants must have completed undergraduate degrees approximately equivalent in requirements to those specified for degrees conferred by The University of Tennessee, Knoxville.

The Graduate Record Examination, three letters of recommendation and interviews with appropriate faculty are required of all applicants. Applicants for admission to M.F.A. design/technical theatre and playwriting/dramaturgy programs must submit samples of their work.

Auditions are required of M.F.A. degree acting and directing applicants.

For detailed information about the graduate program, contact the Director of Graduate Studies, Department of Theatre.

THE MASTER OF FINE ARTS PROGRAM

At least 60 semester hours, 40 of which must be at the 500 level or above, are required for the degree of Master of Fine Arts with a major in Theatre and normally to be completed in three consecutive years of full-time residence. Theatre 501 is required the first year of residence. A diagnostic examination in theatre history and literature/criticism and 3 hours of advanced theatre history is required. An additional 6 hours of each may be required as determined by the diagnostic examination.

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 509 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 the first year of residence.

Acting

Theatre 520-21-22-23-24-25 Master Class are required, along with one course in directing and two hours each in voice and dance.

Directing

Required courses are 430 Directing, 520-21 Master Class for first year acting candidates and 6 hours of 536 Projects in Play Directing.

Playwriting

Required are 470-71 Playwriting, at least 12 hours of 573 Playwriting Seminar, and at least 3 hours of 585 Production Workshops.

Dramaturgy

An additional two courses in dramatic theory and criticism are required as are Theatre 570 Dramaturgy: Theory and Practice, at least 6 hours of 585 Production Workshops, 430 Play Directing, 3 hours of 536 Projects in Directing, and 12 hours of 573 Seminar and Projects. In addition, students must select an arts and humanities specialization comprising at least one year of language study plus 6 hours in the selected area.

REQUIREMENTS FOR SECOND MASTER'S DEGREE

Students admitted to the MFA program who have already earned a master's or a doctoral degree may apply up to 12 credit hours from the previous graduate program to the MFA degree with approval of the student's committee. The Dean of the College of Arts and Sciences, and the Dean of The Graduate School.

Any such credits applied from a previous graduate program would be from courses that are directly relevant to the student's MFA curriculum and must have been earned within the time limit (6 years) established for completion of the MFA degree.

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 Record.

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 chiroscuro. Prereq: 130.

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 9 hrs.

423 Period Movement and Dance (2) Movement styles and dances from Renaissance to 20th century. Prereq: Stage Movement or consent of instructor.

424 Theatre Dance II (2) Advanced dance technique incorporating elements of musical theatre. Prereq: Theatre Dance or consent of instructor. May be repeated. Maximum 3 hrs.

425 Selected Musical Theatre Techniques (2) Study and practice of musical theatre material 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, vacuumforming, plastic molding, and cobbling. Prereq: 345 or consent of instructor.

446 Costume Patternmaking (3) Draping patterns for period costumes. Century and study of historic patterns 1500-1800. Prereq: 345 or consent of instructor.

450 Advanced Scenory Technology I (3) Study and practice of theatrical workroom, production participation required. Prereq: 250. Graduate credit to theatre M.F.A. students only.

451 Advanced Scenory Technology II (3) Study and practice of metalworking and plastics for theatrical production; production participation required. Prereq: 250. Graduate credit to theatre M.F.A. students only.

452 Advanced Scenory 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 Scenory Painting (2) Introduction to materials, techniques, and principles of craft. Gaining skill and understanding through studio experience. Prereq: Consent of instructor.


456 Rendering (3) Techniques in monochrome and full color illustration of space and form. Prereq: Acquaintance with basic mechanical perspective and freehand sketching.

462 Advanced Lighting Design (3) Advanced problems in lighting design and theory, lighting musical theatre, opera, and dance. Prereq: 365 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 technical 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 and major playwrights using a variety of analytically based methods, with reference to Aristotelian to Structuralist approaches in drama.

