University Calendar for 1990-91

Summer Term 1990

May 31 (Thursday)  
July 3 (Tuesday)  
July 5 (Thursday)  
July 4 (Wednesday)  
August 8 (Wednesday)  
August 10 (Friday)

Classes Begin  
First Session Ends  
Second Session Begins  
Independence Day  
Second Session Ends  
Commencement

Fall Semester 1990

August 22 (Wednesday)  
September 3 (Monday)  
October 5 (Friday)  
November 22-23 (Thursday-Friday)  
December 5 (Wednesday)  
December 6-7 (Thursday-Friday)  
December 8, 10-13 (Saturday-Thursday)  
December 15 (Saturday)

Classes Begin  
Labor Day  
Fall Break  
Thanksgiving  
Classes End  
Study Period  
Final Exams  
Commencement

Spring Semester 1991

January 9 (Wednesday)  
January 21 (Monday)  
March 18-22 (Monday-Friday)  
March 29 (Friday)  
April 9 (Monday)  
April 30-May 1 (Tuesday-Wednesday)  
May 2-7 (Thursday-Tuesday)  
May 10 (Friday)

Classes Begin  
Martin Luther King Day  
Spring Break  
Good Friday  
Classes End  
Study Period  
Final Exams  
Commencement

Summer Term 1991

May 30 (Thursday)  
July 3 (Wednesday)  
July 4 (Thursday)  
July 5 (Friday)  
August 7 (Wednesday)  
August 9 (Friday)

Classes Begin  
First Session Ends  
Independence Day  
Second Session Begins  
Second Session Ends  
Commencement

NOTE: Deadlines for degree requirements on pp. 25-26.
# TABLE OF CONTENTS

Inside front cover - Contacts/Responsibility

## The Graduate School

### Admission and Registration
- 13 Introduction
- 13 Types of Admissions
- 15 Admission Procedures
- 16 Registration Procedures
- 17 Family Educational Rights and Privacy Act
- 18 Student Identification Number

### Fees, Residency Classification, and Financial Aid
- 16 University Fees
- 18 Residency Classification for Tuition Purposes
- 19 Academic Common Market
- 21 Financial Aid

### Student Services
- 18 Housing
- 18 Vehicle Operation and Parking Services to the Physically Disabled Ombudsman Office

### General Regulations
- 19 Advisor/Major Professor
- 19 Prerequisites
- 20 Course Listings
- 20 Course Loads
- 21 Change of Registration
- 21 Graduation System
- 21 Proficiency Examinations
- 21 English Proficiency
- 21 Minors
- 21 Law Courses
- 21 Auditors and Audited Courses
- 21 Short Courses and Workshops
- 21 Correspondence Study
- 22 Transfer Credits
- 22 Change of Program
- 22 Residence Requirements
- 22 Theses and Dissertations
- 22 Academic Standards
- 22 Appeals Procedure

### Requirements for Advanced Degrees
- 22 Master's Degrees
- 22 Specialist in Education Degree
- 22 Doctoral Degrees
- 22 Summary of Procedures for Degrees

### Colleges
- 29 Agriculture
- 30 Communications
- 31 Engineering
- 32 Liberal Arts
- 32 Medicine - Knoxville Unit
- 33 Social Work
- 34 Veterinary Medicine

### Fields of Instruction
- 35 Accounting and Business Law
- 36 Advertising
- 36 Agricultural and Extension Education
- 36 Agricultural Economics and Rural Sociology
- 37 Agricultural Engineering
- 38 Agriculture
- 39 Animal Science
- 40 Anthropology
- 41 Architecture
- 42 Art
- 43 Art and Music Education
- 44 Audiology and Speech Pathology
- 45 Aviation Systems
- 46 Biochemistry
- 47 Biomedical Sciences
- 48 Botany
- 49播送
- 50 Business Administration
- 51 Chemical Engineering
- 52 Chemistry
- 53 Child and Family Studies
- 54 Civil Engineering
- 55 Classics
- 56 Comparative and Experimental Medicine
- 57 Computer Science
- 58 Curriculum and Instruction
- 59 Ecology
- 60 Economics
- 61 Education
- 62 Educational and Counseling Psychology
- 63 Educational Leadership
- 64 Electrical and Computer Engineering
- 65 Engineering Science and Mechanics
- 66 English
- 67 Environmental Practice
- 68 English Proficiency
- 69 Food Technology and Science
- 70 Forestry, Wildlife and Fisheries
- 71 Geography
- 72 Geological Sciences
- 73 Germanic and Slavic Languages
- 74 Health, Leisure, and Safety
- 75 History
- 76 Home Economics
- 77 Human Ecology
- 78 Human Performance and Sport Studies
- 79 Industrial and Organizational Psychology
- 80 Industrial Engineering
- 81 Interdisciplinary Programs
- 82 Journalism
- 83 Law
- 84 Library and Information Science
- 85 Life Sciences
- 86 Management
- 87 Management Science
- 88 Marketing, Logistics and Transportation
- 89 Materials Science and Engineering
- 90 Mathematics
- 91 Mechanical and Aerospace Engineering
- 92 Mechanical Engineering
- 93 Medical Biology
- 94 Medical Science
- 95 Microbiology
- 96 Music
- 97 Music Education
- 98 Music Proficiency
- 99 Music Theory
- 100 Nursing
- 101 Nuclear Engineering
- 102 Nutrition and Food Sciences
- 103 Ornamental Horticulture and Landscape Design
- 104 Pathobiology
- 105 Philosophy
- 106 Physics and Astronomy
- 107 Planning
- 108 Plant and Soil Science
- 109 Political Science
- 110 Psychology
- 111 Religious Studies
- 112 Rural Practice
- 113 Sociology
- 114 Social Work
- 115 Special Programs
- 116 Special Services Education
- 117 Speech Communication
- 118 Statistics
- 119 Technological and Adult Education
- 120 Textiles, Merchandising and Design
- 121 Theatre
- 122 Urban Practice
- 123 Veterinary Medicine
- 124 Zoology

### Facilities for Research and Service
- 171 Bureau of Educational Research and Service
- 172 Center for Business and Economic Research
- 173 Center for Computer Integrated Engineering and Manufacturing
- 174 Center for International Education
- 175 Center for Measurement and Control Engineering
- 176 Centers of Excellence
- 177 Center for Laser Applications
- 178 Center for Livestock Diseases and Human Health
- 179 Center for Materials Processing Science Alliance
- 180 Waste Management Research and Education Institute
- 181 Communications Research Center
- 182 Computing Center
- 183 Center for International Education
- 184 Agricultural Experiment Station
- 185 Agricultural Extension Service
- 186 Management Development Center
- 187 Off-Campus Graduate Centers
- 188 Kingsport University Center
- 189 Oak Ridge Resident Graduate Program
- 190 Nashville Graduate Engineering Program
- 191 Chattanooga Graduate Education Program
- 192 UT-OR Graduate School of Biomedical Sciences
- 193 College of Social Work
- 194 Psychological Clinic
- 195 Transportation Center
- 196 University of Tennessee Space Institute
- 197 Water Resources Research Center

### Index
The University of Tennessee

Board of Trustees

**Ex Officio Members**
- The Governor of Tennessee
- The Commissioner of Education
- The Commissioner of Agriculture
- The President of the University
- The Executive Director, Tennessee Higher Education Commission

**From Congressional Districts**

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**From Anderson, Bedford, Coffee, Franklin, Lincoln, Moore, and Warren Counties**

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- Michael Graves June 1, 1993

**From Hamilton County**

- Paul J. Kinser June 1, 1996

**From Knox County**

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**From Shelby County**

- Sam Cooper June 1, 1990
- Jack Craddock June 1, 1990

**University Administration**

- Lamar Alexander, B.A., J.D., President of the University
- Joseph E. Johnson, A.B., A.M., Ed.D., Executive Vice President and Vice President for Development
- Homer S. Fisher, B.S., M.B.A., Senior Vice President
- Michael T. Nettles, B.A., M.S., M.A., Ph.D., Vice President for Assessment
- D.M. (Pete) Gossett, B.S., M.S., Ph.D., Vice President for Agriculture
- Emerson H. Fly, B.S., CPA, Vice President for Business and Finance
- James C. Hunt, A.B., M.S., M.D., Vice President for Health Affairs
- Sammie Lynn Puett, B.S., M.S., APR, Vice President for Public Service and University Relations
- Beauchamp E. Brogan, B.S., L.L.B., J.D., General Counsel
- Charles M. Peccolo, Jr., B.S., M.Acc., CPA, CCM, Treasurer

**UT, Knoxville Administration**

- John J. Quinn, B.S., Ph.D., Chancellor
- Philip A. Scheurer, B.A., M.S., Vice Chancellor for Student Affairs
- Jack E. Williams, B.S., Associate Vice President for Development
- C.W. Minkel, B.A., M.A., Ph.D., Vice Provost and Dean of the Graduate School
- Thomas C. Collins, B.S., M.S., Ph.D., Vice Provost for Research
- C. Glen Hall, B.S., M.S., Ph.D., Dean of the College of Agriculture
- J. William Rudd, B.A., M.A., Dean of the School of Architecture
- C. Warren Neel, B.S., M.B.A., D.B.A., Dean of the College of Business Administration
- Dean of the College of Communications
- Richard Wisniewski, B.S., M.E., Ed.D., Dean of the College of Education
- William T. Snyder, B.S., M.S., M.S., Ph.D., Dean of the College of Engineering
- Jacqueline O. DeLonge, B.S., M.A., Ph.D., Dean of the College of Human Ecology
- Marilyn V. Yarbrough, B.A., J.D., Dean of the College of Law
- Lorman A. Ratner, A.B., M.A., Ph.D., Dean of the College of Liberal Arts
- Sylvia E. Hart, B.S., M.S., Ph.D., Dean of the College of Nursing
- Eunice O. Shatz, B.A., M.S., Ph.D., Dean of the College of Social Work
- G. M. H. Shires, B.V.Sc., M.R.C.V.S., Interim Dean of the College of Veterinary Medicine
- Joseph P. Goddard, B.S., M.S., Ph.D., Dean of the Division of Continuing Education
- Gerald O. Bowker, B.A., M.A., Dean of Admissions (Undergraduate) and Records
- Wesley L. Harris, B.S., Ph.D., Vice President of the UT Space Institute
- Raymond Popp, B.S., M.A., Ph.D., Director of the UT-Oak Ridge Graduate School of Biomedical Sciences
- Gary R. Purcell, A.B., M.L.S., M.A. Ph.D., Director of the Graduate School of Library and Information Science
- James A. Spencer, B.A., M.C.P., Director of the Graduate School of Planning

**From Weakley County**

- TERM EXPIRES
- June 1, 1990

**Student Member**

- Christopher C. Bridges July 1, 1990

**Officers of the Board**

- Governor Ned McWherter, Chairman
- William M. Johnson, Vice Chairman
- Beauchamp Brogan, Secretary
- Linda Logan, Assistant Secretary
The Graduate School Administration

C.W. Minkel, B.A., M.A., Ph.D., Vice Provost and Dean of The Graduate School
Linda R. Painter, B.S., M.S., Ph.D., Associate Dean of The Graduate School
Wayne T. Davis, B.S., M.S., Ph.D., Associate Dean of The Graduate School
Diana C. Lopez, B.S., M.S., Director, Graduate Admissions and Records
Irene Kaplon, Assistant Director, Graduate Admissions and Records
Rose Ann Trantham, Assistant Director, Graduate Admissions and Records
S. Kay Reed, B.S., M.S., M.A., Ph.D., Graduate Recruitment Coordinator
Ann L. Lacava, Thesis/Dissertation Coordinator