520-21-22-23-24-25 Master Class in Acting (4,4,4,4,4,4) Master classes in acting techniques, voice, and movement. Theatre MFA students only.

536 Projects in Play Directing (3) Practical work in play direction involving various lengths, and kinds of scripts. May be repeated. Maximum 9 hrs.

542 The Social History of Costume (3) Study and analysis of costume as related to society's manners and mores, architecture and furniture.


544 Millinery for the Stage (2) Pattern making and construction techniques for hats from antiquity to present. Prereq: Consent of instructor.

545 Millinery for the Stage (2) Pattern making and construction techniques for hats from antiquity to present. Prereq: Consent of instructor.

546 Advanced Costume Patternmaking (3) Advanced studies in patterned costume design. Development of historic patterns through flat pattern method. Prereq: 446.

547 Painting and Dyeing for the Theatre (2) Fibers, dyes and dye processes; color matching and dyeing.
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 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. Preprofessional course requirements must be completed by the end of spring term of the year in which the student intends to enroll. Preprofessional course requirements must have been satisfactorily completed within five years of the time the student wishes to enter the program.

Subject Area Semester Hours
English 6
Humanities and Social Sciences* 18
Physics 8
General Chemistry 8
Organic Chemistry 4
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.

Beginning with the 1995 application cycle, the College of Veterinary Medicine will utilize the new Veterinary Medical College Application Service (VMCAS) for all applicants. Forms and instructions for making application for admission may be obtained beginning July 1, 1995 from the Office of the Associate Dean, The University of Tennessee, College of Veterinary Medicine, P.O. Box 1071, Knoxville, TN 37901-1071.

Note: The deadline for receipt of the completed applicant materials by VMCAS is November 1. NON-TENNESSEE APPLICANTS MUST HAVE A MINIMUM CUMULATIVE GRADE-POINT AVERAGE OF 3.2 ON A 4.0 SCALE.

Applications are accepted only from U.S. citizens or permanent residents of the U.S.

D.V.M. Curriculum
The curriculum of the College of Veterinary Medicine is a nine-semester, four-year program. Each class begins in August and graduates four years later in May. The first three years follow the traditional fall and spring semesters with the summer break following years one and two. The final year of the professional curriculum begins immediately following summer semester and is a continuous clinical rotation extending over one calendar year.

The first year consists mostly of the preclinical subjects of anatomy, physiology, histology, and microbiology. Also included in this first year are clinical subjects of physical diagnosis and anesthesia. Considerable integration of subject matter is incorporated during this year.

The second and third years include the study of diseases, their causes, diagnosis, treatment and prevention, and courses are team-taught on an organ system basis.

The final year (three semesters) is devoted to intensive education in solving animal disease problems involving extensive clinical experience in the Veterinary Teaching Hospital. Each student will rotate through a series of clinical blocks.

An innovative feature of this curriculum is the designation of semester 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 15 credit hours in the sixth semester and may register for up to 10 credit hours of graduate courses without enrolling in The Graduate School and these hours will be credited toward the D.V.M. degree. This semester of elective study offers a unique educational alternative for select students in the DVM and is intended to enhance professional growth, concentration in an area of interest and career opportunities.

In addition to the disciplines and art of veterinary medicine, students receive instruction in paramedical subjects such as animal behavior, medical communication, professional ethics, jurisprudence, economics, and practice management.

The curriculum requires successful completion of 152 semester credits.

THE GRADUATE PROGRAM

The college also administers a graduate program involving all departments which leads to the Master of Science and the Doctor of Philosophy degrees. Because of the interdisciplinary departmental administration of the College of Veterinary Medicine, the faculty have opportunities in the graduate programs of other institutional units, including Animal Science (nutrition, physiology, genetics and animal management), Microbiology (bacteriology, virology, and immunology), Ecology (environmental toxicology), Public Health, and Comparative and Experimental Medicine. (Refer to other sections of this catalog for a full description of these programs.) The majority of the graduate students and graduate faculty of the College of Veterinary Medicine are involved in the Comparative and Experimental Medicine program. This program provides a wide spectrum of interdisciplinary training that prepares graduates for teaching and/or research careers in the health sciences.

ACADEMIC COMMON MARKET

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

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. General approaches to diagnosis, treatment and prevention.
821 Virology and Immunology (5) Structural and genetic basis for classification of animal viruses into separate families. Molecular biology of virus replication; how behavior causes replication; tissues and cells of immune system and how it functions in protection and disease. Practical aspects of immunology: immunopathogenesis, diagnostic serology and immunosuppressive therapy.

821-22 Anatomy LI (4,4) Gross and applied anatomy: neural structures of common domestic animals: dog, cat, horse, cow. Dissection of embalmed specimens, projections, slides, models, and living animals.

823-24 Physiology LI (4,4) Introduction to concepts and problems in physiology which form basis for clinical applications and for formal training in pharmacology, medicine, pathology, and surgery. Cellular, neural, cardiovascular, renal, respiratory, digestive, endocrine, and reproductive physiology.


827 Special Problems in Animal Science (1-8) Extramural and specially designed study for students interested in select topics in anatomy, histology, and physiology.

830 Art of Veterinary Medicine I (3) Paramedical subjects important to veterinary practice: practice management, interpersonal relations, communications, jurisprudence, ethics, careers, animal behavior and veterinary history. May be repeated. S/NC only.

831 Physical Diagnosis (1) Basic care, feeding, restraint, and handling domestic animals. Introduction to physical examination and diagnostic techniques used by veterinarians.

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 epidemiology 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, special 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 laboratory and lecture topics: principles of veterinary medicine and surgical concepts. Applied techniques in animal handling to facilitate anesthesia, surgery, post-surgical recovery and wound healing. Demonstration of pharmacology and physiologic effects of anesthesia and 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, special pathology, medicine and surgery of diseases of integumentary system. Laboratory examination, pathology, diagnosis and treatment.

841 Reproductive System (4) Pathophysiology, special pathology, medicine and surgery of diseases of musculoskeletal systems. Basic principles, pathologic changes and radiographic interpretation.

842 Alimentary System (5) Pathophysiology, special pathology, medicine and surgery of diseases of alimentary systems.

843 Musculoskeletal Systems I (3) Pathophysiology, special pathology, medicine and surgery of diseases of muscular and skeletal systems. Basic principles, pathologic changes and radiographic interpretation.

844 Musculoskeletal System II (3) Pathophysiology, special pathology, medicine and surgery of diseases of musculoskeletal systems. Advanced principles, radiographic interpretation and surgical procedures.

845 Principles of Medical Science (2) Physiology and pathologic principles underlying mechanisms of disease. Selected examples of human and animal diseases; recent scientific advances in biomedical sciences.

846 Multispecies Medicine (4) Anatomy, pathophysiology, medicine, and surgery of avian species, laboratory and zoo animals and reptiles. Species and diseases peculiar to the practicing veterinarian. Current topics on foreign animal diseases.

847 Current Topics in Veterinary Medicine (1-3) Elective subjects in veterinary medicine: basic sciences, clinical specialties and issues related to veterinary practice.

848 Art of Veterinary Medicine II (1) Paramedical subjects important to veterinary practice: practice management, interpersonal relations, communication, jurisprudence, ethics, careers, animal behavior and veterinary history. May be repeated. S/NC only.

849 General Elective in Clinics (2) Special rotation with clinical training in urban practice, rural practice, environmental practice and pathology. S/NC or letter grade.

850 Introduction to Clinics I (1) Clinical veterinary practice with discussions and practical experience. Problem-solving and integration of basic sciences with clinical applications. Problem-oriented veterinary medical record.

851 Urinary System (3) Pathophysiology, special pathology, medicine and surgery of diseases of urinary system. Urinary system in health and disease.