The Graduate Council

Membership September 1, 1989

Ex Officio Members
Dr. C.W. Minkel, Graduate Council Chairman
Dr. Sam Bills, Continuing Education
Dr. Wayne Davis, The Graduate School
Dr. Mildred Fenske, College of Nursing
Dr. William Grecco, College of Engineering
Dr. Glen Hall, College of Agriculture
Dr. Herb Howard, College of Communications
Dr. Charles Jackson, College of Liberal Arts

College or Unit  Elected Members  Expiration  Proxy
Agriculture  Dr. Fred Allen  Aug. 31, 1992  Dr. J. L. Collins
Business Administration  Dr. Gary N. Dicer  Aug. 31, 1990  Dr. John M. Wachowicz
  Dr. C. Douglass Izard  Aug. 31, 1991  Dr. Alan M. Schlottmann
Communications  Dr. Michael Singletary  Aug. 31, 1990  Dr. Barbara Moore
Education  Dr. Charles Hargis  Aug. 31, 1990  Dr. Andy Kozar
  Dr. Charles Thompson  Aug. 31, 1991  Dr. George Harris
  Dr. Patricia Beitel  Aug. 31, 1992  Dr. Charles Faires
  Dr. John Ray  Aug. 31, 1992  Dr. Joan Paul
Engineering  Dr. Paul J. Phillips  Aug. 31, 1990  Dr. Robert Counce
  Dr. Joseph J. Perona  Aug. 31, 1991  Dr. H.W. Hsu
  Dr. J. Reese Roth  Aug. 31, 1992  Dr. Richard M. Bennett
  Dr. Paul N. Stevens  Aug. 31, 1992  Dr. Donald R. Pitts
Graduate Student Assoc.  Ms. Connie Lester  Aug. 31, 1990  Mr. Nana Boateng
  Ms. Mary Moss  Aug. 31, 1990  Ms. Janet Pope
  Mr. Yahya Sotoudeh  Aug. 31, 1990  Ms. Patrice Ryan
Human Ecology  Dr. Carl Dyer  Aug. 31, 1990  Dr. Randy Bresee
Liberal Arts  Dr. Michael Logan  Aug. 31, 1990  Dr. Donald Ploch
  Dr. Charles Maland  Aug. 31, 1991  Dr. William Hefflin
  Dr. Susan Riechert  Aug. 31, 1991  Dr. Dewey Bunting
  Dr. Kenneth Walker  Aug. 31, 1991  Dr. Harry McSween
  Dr. John Finger  Aug. 31, 1992  Dr. Edward Bratton
  Dr. Karen Levy  Aug. 31, 1992  Dr. William Bass
Nursing  Dr. Mary Lue Jolly  Aug. 31, 1992  Dr. Barbara Brown
School Lib. & Inf. Sci.  Dr. Glenn Estes  Aug. 31, 1991  Dr. William C. Robinson
School of Planning  Dr. Pat Fisher  Aug. 31, 1992  Dr. David Johnson
Social Work  Dr. Cathy Fayer  Aug. 31, 1992  Dr. Charles Glisson
  Dr. James Orten  Aug. 31, 1992  Dr. Judith Fiene
UT Space Institute  Dr. Walter Frost  Aug. 31, 1991  Dr. Atul Shelth
Veterinary Medicine  Dr. Terry Schultz  Aug. 31, 1991  Dr. Michael H. Sims
## Majors and Degree Programs

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*Non-degree and provisional students must obtain permission from the department/program head to register for courses in these fields.

*Available for the Academic Common Market to residents of reciprocal states. See fields of instruction.
## ADMISSION TEST REQUIRED

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a International applicants only.
b American applicants only.
c G.S. Rating Form submitted to Department.
d Forms obtained from & returned to Department.
GRADUATE STUDY
Rules, policies, fees, and courses described in this catalog are subject to change without notice.
The Graduate School

C. W. Minkel, Vice Provost and Dean of The Graduate School
Wayne T. Davis, Associate Dean of The Graduate School
Linda R. Painter, Associate Dean of The Graduate School
Diana Lopez, Director, Graduate Admissions and Records
Irene Kaplon, Assistant Director, Graduate Admissions and Records
Rosa Ann Trantham, Assistant Director, Graduate Admissions and Records
S. Kay Reed, Graduate Recruitment Coordinator
Ann L. Lacava, Thesis/Dissertation Coordinator

The University of Tennessee is the official land-grant institution for the State of Tennessee with its main campus in Knoxville. UT Knoxville is a comprehensive, research-oriented institution offering a wide range of graduate programs leading to the Master's and doctoral degrees. The University offers Master's programs in 85 fields and doctoral work in 52. Approximately 6,000 graduate students are enrolled on and off campus. Administration of graduate student policies and procedures, and associated record keeping, is the responsibility of the Dean of The Graduate School. Much of the day-to-day administration of graduate study is conducted by department heads or faculty advisors and committees responsible for particular programs. In addition to departmental units, numerous interdisciplinary programs, institutes and centers have been developed on campus and in locations throughout the state.

The Graduate School brings together faculty and graduate students as a community of scholars with a common interest in innovative work and advanced study. Programs are available to individuals desiring work toward the Master's and doctoral degrees or professional certification, those interested in continuing education for updating and broadening knowledge, and those pursuing postdoctoral research. Traditionally, universities have provided graduate programs primarily for full-time, degree-oriented students. Serving the needs of students engaged full-time in intensive study and pursuit of a degree continues to be a major emphasis of UT Knoxville's graduate effort. At the same time, the University employs a variety of modes, traditional and nontraditional, in offering quality programs designed to serve a diverse student clientele.

The policies of The Graduate School are developed by the Graduate Council, a body composed of elected representatives from each college, the Space Institute, and the Graduate Student Association. Ex-officio members include the Dean, Associate Deans of The Graduate School, the Chair of the Research Council, the Director of Libraries, the Dean of Continuing Education, and the administrative officer having primary responsibility for graduate curriculum in each college or school. The Graduate Office develops procedures to implement the policies formulated by the Council, and has primary responsibility for Graduate School admissions and records.

Graduate education has been conducted at The University of Tennessee since 1821. The first known Master's degree was awarded in 1827. In 1879 the Board of Trustees created a graduate degree program. The Master of Arts, the Doctor of Philosophy, Civil Engineer, and Mining Engineer degree programs were developed in 1912. Although two Ph.D. degrees were awarded, in 1886 and 1887, formal doctoral programs were not instituted until 1929 for Biological Sciences at Memphis and in 1943 for Chemistry on the Knoxville campus. A Committee on Graduate Study was appointed in 1904 and coordinated the graduate programs until the Graduate Council was formed in 1949. More than 5,700 doctoral degrees and 33,500 Master's degrees have been awarded to date.

The graduate application, a $15 fee, and one (1) official transcript from each institution previously attended are required for consideration as a potential degree candidate. Note: The fact that courses completed at one institution may be included on a transcript from another institution will not suffice; official transcripts must be received from each institution previously attended.

ADMISSION TO A GRADUATE DEGREE PROGRAM

Admission to a degree program requires a minimum grade point average of 2.5 out of a possible 4.0, or a 3.0 during the senior year of undergraduate study. However, many departments require a higher average. The equivalent of a minimum B average is required for international students.

The graduate application, a $15 fee, and one (1) official transcript from each institution previously attended are required for consideration as a potential degree candidate. Note: The fact that courses completed at one institution may be included on a transcript from another institution will not suffice; official transcripts must be received from each institution previously attended.

Types of Admissions

To earn graduate credit, a student must be enrolled in one of the categories listed below. Coursework taken in any other status is unacceptable for graduate credit and cannot be changed to graduate credit.

ADMISSION TO A GRADUATE DEGREE PROGRAM

Admission to a degree program requires a minimum grade point average of 2.5 out of a possible 4.0, or a 3.0 during the senior year of undergraduate study. However, many departments require a higher average. The equivalent of a minimum B average is required for international students.

The graduate application, a $15 fee, and one (1) official transcript from each institution previously attended are required for consideration as a potential degree candidate. Note: The fact that courses completed at one institution may be included on a transcript from another institution will not suffice; official transcripts must be received from each institution previously attended.
In addition to meeting the minimum requirements for admission to The Graduate School, applicants at the doctoral level must have demonstrated an outstanding minor or academic performance. To be considered are such criteria as performance in prior undergraduate and/or graduate studies, achievement on admission tests for graduate studies, letters of recommendation from professors familiar with the applicant's capabilities, and other evidence of scholarly achievement.

Refer to pages 8-9 and to descriptions of programs for specific requirements for admission.

NON-DEGREE ADMISSION

Applicants may apply for non-degree status who, for example:

1. do not desire to pursue a degree program; or
2. need additional time to fulfill application requirements for a degree program.

There is no specific limit on the number of courses that a student may take in non-degree status. However, before accumulating 15 hours of graduate coursework in this status, the student must accomplish:

1. apply and be admitted to a specific degree program (see Change of Program instructions); or
2. file a Plan of Study form with the Office of Graduate Admissions and Records for approval to continue taking courses in non-degree status. The plan of study must include a stated educational objective and a list of courses proposed to achieve that objective.

A maximum of 15 graduate hours taken before acceptance into a degree program may be applied toward a graduate degree, if approved by the student's committee. Courses applied toward any graduate degree must fall within the time limit specified for the degree.

The graduate application, a $15 application fee, and one (1) official transcript from each institution previously attended are required for consideration as a non-degree student. Note:

The fact that courses completed at one institution may be included on a transcript from another institution will not suffice; official transcripts must be received from each institution previously attended. The minimum requirements are a Bachelor's degree with a 2.5 grade-point average on a 4.0 scale (or a 3.0 the senior year) from a college or university accredited by the appropriate regional accrediting agency. A major area need not be declared, but some departments do not permit non-degree students to register for graduate courses (see pages 8-9 for information on restricted programs).

Every graduate student must meet with an academic advisor at least once each semester to discuss his/her program. For students with a declared major, the advisor must be from the appropriate academic unit. If no advisor has been assigned, the department head or designee is the advisor. For a student without a declared major, the Associate Dean of The Graduate School or designee is the advisor.

Any student admitted to the provisional status who has exceeded six hours of graduate credit must receive permission from The Graduate School to register for a second or succeeding semester if admission to the non-degree or degree status has not been obtained. To be admitted to the non-degree status, the student must earn at least a 3.0 grade-point average in all coursework (graduate and undergraduate) taken in provisional status, to include at least six hours of graduate work. Provisional students failing to meet this requirement will be denied registration.

The Office of Graduate Admissions and Records will process the change to non-degree status if all requirements are met. To apply for a specific degree program, the student must submit the Request for Change of Graduate Program form to the Office of Graduate Admissions and Records.

Provisional admission does not assure admission to a non-degree or degree program. A student who hopes to enter a degree program will be directed to the appropriate department.

The student who fails to complete provisional admission within seven weeks after registration will NOT be permitted to register again. A student must receive a copy of the transcript showing the coursework taken, until all admission requirements are met.

An international student on a non-immigrant visa may not enroll in the non-degree status.

INTERNATIONAL STUDENT ADMISSION

The Graduate School accepts only students who have superior records. An international student must have an equivalent 4-year Bachelor's degree with at least a B average on undergraduate course work and a B+ or better on all previous graduate work. On various grading scales, this would indicate:

- 3.0 and 3.5 on 4.0 scale;
- 14 and 15 on 20 point scale;
- 80.0 from Chinese institutions;
- 1st Class or Division from Indian institutions;
- Upper 2nd Class Honors on various British systems.