852 Cardiovascular System (2) Pathophysiology, special pathology, medicine and surgery of diseases of cardiovascular system. Anatomic, physiologic and pharmacologic principles which provide basis for treatment.


854 Respiratory System (3) Pathophysiology, special pathology, medicine and surgery of diseases of respiratory system. Upper and lower respiratory system: infections and noninfectious disease.

855 Radiology (3) Basic, advanced and special techniques in radiology with interpretation and use of radiologic and related techniques in diagnosis and treatment of animal diseases.

856 Special Senses (2) Pathophysiology, special pathology, medicine and surgery of diseases of visual and auditory systems.

857 Nervous System (3) Pathophysiology, special pathology, medicine and surgery of diseases of nervous system: clinical neurology and neuropathology.

858 Clinical Rotation in Specialties (2) Clinical training in specialty services: anesthesiology, ophthalmology or dermatology. Direct responsibility for diagnosis, patient care, and treatment of clinical cases in both urban and rural practice.

859 Clinical Clerkship (2) Advanced clinical training in urban practice, rural practice, environmental practice, and pathology. S/NC or letter grade.

861 Pharmacology (4) Principles of pharmacokinetics and pharmacodynamic properties of veterinary drugs: mode of action, pharmacologic effects, chemical and physical properties, metabolism, toxicities, important idiosyncrasies and clinical application.

863 Clinical Rotation in Environmental Practice (2) Clinical training in avian medicine, laboratory animal and zoo animal medicine, epidemiology, 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 animal medicine, epidemiology, public health, pharmacology or toxicology.

871 General Pathology (I) Principles of pathology: causes of disease, disturbances of cell growth, inflammation, and neoplasia.

873 Parasitology (3) Principles of parasitology: protozoology, helminthology, and entomology and relationship to diseases in animals.

875 Clinical Rotations in Pathobiology II (2) Clinical training and demonstrations in laboratory diagnosis: post-mortem examination and clinical pathologic parasitologic and microbiologic techniques.

876 Clinical Rotations in Pathobiology II (2) Clinical training and demonstrations in laboratory diagnosis: post-mortem examination and clinical pathologic parasitologic and microbiologic techniques.

877 Special Problems in Pathobiology (1-8) Extramural and specially designed study for students interested in select topics in morphology, pathology, clinical pathology, 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 II (2) Clinical training in radiographic techniques and interpretation of radiographs as part of diagnostic process.

887 Special Problems in Urban Practice (1-8) Extramural and specially designed study for students interested in select topics in medicine, surgery, anesthesiology, radiology and medical specialties of small companion animals.

911 Clinical Rotations in Rural Practice I (4) Clinical training in medicine, surgery, specialty disciplines and herd health of food animals and horses. Direct responsibility for diagnosis, care, and treatment of clinical patients.

912 Clinical Rotations in Rural Practice II (4) Clinical training in medicine, surgery, specialty disciplines and herd health of food animals and horses. Direct responsibility for diagnosis, care, and treatment of clinical patients.

913 Clinical Rotations in Rural Practice III (4) Clinical training in medicine, surgery, specialty disciplines and herd health of food animals and horses. Direct responsibility for diagnosis, care, and treatment of clinical patients.

914 Clinical Rotations in Rural Practice IV (4) Clinical training in medicine, surgery, specialty disciplines and herd health of food animals and horses. Direct responsibility for diagnosis, care, and treatment of clinical patients.

915 Clinical Rotation in Radiology I (2) Clinical training in basic and special techniques in radiology with interpretation and use of radiographs as part of diagnostic process.

917 Special Problems in Rural Practice (1-8) Extramural and specially designed study for students interested in select topics in medicine, surgery, herd health, reproduction, radiology and medical specialties of large animals.

GRADUATE COURSES

533 Epidemiology/Public Health (4) Principles of epidemiology and public health. Host-agent relationships. Pathogenesis, diagnosis, control and public health significance of diseases of animal origin. Consent of instructor. (Same as Comparative and Experimental Medicine - Veterinary Medicine 533.) Sp

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, pathophysiology, medicine and surgery of domestic animals; domestic, zoo and laboratory and zoo mammals. Common species and diseases. Prereq: Consent of instructor. (Same as Companion Animal and Experimental Medicine - Veterinary Medicine 537.) Sp

545 Principles of Medical Science (2) Principles and pathologic principles underlying mechanisms of disease. Selected examples of human and animal diseases; recent scientific advances in biomedical sciences. Prereq: Consent of instructor. (Same as Com-
Zoology
(College of Arts and Sciences)

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

Arthur C. Echternacht, Head

Professors:
Bagby, R. M., Ph.D. ......................................... Illinois
Carlson, J. G. (Emeritus) (Distinguished Prof.), Ph.D. ........ Pennsylvania
Chen, T. T., Ph.D. ........................................... Florida
Echternacht, Arthur C., Ph.D. ......................... Kansas
Etner, D. A., Ph.D. .......................................... Minnesota
Handel, Mary Ann (Distinguished Prof.), Ph.D. ............ Kansas State
Hochman, B. (Emeritus), Ph.D. ..................... California
Jeon, K. W., Ph.D. ........................................... London
Joy, D. C. (Distinguished Scientist), Ph.D. ......... Michigan State
Kennedy, J. R., Ph.D. ....................................... Iowa
Liles, J. N. (Emeritus), Ph.D. ...................... Ohio State
MacCabe, J. A. (Liaison). Ph.D. ...................... California (Davis)
McCracken, G. F., Ph.D. ............................... Cornell
Pimm, S. L., Ph.D. ........................................... New Mexico State
Riehert, Susan E. (Distinguished Prof.), Ph.D. ............ Wisconsin
Roth, L. Evans, Ph.D. ...................................... Chicago
Shivers, C. A., Ph.D. ...................................... Michigan State
Vaughan, J. A., Ph.D. ...................................... Duke
Welch, H. G. (Emeritus), Ph.D. .................... Florida
Whitson, G. L., Ph.D. ....................................... Iowa

Associate Professors:
Boske, C. R. B., Ph.D. ..................................... Cornell
Burnham, K. D. (Emeritus), Ph.D. .................. Iowa
Drake, J. A., Ph.D. ......................................... Purdue
Fox, David J., Ph.D. ...................................... Johns Hopkins
Ganguly, R., Ph.D. ......................................... Nebraska
Gittelman, J. L., Ph.D. ..................................... Sussex
Greenberg, Neil, Ph.D. .................................... Rutgers
McKee, B. D., Ph.D. ....................................... Michigan State
Pan, M. L., Ph.D. ........................................... Pennsylvania

Assistant Professors:
Hall, J. C., Ph.D. ............................................. Illinois
Prosser, R. A., Ph.D. ....................................... Illinois

The Department of Zoology offers the Master of Science and Doctor of Philosophy with concentrations in aquatic biology, ecology, cell and molecular biology, physiology, genetics, and reproductive and developmental biology.

REQUIREMENTS FOR ADMISSION
Applicants for graduate study are expected to have a background no less extensive than that required of undergraduate majors in this department. This includes a knowledge of the basic principles of cell biology, genetics, and ecology. Other requirements for admission are:
1. one year of general zoology or biology
2. 18 semester hours of upper division zoology or biology
3. two years of chemistry including one year of general inorganic chemistry
4. one year of mathematics including calculus
5. one year of physics
6. Graduate Record Examination scores (general and biology); and
7. a grade-point average of 3.0 out of 4.0. Otherwise, superior students, deficient in one or more of the above requirements, may be admitted at the discretion of the department's Graduate Affairs Committee.

THE MASTER'S PROGRAM
Special requirements in Zoology are as follows:
1. completion of course requirements as determined by the candidate's faculty committee, including a course in biostatistics; and
2. achievement of a 3.0 or better GPA in all courses taken for graduate credit; and
3. completion of a thesis.