Other grading systems will be evaluated upon receipt of foreign transcripts. An international student may apply for admission any semester, but normally enters the summer or fall semester. Deadlines for submission of applications are:

Fall 15 July
Spring 15 November
Summer 15 March

The Office of Graduate Admissions and Records must be notified of the student's entering date after admission has been granted. Individual departments and colleges may have further restrictions on admission dates. For this reason, students should contact the department whose program they wish to enter.

The following items must be received before admission will be considered:

1. A completed application form with a $15 non-refundable processing fee. Payment should be made in United States dollars by either a cashier's check, money order, or a personal check. If payment is by personal check, the check must be drawn on a United States bank to be honored in United States currency. Checks drawn on overseas banks are not accepted. International money orders are suggested.

2. Official or attested university records, with certified translations if the records are not in English (Notarized copies are not acceptable).

3. Certification of English proficiency. Every student whose native language is not English must demonstrate a level of proficiency as a provisional or non-degree student. An international student may apply for admission to the provisional status who has not been approved initially or for transfer by the Immigration and Naturalization Services (INS) to attend UT Knoxville.

A student admitted to the provisional status who has exceeded six hours of graduate credit must receive permission from The Graduate School to register for a second or succeeding semester if admission to the non-degree or degree status has not been obtained. To be admitted to the non-degree status, the student must earn at least a 3.0 grade-point average in all coursework (graduate and undergraduate) taken in provisional status, to include at least six hours of graduate work. Provisional students failing to meet this requirement will be denied registration.

The Office of Graduate Admissions and Records will process the change to non-degree status if all requirements are met. To apply for a specific degree program, the student must submit the Request for Change of Graduate Program form to the Office of Graduate Admissions and Records.

Provisional admission does not assure admission to a non-degree or degree program. A student who hopes to enter a degree program will be directed to the appropriate department.

The student who fails to complete provisional admission within seven weeks after registration will NOT be permitted to register again. A student must receive a copy of the transcript showing the coursework taken, until all admission requirements are met.

An international student on a non-immigrant visa may not enroll in the non-degree status.

INTERNATIONAL STUDENT ADMISSION

The Graduate School accepts only students who have superior records. An international student must have an equivalent 4-year Bachelor's degree with at least a B average on undergraduate course work and a B+ or better on all previous graduate work. On various grading scales, this would indicate:

- 3.0 and 3.5 on 4.0 scale;
- 14 and 15 on 20 point scale;
- 80.0 from Chinese institutions;
- 1st Class or Division from Indian institutions;
- Upper 2nd Class Honors on various British systems.

Other grading systems will be evaluated upon receipt of foreign transcripts. An international student may apply for admission any semester, but normally enters the summer or fall semester. Deadlines for submission of applications are:

Fall 15 July
Spring 15 November
Summer 15 March

The Office of Graduate Admissions and Records must be notified of the student's entering date after admission has been granted. Individual departments and colleges may have further restrictions on admission dates. For this reason, students should contact the department whose program they wish to enter.

The following items must be received before admission will be considered:

1. A completed application form with a $15 non-refundable processing fee. Payment should be made in United States dollars by either a cashier's check, money order, or a personal check. If payment is by personal check, the check must be drawn on a United States bank to be honored in United States currency. Checks drawn on overseas banks are not accepted. International money orders are suggested.

2. Official or attested university records, with certified translations if the records are not in English (Notarized copies are not acceptable).

3. Certification of English proficiency. Every student whose native language is not English must demonstrate a level of proficiency as a provisional or non-degree student. An international student may apply for admission to the provisional status who has not been approved initially or for transfer by the Immigration and Naturalization Services (INS) to attend UT Knoxville.

A student admitted to the provisional status who has exceeded six hours of graduate credit must receive permission from The Graduate School to register for a second or succeeding semester if admission to the non-degree or degree status has not been obtained. To be admitted to the non-degree status, the student must earn at least a 3.0 grade-point average in all coursework (graduate and undergraduate) taken in provisional status, to include at least six hours of graduate work. Provisional students failing to meet this requirement will be denied registration.

The Office of Graduate Admissions and Records will process the change to non-degree status if all requirements are met. To apply for a specific degree program, the student must submit the Request for Change of Graduate Program form to the Office of Graduate Admissions and Records.

Provisional admission does not assure admission to a non-degree or degree program. A student who hopes to enter a degree program will be directed to the appropriate department.

The student who fails to complete provisional admission within seven weeks after registration will NOT be permitted to register again. A student must receive a copy of the transcript showing the coursework taken, until all admission requirements are met.

An international student on a non-immigrant visa may not enroll in the non-degree status.
TRANSIENT GRADUATE STUDENT ADMISSION

A student who has been enrolled in a graduate degree program at another institution and who wishes to take courses for transfer to that institution may be admitted after submitting a completed Graduate Application for Admission, the $15 application fee, and a Transient Student Certification 10 days prior to registration. Only one semester, or a maximum of 12 hours, of coursework can be taken in transient status. Necessary forms may be obtained from the Office of Graduate Admissions and Records.

ELIGIBILITY OF SENIORS

Subject to approval by The Graduate School, a senior at UT Knoxville who needs fewer than 30 semester hours to complete requirements for a Bachelor's degree and has at least a B average (3.0) may enroll in graduate courses for graduate credit provided the combined total of undergraduate and graduate coursework does not exceed 15 credit hours per semester. Approval must be obtained each semester at the Office of Graduate Admissions and Records during registration. A maximum of 15 hours of graduate credit can be obtained in this status.

ENROLLMENT OF VETERINARY MEDICINE STUDENTS IN GRADUATE COURSES

A student in good standing in the College of Veterinary Medicine may enroll in UT Knoxville graduate courses without being admitted to The Graduate School under the following conditions:

1. The student's advisor must approve in advance the student's enrollment in each course.

2. The student may take a maximum of 10 semester hours of graduate courses during the D.V.M. program.

3. Approval must be obtained each semester at registration through the Office of Graduate Admissions and Records. The student's progress is subject to review and approval each semester by the Associate Dean, College of Veterinary Medicine.

ADMISSION OF FACULTY MEMBERS

Faculty members of UT Knoxville or the Institute of Agriculture at the rank of assistant professor or above, and members of the administrative staff at UT Knoxville, the UT Central Administration, and the Institute of Agriculture will not normally be admitted to an Ed.D. or Ph.D. degree program at UT Knoxville. Exceptions may be granted on an individual basis upon petition to The Graduate School. Petitioners must present their request in writing, providing adequate assurance that the residence requirement will be met and that there will be no conflict of academic or administrative interest. Written endorsements must be provided by the respective deans and department heads of the units in which members are employed and in which the doctoral degrees are to be pursued. Requests should be directed to the Vice President and Dean, The Graduate School.

Admission Procedures

Anyone with a Bachelor's degree from a regionally accredited institution who wishes to take courses for graduate credit, whether or not the person desires to become a candidate for a degree, must make formal application for admission to The Graduate School or apply for transient status. No action is taken until a file is completed. The applicant will be notified by mail of the action taken.

To apply for admission the following materials must be sent to The Graduate School:

1. The completed Graduate Application for Admission (inside front cover of Graduate Catalog).

2. A $15 non-refundable application fee.

3. One official transcript from all colleges and universities attended.

4. Reference letters or rating forms, when required. See pages 8-9. Forms obtained from the college or department should be returned to the same source.

5. Scores from examinations which may be required for admission. Graduate programs which require scores from the Graduate Record Examination or the Graduate Management Admission Test are shown on pages 8-9. The TOEFL is required of all students whose native language is not English, unless they have graduated from a regionally accredited U.S. institution.

Application forms for the above tests can be obtained by writing:

Educational Testing Service
Princeton, NJ 08540

UT Knoxville is an approved testing center for all examinations. Examination results reach the University in approximately six weeks.

The student who fails to gain admission within seven weeks after registration will NOT be permitted to register again until all admission requirements are satisfied.

All of the above documents become the property of the University and will not be returned. For international graduate student admission procedures, see International Student Admissions.

Registration Procedures

Registration is required of all graduate students when registering in any graduate facility and/or faculty time. The minimum number of hours for registration is 3. Registration allows use of services such as library checkout, laboratories, and recreation facilities not open to the public.

Dates of registration are listed in the Graduate School Newseach term. Registration is scheduled during each semester for a subsequent semester. Any graduate student who has applied for admission can register. A schedule is mailed to the local address and a change of registration period is held toward the end of the term. A late registration period is held normally two days prior to the beginning of classes. A late fee of $15.00 is assessed to any student in attendance at the University who fails to register early for the following semester(s). A student who participants in regular registration must obtain the computerized class schedule and pay fees on the first day of late registration. Additional information can be obtained from the Office of Graduate Admissions and Records.

Failure to pay tuition and fees before the deadline listed each semester in the Timetable of Classes will result in the assessment of a late registration fee. Retroactive registration is not permitted.

To register, students should:

1. Report to the Office of Graduate Admissions and Records to obtain registration materials (scan form and Timetable of Classes).

2. Confer with an advisor assigned by the department to obtain approval of a schedule of courses. If not done previously.

3. Sign the course form granting approval of the advisor and return it to the Office of Graduate Admissions and Records at the official deadline.

4. Consult Timetable to complete registration.

Non-degree or provisional students in unrestricted programs (see pages 8-9) may obtain permission to register from the Office of Graduate Admissions and Records. Students in these categories with no declared major must obtain permission from the department/program head to register for courses in restricted fields.

Readmission

A student who has not attended The Graduate School at UT Knoxville for more than three semesters (including summer) must apply for readmission. A readmission application should be submitted to the Office of Graduate Admissions and Records at least two weeks prior to the desired reentry date. A student who has attended another institution since enrollment at UT Knoxville must submit one official transcript showing all coursework and any degrees earned at that institution. The student will be notified when action has been taken by the department/program and The Graduate School. A student who is permitted to enroll and is subsequently denied readmission will receive credit for courses completed successfully. Future registration will not be allowed until readmission is granted.

Family Educational Rights and Privacy Act

The Family Educational Rights and Privacy Act provides for confidentiality of student records. However, it also provides for basic identification of persons at UT Knoxville without the consent of the individual. Release of information to third parties includes directory information such as contained in the campus telephone book and sports brochures. Such information may include name, address, telephone number, date and place of birth, major, dates of attendance, degrees and awards, the most recent level of educational agency or institution attended, participation in school activities and sports, and weight and height (for special activities).

Notice of the categories to be contained in a publication will be given in advance. A period of one week is provided during which a student may request that such information not be released.
Student Identification Number

UT Knoxville requires assignment of an individual student number for internal identification of each student's record. The University began using the social security number as the student identification number prior to 1 January, 1975; therefore, federal law allows continued use of this number. However, if a student does not desire to use the social security number, notification to the University must be made at the time of application for admission. A student identification number will then be assigned instead. For prompt and accurate retrieval of records and for conducting business about their own records, students and alumni must give their student identification number. Student identification numbers, whether social security numbers or assigned numbers, are used administratively within the University only and are not given to third parties without expressed consent of the student.

Fees, Residency Classification, and Financial Aid

University Fees

University fees and other charges are determined by the Board of Trustees and are subject to change without notice. All student fees are due at the beginning of the term. All charges and refunds will be made to the nearest even dollar. All charges are subject to subsequent audit and verification. The University reserves the right to correct any error by appropriate additional charges or refunds.

All students are required to have a validated fee receipt to complete the registration procedure. This includes graduate assistants, teaching assistants, teaching associates, graduate research assistants, staff, and others whose fees may be billed, prepaid, or waived. Delayed registration service fees are also applicable to such students.

No student is authorized to attend classes who has not obtained a computerized class schedule and a validated fee receipt.