THE DOCTORAL PROGRAM
Special requirements in Zoology are as follows:
1. courses as determined by the candidate's faculty committee, including a course in biostatistics;
2. an oral and comprehensive written examination in zoology and allied fields in which the candidate has had training;
3. a reading knowledge of at least one foreign language in which there exists a sizeable amount of literature relevant to the major field of study. The student has the option of demonstrating a reading knowledge of this foreign language by (a) passing the official reading examination given by the language department or (b) earning a grade of at least a B in the second semester of a special language reading course for graduate students. This foreign language requirement must be fulfilled before a student can take the comprehensive examination.

GRADUATE COURSES
403 General Genetics Laboratory (3) Experiments designed to illustrate basic principles of inheritance; primary organism--Drosophila. Prereq: Biology 220. 2 labs.
405-06-11-12 Minicourse in Zoology (2,2,2,2) Select advanced topics in zoology, concentrated in time and subject matter. Consult departmental listing for topics offered. Prereq: As announced. May be repeated. Maximum 4 hrs may apply toward zoology major.
420 Cell and Tissue Structure and Function (4) Study of animal cells and tissues at light and electron microscope levels. Prereq: Biology 210. 2 hrs and 2 labs.
430 Immunology (3) (Same as Microbiology 430.)
439 Immunology Laboratory (2) (Same as Microbiology 439.)
449 Laboratory in Physiology (2) Prereq or coreq: 440 or 445.
450 Comparative Animal Behavior (3) Principles and methods of ethology; ecological, developmental, physiological, and evolutionary aspects. (Same as Psychology 450.)
459 Comparative Animal Behavior Laboratory (3) Introduction to observational and experimental research in ethology. Coreq: 450. (Same as Psychology 459.)
460 Evolution (3) Modern concepts of animal evolution. Prereq: Biology 220.
465 Human Genetics (3) Genetic and molecular principles and problems of human inheritance. Prereq: Biology 220.
470 Aquatic Ecology (3) Introduction to physicochemical nature of inland waters with description of biotic communities and their interrelationships. Prereq: Chemistry 120-30 and Biology 230. 2 hrs and 1 lab.
472 Arachnology (3) Biology of spiders, mites, scorpions and relatives. Prereq: 360 or 380. 2 hrs and 1 lab.
473 Herpetology (3) Biology of amphibians and reptiles, ecology and adaptive radiation. Prereq: Biology 230. 2 hrs and 1 lab.
475 Ornithology (3) Behavior, ecology, populations, evolution and field identification of birds. Prereq: Biology 230. 2 hrs and 1 lab.
476 Mammalogy (3) Evolution, classification, biogeography, ecology, behavior and functional anatomy of mammals. Prereq: Biology 230 or equivalent. 2 hrs and 1 lab.
480 Physiology of Exercise (3) (Same as Physical Education 480.)
484 Conservation Biology (3) Application of principles and techniques of ecological research to conservation of biodiversity at genetic, population, community, and ecosystem levels. Prereq: General Genetics and General Ecology. (Same as Ecology 484.)
490 Comparative Endocrinology (3) Comparative analysis of physiology and morphology of endocrine glands in vertebrates and invertebrates, role and interaction in maintenance of organism and species. Prereq: 440 or equivalent.
500 Thesis (1-15) P/NP only. E
501 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. 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. Maximum 4 hrs. S/N only. E
503 Zoology Seminar (1) Advanced topics in zoology. Senior zoology majors encouraged. Required of all first- and second-year graduate students. May be repeated. Maximum 4 hrs. S/N only. E
504 Special Topics (1-2) Selected directed readings or special course in topics of current interest. Consult departmental listing for offerings. May be repeated with consent of instructor. Maximum 6 hrs. S/N only.
506 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.
507 Animal Cell Culture (2) Techniques for culture of animal cells, tissues and organs. 1 hr and 1 lab.
510 Introduction to Electron Microscopy - Transmission Electron Microscope (3) Practical application of techniques for preparation of biological samples for viewing in transmission electron microscopy. Use of microscope and ancillary equipment, darkroom techniques, preparation of materials for publication and special project. Admission limited to departmentally approved graduate students. (Same as Botany 510) 2.5 hrs lab. E
511 Introduction to Electron Microscopy - Scanning Electron Microscope (3) Practical introduction to techniques of electron microscopy and to scanning electron microscope. Use of microscope, introduction to darkroom techniques and digital image processing, prepara-
tion of samples for observation, and special projects. 
Prereq: Consent of instructor. 2 hrs and 1 lab. Sp.