The University is authorized by statute to withhold diplomas, grades, transcripts, and registration privileges on any student until student debts and obligations (other than Student Loan Fund notes which have not matured) owed to the University are satisfied.

The general fees for graduate students in effect at the time of publication are as follows:

| APPLICATION FEE | $15 |

Each graduate application for admission must be accompanied by a non-refundable fee of $15 before it will be processed (fee not required if: (1) former UT Knoxville graduate student; or (2) previously paid to UT Knoxville Graduate School within past 12 months).

If a student applies but does not enter graduate school within twelve months after date of requested admission, the file will be destroyed and it will be necessary to resubmit the

$15 application fee and a new application. This fee is not refundable.

MAINTENANCE FEE (in-state students)

PER SEMESTER ................................................... $855

MAINTENANCE AND TUITION (out-of-state students)

PER SEMESTER ................................................... $2,331

NOTE: In lieu of the above charge for tuition and/or maintenance fee, part-time students may elect to pay fees computed by the semester hour credit (or audit) as follows:

In-State:
$124 per semester hour or fraction thereof; minimum charge $248.

Out-of-State:
$270 per semester hour or fraction thereof; minimum charge $540.

UNIVERSITY PROGRAMS AND SERVICES FEE

PER SEMESTER ................................................... $105

All students enrolled in excess of eight semester hours per term are assessed an activity fee of $105. Part-time students taking fewer than nine semester hours will be assessed at the rate of $7 per semester hour or fraction thereof; minimum charge $14.

Graduate, teaching, and research assistants, teaching associates, and fellowship students, who may have waiver of fees (tution and/or maintenance fee) must pay the appropriate University Programs and Services Fee and late payment fee, if applicable.

Knoxville campus students taking a course load of 6-8 hours may elect to pay the full programs and services fee.

Knoxville campus day students taking a course load of 3-5 hours may elect to pay the student health fee ($30), plus the appropriate part-time programs and services fee. The student health fee is included in the full $105 programs and services fee.

The University programs and services fee is not refundable.

The fee for the summer term is $59.

LATE PAYMENT FEE

Graduated Late Service Fee

Up on receipt of a schedule (full, partial, or incomplete) a student is registered and is immediately responsible for payment of fees.

Students who register early for a semester must pay their fees (or make satisfactory arrangements with the Bursar's Office) on the two registration check-in days, prior to the beginning of classes, in order to avoid late payment service charges. Effective the first day of classes, a graduated late service fee of $2 per day will be charged during the next ensuing five regular business days.

Students who register through late registration will be granted two additional days after classes begin to pay their fees (or make satisfactory arrangements with the Bursar's Office) before the graduated late service fee begins. Such students will be charged the graduated late service fee beginning with the third regular business day following the last registration day (minimum charge $6 third day, $8 fourth day, $10 fifth day).

Additional Late Service Fees

All students who have not completed registration and paid their appropriate charges (or made satisfactory arrangement with the Bursar's Office) within five regular business days after classes begin will be charged an additional $10 late service fee for each day.

After 10 regular business days, students will be charged a second additional $10 late service fee (total $30). After 15 regular business days, students will be charged a third additional $10 late service fee (total $40). After 20 regular business days, students will be charged a fourth additional $10 late service fee to a maximum of $70, and may, at the discretion of the University, be withdrawn from school and assessed the appropriate fees as of the date dropped.

A $10 service fee is applicable to extension accounts and room and board charges which are not paid (or deferral arrangements made) within seven calendar days after the date payment was due.

Doctoral students who must register retroactively for dissertation credit will be charged a late fee of $35 for each semester of retroactive registration.

REINSTATEMENT FEE ........................................... $45

Failure to pay fees or to make satisfactory arrangements for deferment or waiver by the end of the fourth week of classes will result in the assessment of appropriate fees and forfeiture of all university services, including the receipt of grades, transcripts, and schedule of classes. After grades are withheld, the reinstatement fee is $45.

LATE REGISTRATION FEE .................................... $15

Students who do not register during the preceding semester will be charged a $15 late registration fee.

RETURNED CHECK SERVICE FEE POLICY

During registration check-in days, all checks are deposited the day they are received. A $10 service charge will be assessed when checks fail to clear the bank on which drawn. In addition, if the returned check is in payment of initial fees and charges, the late payment fee in effect at the time the check is redeemed (minimum charge - $20) will be added to the returned check service fee. Returned checks will not be redeposited. Cash or certified funds are required for payment of the returned check, late fee, and service charges.

Any student who does not respond within seven days from the date of the first notice will be assessed an additional $10 Service Fee.

For other returned checks the service charge will be $10 if the check is made good within seven days from the date of notice and $20 if made good after seven days. Failure to clear returned checks will result in the forfeiture of all university services, including the receipt of grades, transcripts, and schedule of classes.

MUSIC FEE

One half-hour lesson per week per semester ............................................. $45

One-hour lesson per week .................................................. $90

Payable at registration by students receiving individual instruction in music.
GRADUATION FEE

Master's degree candidates .................................. $30
Doctoral degree candidates .................................. $75
Doctoral hood rental (optional) ................................ $5

There are no additional charges for diploma, binding, or microfilming. The graduation fee is non-refundable and is valid for two semesters after the semester in which it is paid.

PROFICIENCY FEES

Fees for proficiency examinations are $7 per credit hour for graduate students. See Proficiency Examinations for additional information.

TUITION PAYMENT PLANS

All student fees should be paid in full at registration check-in each semester.

Prepayment Plan

A prepayment plan has been developed to assist students and/or parents with planning and budgeting their academic year expenses. Under the plan, students and/or parents may choose the expenses they wish to prepay including board, tuition, and fees. Expenses may be prepaid over a period of eight months. Students and/or parents wishing to participate in the prepayment plan should contact the Bursar's Office for details.

Deferred Payment Plan

Although fees, room, and other university expenses are due and payable at the beginning of each term, a full-time student in good financial standing with a definite anticipated source of funds may request the deferral of up to 50% of the total charges at registration check-in. The deferred payment may be divided into two equal payments payable on the 28th and 56th day of the term. All financial aid monies must be applied toward fees before a deferment will be considered. A deferred payment service fee of $10 is assessed when any portion of tuition, fees, and other charges are deferred with the approval of the Bursar's Office. An additional $25 late payment charge will be assessed on each payment which is not paid on or before the due date. For more details, contact the Bursar's Office.

Room and Board Payment Plan

Semester room and board charges may be paid in monthly installments. The first month's rent plus a deposit of one month's rent is due at registration check-in. The remaining installments are due every four weeks. For more information and an application, contact the Bursar's Office.

DEFERRED PAYMENT SERVICE FEE .... $10

(See Tuition Payment Plans)

This fee is applicable when the payment of any part of a student's account is deferred, including accounts which must be billed to outside agencies, organizations, and institutions. This fee is also applicable when any additional charge (out-of-state tuition, music fee, room and board adjustment) is not paid within five regular business days after the date it was incurred. It is the student's responsibility to take the initiative to pay all University obligations promptly.

LATE PAYMENT SERVICE FEE .................... $5

This fee is applicable when a supplemental charge (tuition, room and board adjustments, etc.) is not paid within seven calendar days after the date it is incurred. Students are expected to take the initiative to pay all University obligations promptly. The $10 deferred payment service fee will be added if it is necessary for the Bursar's Office to send a notice regarding non-payment of the adjustment.

FEES FOR COURSES NOT TAKEN FOR CREDIT

Fees for courses audited are the same as for courses taken for credit. For fee purposes, courses listed for 0 credit hours are considered as one-hour courses.

REFUND OF FEES FOR WITHDRAWAL

After a schedule has been received by the student, withdrawal for the semester must be by official notification to the Withdrawal Office, 212 Student Services Building, whether or not fees have been received or if classes have been attended, or if the schedule is incomplete. Failure to notify the Withdrawal Office promptly when withdrawing could result in a larger fee assessment. Withdrawals taken after the first day following registration check-in and before the first official day of classes for the semester are considered a voluntary withdrawal.

The drop/add procedure may not be used to withdraw from school for the semester.

For a regular academic semester, withdrawal within 5 business days beginning with the first day following registration check-in permits a 90 percent fee refund. Withdrawal between 6 and 10 business days following registration check-in permits a 75 percent fee refund. Withdrawal between 11 and 15 business days following registration check-in permits a 60 percent fee refund. Withdrawal between 16 and 20 business days following registration check-in permits a 40 percent fee refund. The above withdrawal refund policy does not apply to the off-campus Graduate Centers. Refunds are assessed at the regular semester-hour rate up to the maximum charge for a complete regular semester.

The refund policy covering withdrawals and dropped courses for the summer semester is based on the length of the term for the course(s) dropped. No refund is applicable to term courses dropped later than 14 calendar days after the regular registration check-in day for the course(s) involved.

WAIVER OF FEES

Graduate assistants, teaching assistants and associates, research assistants, and others whose fees are billed, prepaid, waived, or partially waived must complete their registration with the Bursar's Office, where they should have their fee receipts validated and supply necessary details concerning fee payment. Fee receipts must be validated before classes begin to avoid late registration fees. Graduate students are not eligible for spouse/dependent discount.

STUDENT HEALTH INSURANCE

The University makes available, by contract with an insurance company, group health insurance expressly for students. The program is designed to supplement the care provided by the campus Student Health Service and provide basic benefits at low group premium rates.

Primary emphasis is placed on hospitalization benefits such as in-patient care is not provided on campus. Students not otherwise covered are urged to avail themselves of this or comparable insurance since payment for hospital care is the student's own responsibility.

Information about the insurance is mailed by the company to the student's home and participation is solicited. Enrollment in the plan (or alternative coverage) is mandatory for international students. Students may obtain applications from the Student Health Service or the Center for International Education. Except for international students, enrollment for insurance is not a part of registration for classes. NO-THE: The family health insurance policy should be carefully reviewed since most family policies do not cover the dependent child after a given age, some as early as nineteen.
IDENTIFICATION CARD

ID cards, issued during registration check-in or anytime during the year to all students, are prepared during registration check-in of the first semester a student enrolls in the University and are validated each term thereafter. These cards are required for many purposes such as use of library facilities, check cashing facilities in the UT Knoxville Bookstore, and admission to various athletic, social, and cultural events. These cards are non-transferable and may not be duplicated. A current validated fee receipt is necessary to obtain a new or replacement ID card. IDENTIFICATION CARDS MUST BE CARRIED AT ALL TIMES FOR PURPOSES OF IDENTIFICATION. Lost or stolen cards should be replaced by contacting the Student ID Card Office at Room 344, University Center. There is a minimum charge for replacement or duplicate ID cards.

FEES FOR SPONSORED INTERNATIONAL STUDENTS

An administrative management fee will be charged to sponsoring agencies of international students whose programs require special administrative or management services beyond those normally provided. Fees are $250 per semester and $100 per summer session.

Residency Classification for Tuition Purposes

When a prospective student applies to The Graduate School, he/she is notified of residency classification (in-state or out-of-state) for tuition purposes. Classification is based on information supplied on the Graduate Application for Admission. A student cannot acquire in-state residency status on the basis of full-time enrollment at a higher educational institution in Tennessee. Proof of in-state residence is the responsibility of the individual.

A student who is classified as out-of-state and (1) works full-time in the state or at Fort Campbell, Kentucky, and (2) desires to attend UT Knoxville on a part-time basis (maximum 6 hours of coursework per semester), is eligible for a waiver of out-of-state tuition. The student must apply for a waiver prior to the date of registration each semester. Forms are available from the Residency Assistant in the Office of Graduate Admissions and Records.

Academic Common Market

The Academic Common Market is an interstate agreement among Southern states for sharing unique programs. Participating states can make arrangements for their residents who are fully admitted to specific programs at UT Knoxville on an in-state tuition basis where these programs are not available in the state of residence.

Cooperating states in the Academic Common Market are Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, Oklahoma, South Carolina, Tennessee, Texas, Virginia and West Virginia. Twenty doctoral, one Specialist in Education, and twenty-seven Master's programs at UT Knoxville are approved by the Academic Common Market for residents of these states to enroll in the University.

Residents of member states who seek further information should contact the Residency Assistant in the Office of Graduate Admissions and Records or the Southern Regional Educational Board, 592 Tenth Street, N.W., Atlanta, GA 30318-5790.

Financial Aid

UT Knoxville offers several types of financial assistance for which graduate students may apply.

ASSISTANTSHIPS AND FELLOWSHIPS

Graduate assistantships, scholarships, and traineeships are offered through many departments. Information concerning these types of assistance can be obtained from the department in which the student plans to study.

The Hilton A. Smith Graduate Fellowships and the National Alumni Association Graduate Fellowships for full-time study at UT Knoxville are awarded on the basis of scholarly performance as evidenced by grades and recommendations. Candidates from any field of study are invited to apply if they have a 3.6 grade-point average or above in all previous academic work. The Hilton A. Smith fellowships include monthly stipends, tuition, and maintenance fees. The National Alumni fellowships include a stipend presented at the beginning of each semester (Fall and Spring). Application packets are available from November through January in the Office of Graduate Admissions and Records. Completed applications, including all supporting materials, must be submitted to the Staff Assistant, Office of Graduate Admissions and Records, by February 15. Offers of awards are announced March 15.

EMPLOYMENT

Three sources of student employment are coordinated by the Financial Aid Office: (1) The federally-sponsored College Work-Study Program provides part-time on campus jobs for U.S. citizens or permanent residents who have demonstrated financial need by the Financial Aid Form (FAF) or Family Financial Statement (FFS). A wide range of jobs are available in academic units and administrative offices; (2) Job Location and Development lists off-campus, part-time job opportunities with agencies and companies throughout the Knoxville area. Job interviews and minimal processing are required. Off-campus jobs are limited to U.S. citizens or permanent residents; (3) On-campus, part-time job opportunities are listed by the Student Employment Service. This listing of part-time jobs is based upon requests from on-campus agencies. Referrals are made in accordance with a student's skills and interests regardless of financial need.

Students needing either part-time or summer employment are urged to contact the Financial Aid Office.

LOANS

Four types of loan programs are administered by the Financial Aid Office: 1) Perkins Loan, formerly National Direct Student Loan, (FAF or FFS must be on file); 2) Stafford Loan, formerly Guaranteed Student Loan, (FAF and FFS must be on file with appropriate Stafford Loan forms); 3) PLUS/SLS Loan (requires appropriate loan papers on file and SLS requires that the FAF or FFS be on file); and 4) The University of Tennessee Loan. Processing time varies from one loan program to another. Interested students should contact the Financial Aid Office for more information.

Students must apply through the Financial Aid Office for all loan programs. Loans are limited to U.S. citizens or permanent residents. Students must be admitted into a degree program to be eligible for loans.

Students who have attended any other post-secondary institution, other than UT Knoxville, must provide a Financial Aid Transcript to the Financial Aid Office even if no financial aid was received from the previous institution.

All students receiving financial aid are expected to maintain financial aid progress standards to remain eligible to receive aid. Information on these standards, applications, and additional information are available from the Financial Aid Office, 115 Student Services Building.

VETERANS' BENEFITS

Veterans, and widows or children of certain deceased or disabled veterans, who have been admitted to a degree program can apply for benefits by contacting the Veterans Affairs Office. Maximum benefits are paid by the Veterans Administration for course loads of 9 or more graduate hours each semester.

Student Services

Housing

UNIVERSITY APARTMENTS

The University has provided excellent apartment facilities in several locations for married students with or without families. Apartments not required to house married students are made available to single graduate and professional students. Information and application for these facilities may be secured from the Office of Rental Properties, Stadium Hall.

OFF-CAMPUS HOUSING

A listing of off-campus housing available to students is provided by the Off-Campus Housing Office, 344 University Center. The University does not inspect or approve these facilities. The terms and conditions for the rental of off-campus housing are between the student and the landlord. Students living in off-campus housing are required to observe the same rules of conduct and standards that are applicable to all students.
General Regulations of The Graduate School

Prerequisites
Graduate work in any program must be preceded by sufficient undergraduate work in the major and related areas to satisfy the department that the student can do graduate work successfully in the chosen field. Individual undergraduate records are examined and evaluated by the appropriate department before admission to a degree program is granted. Questions about program prerequisites should be addressed to the advisor.

Course Listings
Each course listing in the Graduate Catalog contains information in abbreviated form. The course number indicates the level at which the course is taught. All 500-600 level courses are graduate courses. The 400 level courses are lower division courses available for graduate credit only if listed in the Graduate Catalog. To receive graduate credit for these, a student must so indicate on the registration materials.

The official course title appears following the course number. Numbers in parentheses following the course title indicate the semester hours credit. If the credit is variable, to be determined in consultation with the instructor, the minimum and maximum are shown (e.g. 2-3). The credit hours are followed by a course description indicating the content to be covered. Prerequisite courses must be taken prior to the course in question. Corequisite courses may be taken prior to or concurrently with the specific course. Recommended prerequisites should be taken previously but are not mandatory.

Some courses may be repeated for a maximum number of hours allowable toward a degree program. This number is stated forewarn repeatable course with the exception of Thesis 500, Dissertation 600, and Registration for Use of Facilities 502. Courses may be cross-listed with two or more departments, an arrangement indicated by a parenthetical statement: (Same as Psychology 543). The course description is given only under the primary department.

"S/NC only" indicates that the course may be taken only for Satisfactory/No Credit grading. Refer to section on Grading System.

A symbol indicating the semester or frequency that the course is normally offered is included at the end of many course descriptions: F-Fall, E-Every semester, S-Spring, A-Alternate years, S-Summer.

These codes are indicated only for Knoxville campus classes and are subject to change without notice. The Timetable of Classes, published several weeks prior to each semester, is the official notification of courses offered for a specific semester. Students should contact the appropriate department/program head concerning courses offered to be offered in future semesters.

Course Loads
The maximum load for a graduate student is 15 hours, and 9 to 12 hours are considered a full load. For students holding an assistantship, refer to the Policy for the Administration of Graduate Assistantships for the appropriate
Grading System

A cumulative grade-point average of 3.0 is required on all graduate coursework taken at UT Knoxville to receive any graduate degree from the University. Grades in the Graduate School have the following meanings:

- **A** (4 quality points per semester hour), superior performance.
- **B+** (3.5 quality points per semester hour), better than satisfactory performance.
- **B** (3 quality points per semester hour), satisfactory performance.
- **C+** (2.5 quality points per semester hour), less than satisfactory performance.
- **C** (2 quality points per semester hour), performance well below the standard expected of graduate students.
- **D** (1 quality point per semester hour), clearly unsatisfactory performance and cannot be used to satisfy degree requirements.
- **F** (no quality points), extremely unsatisfactory performance and cannot be used to satisfy degree requirements.
- **I** (no quality points), a temporary grade indicating that the student has performed satisfactorily in the course, but unforeseen circumstances have prevented the student from finishing the course. An I is NOT given to enable a student to do additional work to raise a deficient grade. All incompletes must be removed within one additional term or by the end of the next term. If a supplementary grade report has not been received in the Office of Graduate Admissions and Records within one semester, excluding the summer term, the grade will be changed to an F. The course will not be counted in the cumulative grade average until a final grade is assigned. No student may graduate with an I on the record.

Graduate Admissions and Records will authorize the change on the student’s permanent record.

Change of Registration

The permanent record will show all courses for which the student has registered except those audited and those from which the student has withdrawn during the first fifteen calendar days after the beginning of classes.

Students who fail to attend the first class meeting without prior arrangement with the department MAY BE DROPPED from the course to make space available to other students. Students have the responsibility to assure that they have been dropped. Otherwise they may receive a grade of F in the course. The deadline for change of registration (e.g. from graduate to undergraduate, undergraduate to graduate, withdrawal) is approximately 36 calendar days after the first day of classes each semester. (See Graduate School News each term for exact date.) A student may change registration for a course at any time prior to and including this date by evacuating a change of registration form and submitting it to the Office of Graduate Admissions and Records. The student must sign the form certifying approval of the registrar. The signature is required to add a course if the course is closed and/or after the first two weeks of classes. If the student withdraws from a course or from the University after the first fifteen calendar days of classes and before the change of registration deadline, a grade of W will be entered on the permanent record.

Course registration may not be changed from credit to audit or audit to credit after the first fifteen calendar days after the beginning of classes.

After the change of registration deadline, a student withdrawing from a course or from the University will receive a grade of F unless it can be demonstrated that the request for withdrawal is based on circumstances beyond the student’s control. In the latter case, a grade of W will be entered on the permanent record.

To change registration in any way after the deadline, a student must present the request, together with documentary evidence of extenuating circumstances, to the Office of Graduate Admissions and Records. In addition, the student must complete a change of registration form and questionnaire signed by the instructor(s) and advisor as evidence of their knowledge of the request. If the request is approved, the Office of Graduate Admissions and Records will authorize the change on the student’s permanent record.

Proficiency Examinations

A proficiency examination may be given in academic courses offered for graduate credit. Applications for proficiency examinations are available in the Office of the Registrar, 209 Student Services Building. To be eligible, a student must be admitted to The Graduate School. The request for examination must be approved by the head of the department offering the course. A student applying for this privilege must present evidence to the department head that they have the knowledge and abilities expected of graduate students who have taken the same course. Upon passing the examination with a minimum grade of B, the student will receive graduate credit. A grade of F in the first one-fourth of the total credit hours in a Master’s degree program may be earned by this method, subject to the approval of the student’s graduate committee. A fee of $7 per credit hour must be paid before each examination. Proficiency examinations may not be used to raise the grade or change the credit in a course previously completed, nor may such an examination be repeated. Proficiency examinations taken at other institutions are not transferable.

English Proficiency

Any student whose native language is not English must present a TOEFL score of at least 525 unless he/she has received a Bachelor’s or Master’s degree from an accredited institution in the United States. Some departments require a higher minimum TOEFL score. The student must also pass an English proficiency examination given by the University prior to initial registration. Students whose performance on the examination indicates a need for additional English study must enroll immediately for English 121 English Grammar Review for Foreign Students or another course assigned by the English Department for undergraduate credit and pass with a grade of C or better. A student may not take more than 6 additional hours of course work while enrolled in English 121. Those students whose scores indicate that they are not prepared to enter English 121 will be referred to a program of intensive English study prior to taking the course.

Persons whose native language is not English must pass an oral test in English (the SPEAK Test) before they can be assigned to classroom duties in connection with their assistantships. The SPEAK Test is administered on campus by the Learning Research Center. Scores on the Test of Spoken English (TSE) may be accepted in place of the SPEAK Test.

Minors

A minor is an academic area or set of interrelated courses secondary to the major, normally consisting of a specified number of hours. A minor differs from a concentration in that it is not a subdivision of the major. For the Master’s degree at UT Knoxville, a minor is defined as 6-12 semester hours in one field outside the major. Usually the minor courses are within a single teaching discipline that also offers a major.