513 Advanced Developmental Biology (3) Molecular and genetic aspects of differentiation and morphogenesis; current literature. Recommended prereq: Life Sciences 511-12.

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

521 Advanced Mammalian Physiology I (4) (Same as Comparative and Experimental Medicine - Veterinary Medicine 521.)

522 Advanced Mammalian Physiology II (4) RESPIRATORY, GASTROINTESTINAL, AND REPRODUCTIVE PHYSIOLOGY, ACID-BASE MECHANISMS, AND METABOLISM. Prereq: 521. (Same as Comparative and Experimental Medicine - Veterinary Medicine 522.)

523 Physiology of Hormones (3) CELLULAR AND ORGANIZATIONAL ACTION OF HORMONES IN INVERTEBRATE AND VERTEBRATE ANIMALS. Prereq: 490 or consent of instructor. Recommended prereq: Biochemistry 410. 2 hrs and 1 lab.

524 Physiological Ecology of Animals (3) ADAPTIVE PHYSIOLOGICAL RESPONSE OF ANIMALS TO NATURAL CHANGES IN OR EXTREME CONDITIONS OF PHYSICAL AND BIOTIC ENVIRONMENT. TERRESTRIAL VERTEBRATES. Prereq: Undergraduate courses in animal physiology and ecology, 440 and Biology 230 or equivalent.

526 General Vertebrate Neuroanatomy (3) (Same as Psychology 525.)

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 insects at tissue and cellular level. 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: 360. 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.)

560 Biometry (3) Statistical methods in analysis of quantitative biological data. Prereq: Statistics course or consent of instructor.

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 and Ecology 573.)

575 Ecological Genetics (3) Genetics of natural populations, with emphasis on single-locus and quantitative genetic approaches. Prereq: 573 and statistics course.

583 Zoogeography (3) Processes determining geographic distribution of animals and distribution and composition of animal communities. Prereq: Ecology course or consent of instructor.

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

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

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

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

601 Advanced Topics (1-3) Readings and discussion of recent advances. Consult the departmental listing for offerings. May be repeated with consent of department. Maximum 9 hrs.

602 Seminar in Cell and Molecular Biology (1) Readings and discussion based on current literature. May be repeated. Maximum 12 hrs.

603 Seminar in Genetics (1) Readings and discussion based on current literature. May be repeated. Maximum 12 hrs.

604 Seminar in Developmental Biology (1) Readings and discussion based on current literature. May be repeated. Maximum 12 hrs.

605 Seminar in Physiology (1) Readings and discussion based on current literature. May be repeated. Maximum 12 hrs.

606 Seminar in Aquatic Biology (1) Readings and discussion based on current literature. May be repeated. Maximum 12 hrs.

607 Seminar in Ecology (1) Readings and discussion based on current literature. May be repeated. Maximum 12 hrs.

608 Seminar in Ethology (1) Readings and discussion based on current literature. May be repeated. Maximum 12 hrs.

609 Seminar in Organic Evolution (1) Readings and discussion based on current literature. May be repeated. Maximum 12 hrs.

610 Current Topics in Cell and Developmental Biology (1) Critical analyses of current literature in journal club format. May be repeated. Maximum 10 hrs. S/NC only.

611 Advanced Topics in Medical Science (1-3) (Same as Comparative and Experimental Medicine - Graduate School of Medicine 611.)