Two interdisciplinary minors are available, at the Master’s and doctoral levels, in Statistics (Business Administration) and in Gerontology (Human Ecology). See Fields of Instruction for specific requirements and approval provisions.
Law Courses

A graduate student may take up to 6 semester hours of law courses and apply them toward a graduate degree upon approval of the College of Law and the student's major professor. The graduate student must register for law courses during the registration period at the College of Law and request an S/NC grade.

Different rules apply to students enrolled in the Dual J.D.-MBA program. Grades must be earned according to the grading system of the respective colleges, e.g., numerical grades for law courses, letter grades for graduate courses. Refer to page 55 for grades acceptable to meet degree requirements. Only one cumulative GPA (law or graduate) will be carried on the student's permanent record.

A student enrolled in the Ph.D. in Business Administration program may use 8 semester hours or more of law courses for the supporting area under the arrangement described on page 55.

Correspondence Study

No graduate credit is accepted at UT Knoxville for work done by correspondence study at any university.

Transfer Credits

Official transcripts must be sent directly to the Office of Graduate Admissions and Records from all institutions previously attended before any transfer of credit will be considered.

To be transferred into a graduate program at UT Knoxville, a course must:
1. be taken for graduate credit;
2. carry a grade of B or better;
3. a part of a graduate program in which the student had a B average (i.e., 3.0/4.0 scale);
4. not have been used for a previous degree; and
5. be approved by the student's graduate committee and The Graduate School on the Admission to Candidacy form.

Courses transferred to any graduate program will not affect the minimum residence requirements for the program, nor will they be counted in determining the student's grade-point average. Credits transferred from universities outside The University of Tennessee system cannot be used to meet the 500- or 600-level coursework requirements. Credit for extension courses taken from other institutions is not transferable, nor is credit for any course taken at an unaccredited and/or foreign institution.

MASTER’S DEGREE

A minimum of one-half of the total hours required for a Master's degree must be taken at UT Knoxville. A maximum of one-third of the total hours may be transferred from institutions outside The University of Tennessee system upon request by the academic unit. In addition, the student may transfer courses taken at other campuses of The University of Tennessee. Transferred courses must have been completed within the six-year period prior to receipt of the degree. They will be placed on the student’s UT Knoxville transcript only after admission to candidacy.

E.D.S. DEGREE

A maximum of six semester (nine quarter) hours of coursework beyond the Master's degree may be transferred to an E.D.S. program. Transferred courses in the last 30 hours taken for the degree must have been completed within the six-year period prior to the receipt of the degree. They will be placed on the student’s UT Knoxville transcript only after admission to candidacy.

DOCTORAL DEGREE

Coursework taken prior to admission to a doctoral program may be used toward the degree as determined by the student's doctoral committee. Although the courses are used as part of the requirements toward the degree, they are not officially transfer courses and are not placed on the student's UT Knoxville transcript.

Residence Requirement

Residence is defined as full-time registration for a given semester on the campus where the program is located. The summer semester is included in this period.

Master's degree: no general Graduate School residence requirement.

Ed.S. degree: one semester of residence if the student has a Master’s degree; two consecutive semesters of residence if the student lacks a Master’s degree.

Doctoral degree: minimum of two consecutive semesters of residence. Individual doctoral programs may have additional residence requirements.

Residence is required as to how and during what period of time the residence requirement will be obtained with the Application for Admission to Candidacy along with signatures of approval from the major professor and the Department Head/Program Director. More information about the rationale for the residence requirement may be obtained from the Graduate Council report available in The Graduate School.

Theses and Dissertations

All theses and dissertations are submitted to The Graduate School Thesis/Dissertation Consultant for examination. The Consultant will review the material and assure that it is attractively presented, free of technical errors in format, suitable for binding, and reflects credit upon the University and The Graduate School. If the thesis or dissertation is not accepted, the student must make corrections and resubmit the materials.

The student and major professor together share responsibility for the accuracy and professionalism of the final product of the student's research. The student should confer with the Thesis/Dissertation Consultant regarding problems and questions in advance of preparing the final copy. The UT Knoxville Guide to the Preparation of Theses and Dissertations provides the correct format for theses or dissertations. Workshops are held...
Requirements for Advanced Degrees

Academic Standards

Graduate education requires continuous evaluation of the student. This evaluation includes not only periodic objective evaluation, such as the cumulative grade-point average, performance on comprehensive examinations and acceptance of the thesis or dissertation, but also judgements by the faculty of the student's progress and potential. Continuation in a program is determined by consideration of all these elements by the faculty and the head of the academic unit.

The academic records of all graduate students are reviewed at the end of each semester, including the summer term. Graduate students must maintain a cumulative grade-point average (GPA) of at least 3.0 on all graduate courses taken for a letter grade of A-F. Grades of S/NC, P/NP, and I, which have no numerical equivalent, are excluded from this computation.

These policies do not apply to provisional students (see section on provisional admission). Departments and programs may have requirements for continuation or graduation in addition to the minimum requirements set forth in this Catalog by The Graduate School. It is the student's responsibility to be familiar with the special requirements of the department or program.

ACADEMIC PROBATION

Upon completion of nine hours of graduate coursework, a graduate student will be placed on academic probation when his/her cumulative GPA falls below 3.0. A student will be allowed to continue graduate study in subsequent semesters if each semester's grade-point average is 3.0 or greater. Upon achieving a cumulative GPA of 3.0, the student will be removed from probationary status.

DISMISSAL

If a student is on academic probation, the degree or non-degree status will be terminated by The Graduate School if the student's semester GPA falls below a 3.0 (required for graduation) in a subsequent semester. When the particular circumstances may be deemed to justify continuation, and upon recommendation of the appropriate academic unit and approval of The Graduate School, a student on probation whose semester GPA is below a 3.0 may be allowed to continue on a semester-by-semester basis.

Dismissal of a graduate student by a department or program is accomplished by written notice to the student, with a copy to The Graduate School. In those cases where the department's requirements for continuation are more stringent than Graduate School requirements, The Graduate School will evaluate the student's record to determine whether the student is eligible to apply for a change of status and register in another area of study. Registration for courses in a department from which a student has been dismissed will not be permitted, except by written authorization from the department.

Appeals Procedure

The student handbook, Hilltopics, published and distributed annually, contains statements of UT Knoxville standards of conduct and of all disciplinary regulations and procedures. Normally, grievances should be handled at the departmental level through the student's advisor or the department or program head. Further appeal may be made to the Dean of the respective college, the Dean of The Graduate School, the Graduate Council, and the Chancellor. The By-Laws of the University (Article V, section 7) provide that any individual may ultimately appeal to the Board of Trustees, through the President. A copy of the Appeals Procedure is available in the Office of Graduate Admissions and Records.

Requirements for Advanced Degrees

Master's Degrees

Master's degree programs are available with thesis and non-thesis options. These programs require 30 or more graduate hours of coursework. In addition to the M.A. and M.S. degrees, a number of other degrees are offered, including the MBA, and the M.S.S.W. A complete list is found under "Majors and Degree Programs," on pages 4-9. Specific degree requirements, consult individual program descriptions listed by college and field of instruction in this Catalog. See also the chart, page 23, for a summary of procedures for the degrees.

Thesis Registration

A student must be registered for course 500 each semester during work on the thesis, including a minimum of 3 hours the semester in which the thesis is accepted by The Graduate School. Six hours of 500 are required for the thesis option. After receiving the Master's degree, a student is no longer permitted to register for Thesis 500.

Thesis

The thesis represents the culmination of an original research project completed by the student. It must be approved according to the UT Knoxville Guide to the Preparation of Theses and Dissertations. Two copies of the thesis must be approved and accepted by The Graduate School on or before the deadline specified each semester in the Graduate School News.
copy must include an approval sheet, signed by the members of the Master's committee, certifying that they have examined the final copy of the thesis and judged it to be satisfactory.

FINAL EXAMINATION FOR THESIS AND PROBLEMS IN LIEU OF THESIS STUDENTS

A candidate presenting a thesis or problems in lieu of thesis must pass a final oral (or oral and written) examination on all work offered for the degree. The examination, which is concerned with coursework and the thesis or problems, measures the candidate's ability to integrate material in the major and related fields, including the work presented in the thesis or problems. This examination, scheduled through the Office of Graduate Admissions and Records, must be held at least three weeks prior to the final date for approval and acceptance of thesis by The Graduate School. Final examinations not properly scheduled must be repeated. The final draft of the thesis must be distributed to all committee members at least two weeks prior to the date of the final examination. In case of failure, the candidate may not apply for reexamination until the following semester. The result of the second examination is final.

REGISTRATION FOR USE OF FACILITIES

Students using University facilities or faculty time must be registered for course 502 if not registered for other courses.

FINAL EXAMINATION FOR NON-THESIS STUDENTS

With the exception of students pursuing the MBA, each non-thesis student must pass a final written examination. A department may require an additional oral examination. The examination is not merely a test over coursework, but a measure of the student's ability to integrate material in the major and related fields. It must be scheduled through the Office of Graduate Admissions and Records in accordance with the deadlines specified in the Graduate School News and will be conducted by the Master's committee. Final examinations not properly scheduled must be repeated. Students taking the final examination but not otherwise using University facilities may pay a fee of $124 instead of registering. In case of failure, the candidate may not apply for reexamination until the following semester. The result of the second examination is final.

TIME LIMIT

Candidates have six calendar years from the time of enrollment in The Graduate School to complete the degree. Students who change degree programs during this six-year period may be granted an extension after review and approval by The Graduate School. In any event, courses used toward a Master's degree must have been taken within six calendar years of graduation.

Specialist in Education Degree

The Specialist in Education (Ed.S.) degree is offered with majors in Curriculum and Instruction, Educational Administration and Supervision, Educational Psychology and Guidance, Safety Education and Service, and Vocational-Technical Education.

Admission to the Ed.S. program requires acceptance by The Graduate School, and review and acceptance by the department or area in which the student is majoring. It is recommended that students who apply for the Ed.S. have at least one year of related work experience. Additional information on admission requirements can be obtained from the departments offering the degree. Also see the chart, page 290 for a summary of procedures for this degree. All deadlines are published each semester in the Graduate School News.

COURSE REQUIREMENTS

The student's program involves a minimum of four semesters of study totaling not fewer than 60 semester hours of graduate credit beyond the baccalaureate degree. A minimum of 6 hours is required outside the major department or area.

A student admitted to the program with a Master's degree, or with acceptable work beyond the Master's degree, may have program requirements modified upon recommendation of the student's committee. However, no modifications will be permitted in examination and research requirements, nor in the minimum 6 graduate hours required outside the major. All prior coursework accepted toward the degree must be related to the student's program objectives. A maximum of 6 hours beyond the Master's degree may be transferred from another institution to an Ed.S. program. See Transfer Credits.

Courses numbered at the 400 level required for certification through UT Knoxville may not be taken for graduate credit and used as part of the coursework in the major. At least one-half of the last 30 semester hours of work, exclusive of thesis courses, must be in 500- or 600-level courses.

ED.S. COMMITTEE

A committee of at least three faculty members is assigned to each student. A minimum of two members of this committee must represent the department or major area. Its responsibilities include formulating the student's program of coursework, supervising progress, recommending admission to candidacy, directing research, and coordinating the qualifying and final examinations.

ADMISSION TO CANDIDACY

Admission to candidacy reflects agreement among the student, graduate committee, and The Graduate School that the student has demonstrated the ability to do acceptable graduate work and that normal progress has been made toward a degree. This action usually connotes that all prerequisites to admission have been completed and a program of study has been approved.

The Admission to Candidacy form, signed by the student's committee and listing all courses to be used for the degree, is submitted to the Office of Graduate Admissions and Records before the student has completed 15 hours of coursework in the Ed.S. program. A qualifying examination may be required for admission to candidacy if the student has a

Master's degree earned six years or more prior to admission to the program. This examination may be written and/or oral.

RESEARCH REQUIREMENTS

See the program descriptions of individual departments for listings of thesis, problems in lieu of thesis, and non-thesis options. Some departments offer only a thesis program.

1. In the non-thesis program, a candidate will study research methods and findings and will demonstrate skill in adapting them to problems as defined by the major department.

2. In the thesis program, or problems in lieu of thesis, 6 hours of research credit (518 and 519) must be earned in the preparation of an acceptable piece of work. The student must continue to register for thesis or problems while working on the project, including the semester it is accepted by The Graduate School. The thesis must be prepared according to instructions in the UT Knoxville Guide to the Preparation of Theses and Dissertations, and approved by the student's committee prior to submission to The Graduate School for final approval and acceptance.

FINAL EXAMINATION

A candidate presenting a thesis, or problems in lieu of thesis, must pass an oral examination covering the student's research and program of study. A non-thesis student must pass a final written, or written and oral examination, on all work offered for the degree. The examination is not merely a test over coursework, but a demonstration of the candidate's ability to integrate materials in the major and related fields. Each examination must be scheduled through the Office of Graduate Admissions and Records before the deadline and will be conducted by the student's committee. Final examinations not properly scheduled must be repeated. In case of failure, the candidate may not be reexamined until the following semester. The result of the second examination is final.

TIME LIMIT

Candidates have six calendar years from the time of entry into the last 30 hours of their degree programs to complete the Ed.S. degree.

Doctoral Degrees

Two doctoral degree programs are available: Doctor of Philosophy (Ph.D.) and Doctor of Education (Ed.D.). Programs are listed under "Majors and Degree Programs," pages 8-9. For specific degree requirements, consult individual program descriptions listed by college and field of instruction in this Catalog. See also the chart, page 24, for a summary of procedures for doctoral degrees.

Doctoral programs include a major field or area of concentration and, frequently, one or more cognate fields. The latter are defined as a minimum of 6 semester hours of graduate coursework in a given area outside the student's major field.
COURSE REQUIREMENTS

Each doctoral student must take an appropriate number of 500-level courses, usually a minimum of 6 semester hours, at UT Knoxville. Normally a doctoral program includes a minimum of 24 hours of graduate coursework beyond the Master's degree, graded A-F. In addition, a minimum of 24 hours of dissertation work in course 600 is required. Additional work taken for S/N grading may comprise up to one-fourth of the student's total graduate hours.

DOCTORAL COMMITTEE

The student and the major professor identify a doctoral committee composed of at least four faculty members, holding the rank of Assistant Professor or above, three of whom, including the chair, must be approved by The Graduate Council to direct doctoral research. At least one member must be from a department other than that of the student's major field. This committee is nominated by the department head or college dean and approved by The Graduate School. The committee should be formed during the student's first year of doctoral study. Subject to Graduate Council policies and individual program requirements, the committee must approve all coursework applied toward the degree, certify the student's mastery of the major field and any cognate fields, direct the research, and recommend the dissertation for approval and acceptance by The Graduate School.

CONTINUOUS REGISTRATION

The student must register continuously for course 600 (minimum of 3 hours) from the time the doctoral research proposal is approved, admission to candidacy is accepted, or registration for course 600 is begun, whichever comes first, including summer semester and the semester in which the dissertation is approved and accepted by The Graduate School. This minimum total of 24 hours of course 600 is required before the dissertation will be accepted. A student who will not be using faculty services and/or university facilities for a period of time may request leaves of absence from dissertation research up to a maximum of six terms (including summer terms). The request, which is to be made in advance, will be considered by The Graduate School upon written recommendation of the department head.

DOCTORAL EXAMINATIONS

Departments may, at their option, administer diagnostic and/or qualifying examinations in the early stages of the student's doctoral program. Successful completion of a comprehensive examination and a defense of dissertation is required for all doctoral degrees. Registration is required in which examinations are taken.

Diagnostic Examination

A student on admission to the doctoral program may be given a written and/or oral diagnostic examination to help determine the student's level of preparation, areas of strengths and weaknesses, and general background. The diagnostic examination is designed to aid in the selection of courses and to determine the student's preparation to continue doctoral studies at UT Knoxville.

Qualifying Examination

Written and/or oral qualifying examination may be given near the end of the student's first year in the doctoral program. Qualifying examinations are designed to test the student's progress, general knowledge of fundamentals of the field, and fitness to continue with the more specialized aspects of the doctoral program.

Comprehensive Examination

The comprehensive examination (or the final examination when parts are given at different times) is normally taken when the doctoral student has completed all or nearly all prescribed courses. Thus, its successful completion indicates that, in the judgement of the faculty, the doctoral student can think analytically and creatively, has a comprehensive knowledge of the field and the specialty, knows how to use academic resources, and is deemed capable of completing the dissertation. The comprehensive examination must be passed prior to admission to candidacy. A written examination is required and an oral examination is encouraged.

The faculty of the graduate program and/or the student's doctoral committee will determine the content, nature and timing of the comprehensive examination and certify its successful completion. The department or committee may at its discretion subdivide the examination, administering portions of the examination at several times during the student's course of study. Students should review carefully the written statement from each doctoral degree program which details the timing, areas covered, grading procedures, and provisions for repeating a failed examination.

Defense of Dissertation Examination

A doctoral candidate must pass an oral examination on the dissertation. The defense of dissertation will be administered by ALL members of the doctoral committee after completion of the dissertation and all course requirements. This examination must be passed at least three weeks before the date of acceptance and approval of the dissertation by The Graduate School. The examination must be scheduled through the Graduate Admissions and Records Office. Final examinations not properly scheduled must be repeated. The dissertation, in the form approved by the major professor, must be distributed to the committee at least two weeks before the examination. The examination is announced publicly and is open to all faculty members.

LANGUAGE REQUIREMENTS

Candidates for the Ph.D. degree may be required to demonstrate a reading knowledge of at least one foreign language in which there exists a significant body of literature relevant to the major field of study. Please refer to the descriptions of individual programs. The doctoral committee will determine the specific language (or languages) required. When the student is prepared to take a language examination, he/she should complete an Application for Doctoral Language Examination at the Office of Graduate Admissions and Records in accordance with the dates and times for the examinations printed in the Graduate School News.

Satisfactory completion (grade of B or better) of German 332 or French 302 may be substituted for a language examination.

ADMISSION TO CANDIDACY

Admission to candidacy reflects agreement among the student, graduate committee, and The Graduate School that the student has demonstrated the ability to do acceptable graduate work and that normal progress has been made toward a degree. This action usually connotes that all prerequisites to admission have been completed and a program of study has been begun.

A student may be admitted to candidacy for the doctoral degree after passing the comprehensive examination, fulfilling any language requirements (for Ph.D.), and maintaining at least a B average in all graduate coursework. Admission to candidacy must be applied for and approved at least one full semester prior to the date the degree is to be conferred. Each student is responsible for filing the admission to candidacy form, listing all courses to be used for the degree, signed by the doctoral committee and approved by The Graduate School.

DISSERTATION

The dissertation represents the culmination of an original major research project completed by the student. The organization, method of presentation, and subject matter of the dissertation are important in conveying to others the results of such research. A student should be registered for the number of dissertation hours representing the fraction of effort devoted to this phase of the candidate's program. Thus, a student working full time on the dissertation should register for 12 hours of 600 per semester.

Two copies of the dissertation (prepared according to the regulations in the UT Knoxville Guide to the Preparation of Theses and Dissertations) must be submitted to and accepted by The Graduate School. Each copy must include an approval sheet, signed by all members of the doctoral committee, which certifies to The Graduate School that they have examined the final copy and found that its form and content demonstrate scholarly excellence. Doctoral forms and a thesis card are also submitted at this time. The student should check with the department head concerning additional required copies of the dissertation.

TIME LIMIT

Comprehensive examinations must be taken within five years, and all requirements must be completed within eight years, from the time of a student's first enrollment in a doctoral degree program.
Summary of Procedures for Master's and Specialist in Education Degrees

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<tr>
<th>PROCEDURES</th>
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<th>DATE</th>
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<tbody>
<tr>
<td>Admission as a potential degree candidate</td>
<td>Office of Graduate Admissions and Records and Major Department</td>
<td>Prior to completing 15 hours of graduate courses</td>
</tr>
<tr>
<td>Formation of Master's/Ed. S. committee</td>
<td>Advisor/Major professor</td>
<td>Prior to application for admission to candidacy</td>
</tr>
<tr>
<td>Submission of application for admission to candidacy</td>
<td>Master's/Ed. S. committee</td>
<td>At least one semester prior to graduation*</td>
</tr>
<tr>
<td>Approval of admission to candidacy</td>
<td>The Graduate School</td>
<td>Prior to graduation</td>
</tr>
</tbody>
</table>

GRADUATION REQUIREMENTS FOR NON-THESIS OPTION

| Placement of name on graduation list | Student | Indicate on registration materials |
| Application for diploma              | Office of Graduate Admissions and Records | Deadline available at registration* |
| Payment of graduation fee            | Bursar's Office | Deadline available at registration* |
| Scheduling of Final Examination      | Student and Office of Graduate Admissions and Records | Not later than one week prior to Final Examination* |
| Final Examination                    | Master's/Ed S. committee | Not later than three weeks prior to Commencement* |
| Removal of Incomplete(s)             | Instructor of course | Not later than one week prior to Commencement* |

GRADUATION REQUIREMENTS FOR THESIS/PROBLEMS OPTIONS

| Placement of name on graduation list | Student | Indicate on registration materials |
| Application for diploma              | Office of Graduate Admissions and Records | Deadline available at registration* |
| Payment of graduation fee            | Bursar's Office | Deadline available at registration* |
| Submission of thesis/problems to Master's/Ed. S. committee | Student | At least two weeks prior to Final Examination |
| Scheduling of Final Examination      | Student and Office of Graduate Admissions and Records | Not later than one week prior to Final Examination* |
| Final Examination                    | Master's/Ed S. committee | Not later than three weeks prior to thesis deadline* |
| Approval and acceptance of final copy of thesis and thesis card | Master's/Ed. S. committee and The Graduate School | After Final Examination and not later than two weeks prior to Commencement* |
| Removal of incomplete(s)             | Instructor of course | Not later than one week prior to Commencement* |

*Deadlines are printed in the Graduate School News each semester.
### Summary of Procedures for Doctoral Degrees

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<td>The Graduate School on recommendation of department head</td>
<td>Preferably during the first year of graduate study, but at the latest, prior to admission to candidacy</td>
</tr>
<tr>
<td>*Comprehensive Examination</td>
<td>Major department</td>
<td>Prior to admission to candidacy</td>
</tr>
<tr>
<td><em>Foreign language examination(s)</em>*</td>
<td>Office of Graduate Admissions and Records</td>
<td>Prior to admission to candidacy</td>
</tr>
<tr>
<td>Submission and approval of application for admission to candidacy</td>
<td>Doctoral committee and The Graduate School</td>
<td>At least one semester prior to graduation***</td>
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**GRADUATION REQUIREMENTS**

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<td>Submission of dissertation to doctoral committee</td>
<td>Student</td>
<td>At least two weeks prior to Defense of Dissertation Examination***</td>
</tr>
<tr>
<td>Scheduling of Defense of Dissertation Examination</td>
<td>Student and Office of Graduate Admissions and Records</td>
<td>Not later than one week prior to Defense of Dissertation Examination***</td>
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<tr>
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<td>Doctoral committee</td>
<td>Not later than three weeks prior to dissertation deadline***</td>
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<td>Approval and acceptance of final copy of dissertation, doctoral forms, and dissertation card</td>
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* The order of these items varies with individual programs.
** Not required in some programs.
*** Deadlines are printed in the Graduate School News each semester.
COLLEGES
College of Agriculture

O. Glen Hall, Dean
Gary Schneider, Associate Dean

Departments
- Agricultural and Extension Education
- Agricultural Economics and Rural Sociology
- Agricultural Engineering
- Animal Science
- Entomology and Plant Pathology
- Food Technology and Science
- Forestry, Wildlife and Fisheries
- Ornamental Horticulture and Landscape Design
- Plant and Soil Science

The College of Agriculture began in 1869 when the University was designated as Tennessee’s Federal Land-Grant Institution. As such, the University was enabled for the first time to offer instruction in agriculture. Graduate instruction began as early as 1889. The College is not only an academic unit of The University of Tennessee, Knoxville campus, but is also (with the Agricultural Experiment Station, the Agricultural Extension Service and the College of Veterinary Medicine) one of the four administrative units of The University of Tennessee's Institute of Agriculture. There are many shared resources and positive interactions between various units of the Institute. For example, most of the faculty in the College of Agriculture hold joint appointments in the Agricultural Experiment Station and are actively involved in significant basic and applied research in agriculture and the associated natural resources. On campus and field research laboratories are utilized in the instructional programs of the College, extension and research activities provide many students excellent part-time job opportunities. Very significant is the fact that the Agricultural Experiment Station provides more than 100 graduate research assistantships to support graduate students.

The unique association the College has with the UT Knoxville campus and the other units of the Institute of Agriculture makes it possible for the College to offer comprehensive high quality graduate programs.

Graduate programs of the College of Agriculture are designed to prepare men and women for positions of leadership in industry, state and federal government, teaching, research, and extension.

The graduate student is expected to demonstrate a thorough knowledge of the subject matter in his/her specialized field of study and its relationship to the sociological, economic, and environmental impact on society. The student must demonstrate the ability to plan, conduct, analyze, and report original research. Emphasis is given to intellectual growth and the development of scholarly habits of study, reasoning and analysis so that the graduate will continue to grow and develop professionally throughout his/her career.

MASTER OF SCIENCE PROGRAMS

Programs of graduate study leading to the Master of Science degree are offered through all departments in the College of Agriculture. The graduate program may be entirely in one major subject or may include subject matter areas related to the major.

Both majors and minors are available in Agricultural Economics, Agricultural Engineering, Agricultural and Extension Education, Agricultural Engineering Technology, Animal Science, Entomology and Plant Pathology, Food Technology and Science, Ornamental Horticulture and Landscape Design, and Plant and Soil Science. Majors only are available in Forestry and Wildlife and Fisheries Science, and minors are available in General Agriculture and Rural Sociology. The minor in General Agriculture requires 12 hours of coursework. A complete listing of majors is shown on pages 8-9.

DOCTORAL PROGRAMS

Graduate study leading to the Doctor of Philosophy degree in Animal Science, Agricultural Economics, Agricultural Engineering, Food Technology and Science, and Plant and Soil Science is offered in the college.

College of Business Administration

C. Warren Neel, Dean
Michael J. Stahl, Associate Dean
Roger L. Jenkins, Associate Dean for Graduate Programs
Richard C. Reizenstein, Associate Dean for Undergraduate Programs
David A. Hake, Director, Center for Business and Economic Research
John E. Riblett, Director, Management Development Programs

Departments
- Accounting and Business Law
- Economics
- Finance
- Management
- Management Science
- Marketing, Logistics and Transportation
- Statistics

Facilities for Research and Service
- Center for Business and Economic Research
- Management Development Center

The College of Business Administration was originally the School of Commerce, dating back to 1919. Commerce was changed to Business in 1937 and gained college status in 1947. The college-wide MBA program was approved in 1966 and the doctoral program in 1971.

Graduate programs of the College of Business Administration are designed to prepare men and women to assume positions in the increasingly complex world of business and industry, teaching and research, and government.
Viewing the business firm as operating in dynamic social, political, and economic environments that demand leaders capable of dealing with innovation and rapid change, the College places central importance on development of students' thought processes. Emphasis is focused on flexibility of mind, receptivity to new ideas, and capacity to adapt one's reasoning powers. Our objective is to encourage the student to develop the ability to reason analytically and logically. Above all else, we strive to instill the irreplaceable desire to continue to learn and grow in knowledge throughout the student's life.

The College of Business Administration has made a commitment to total quality management by integrating the principles of productivity through quality and statistical process control throughout the graduate curriculum. Interdisciplinary partnerships are encouraged among academic units in the College, with other University academic units and with the private sector, enhancing the process of inquiry and critical thinking which is crucial to total quality management.

The College of Business Administration is fully accredited by the American Assembly of Collegiate Schools of Business and is associated with other leading graduate schools of business as a member of the Graduate Management Admission Council.

GRADUATE PROGRAMS

The College of Business Administration offers programs leading to five advanced degrees: the Doctor of Philosophy with majors in Business Administration, Economics, and Management Science; the Ph.D. in Business; the Master of Arts with a major in Economics; the Master of Science with a major in Statistics; the Master of Accountancy; and the Master of Business Administration. The Department of Management and the Department of Psychology in the College of Liberal Arts jointly offer an intercollegiate program in Industrial and Organizational Psychology leading to the Master of Science and Doctor of Philosophy degrees (see Industrial and Organizational Psychology). Also, the Department of Management Science coordinates an intercollegiate program leading to the Master of Science (see Management Science).

The two College-wide programs, the MBA and the Ph.D. in Business Administration, are described in Business Administration, Fields of Instruction. Descriptions of other degree programs are under the appropriate departmental or program headings.

FINANCIAL ASSISTANCE

A limited number of teaching and other assistantships that require from 10 to 20 hours of service per week are available through the departments of the College. Remuneration includes remission of fees and tuition as well as a monthly stipend. Awards are generally made on the basis of scholarship and performance on the appropriate (GMAT or GRE) admission test. Application forms may be obtained in any of the departments. Information on College-administered fellowships is available from the Office of Graduate Business Programs in the College of Business Administration.

Applications must be received by March 1 for consideration of assistantships and fellowships to be awarded for the following fall term.

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**College of Communications**

B. Kelly Leiter, Dean

Herbert H. Howard, Assistant Dean for Graduate Studies and Research

**Departments and Schools**

Advertising
Broadcasting
Journalism

**Facility for Research and Service**

Communications Research Center (CRC)

The College of Communications grew out of the Communications Department, which is originally located in the College of Business Administration. The Master's program began in 1968 under Journalism and was changed to Communications after the School gained College status in 1970. The doctoral program was initiated in 1973.

A chair of excellence was established in 1987 to support a distinguished professorship in science, technology, and medical writing. Communications media are a vital force in today's complex society. Specialization, gaps among segments of society, and the nature of world conflict point to the need for more understanding of how people communicate. Educating men and women in the perceptive understanding of the communications media is a necessity. The graduate programs in the College acquaint students with the nature of communications and prepare them for professional work in many fields.

The College of Communications offers the Master of Science and the Doctor of Philosophy degrees with a major in Communications. In addition, Communication Arts is available as a minor for students majoring in other departments. Required coursework will be selected after discussion with the major advisor and an advisor from the College of Communications.

The M.S. program is accredited by the Accrediting Council on Education in Journalism and Mass Communication. The College is a member of the Association of Schools of Journalism and Mass Communication and the Broadcast Education Association.

For application forms and other information about the M.S. and Ph.D. programs in Communications, write to Assistant Dean for Graduate Studies, College of Communications, 98 Communications Building, The University of Tennessee, Knoxville, TN 37996-0313.

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**College of Education**

Richard Wisniewski, Dean

C. Glennon Rowell, Associate Dean for Graduate Studies

Thomas W. George, Associate Dean for Undergraduate Studies

Timothy J. Pettitbone, Associate Dean for Research

**Departments**

Art and Music Education
Curriculum and Instruction
Educational and Counseling Psychology
Educational Leadership
Health, Leisure, and Safety
Human Performance and Sport Studies
Special Services Education
Technological and Adult Education

**Facilities for Research and Service**

Bureau of Educational Research and Service
Center for Environmental/Energy/Science Education
Center for Physical Activity and Health
Institute for Teacher Education
Instructional Services Center
Public Schools for Cooperative Research
Reading Center
Safety Center
State Testing and Evaluation Center

Education programs were first offered at the graduate level in 1905 by the School of Education. Through the Summer School of the South, the programs thrived, and the School became a College in 1926. The Ed.D. program was established in 1950, and the college-wide Ph.D. program began in 1979.

The faculty of the College of Education is committed to performing three major functions: (1) to provide professional preparation for teachers, administrators, school service personnel, and other professionals such as health and recreation personnel at the undergraduate and graduate levels; (2) to collaborate with school personnel, educational agencies, professional groups, and others interested in the evaluation and improvement of educational opportunities, programs, and services; and (3) to promote and conduct research and development in education and other areas of responsibility.

The College of Education holds membership in the American Association of Colleges for Teacher Education and in the Holmes Group. All certification and degree programs through the doctoral level are fully accredited by the National Council for Accreditation of Teacher Education, the Southern Association of Colleges and Schools, and the Tennessee State Department of Education.

**MASTER OF SCIENCE PROGRAMS**

On the Master's level, professional study may be planned (1) in one of the areas listed on page 8-9, (2) in appropriate combinations of these areas, or (3) in combinations of one or more of these areas with appropriate subjects or areas in other colleges.

Students in the College of Education's five-year preparatory program must meet all criteria for admission to the Graduate School to earn 12 hours credit toward their Master's degrees. Admission to Graduate School must be prior to or during the semester that the first graduate credit is to be earned. Internship cannot be used for graduate credit.

**SPECIALIST IN EDUCATION PROGRAMS**

This degree may be earned in Educational Administration and Supervision, in Educational Psychology and Guidance, in Curriculum and
Instruction, in Safety Education and Service, or in Vocational-Technical Education.

**DOCTORAL PROGRAMS**

The College of Education offers programs of advanced study leading to the Doctor of Education in the major areas listed on page 8-9. Ph.D. in Education requirements are available under Education, Fields of Instruction.

**TEACHER CERTIFICATION**

Applicants for initial teacher certification and those applicants previously certified who are seeking initial institutional recommendation for certification must gain admission to the college's Teacher Education Program. A complete explanation of the admission process appears in the Undergraduate Catalog.

**College of Engineering**

William T. Snyder, Dean  
William L. Grecco, Associate Dean  
William A. Miller, Associate Dean

**Departments**

Chemical Engineering  
Civil Engineering  
Electrical and Computer Engineering  
Engineering Science and Mechanics  
Industrial Engineering  
Materials Science and Engineering  
Mechanical and Aerospace Engineering  
Nuclear Engineering

**Facilities for Research and Service**

Center for Measurement and Control Engineering  
Center for Excellence for Materials Processing

The College had its beginnings in the University when surveying was introduced into the curriculum in 1836. The first two professional degrees, Civil Engineer and Mining Engineer, were established in 1879 at the same time that the Board of Trustees authorized the establishment of a graduate school. Known as Mechanic Arts originally, Engineering became a college in 1904.

The purpose of the College of Engineering is to educate men and women to the high levels of research, technical competence, and social understanding that will enable them to fulfill their responsibilities as professional engineers. Graduate programs of the College of Engineering provide opportunities for advanced study leading to the Master of Science and the Doctor of Philosophy degrees. For a listing, consult majors and degrees available on page 8-9.

**GRADUATE PROGRAM AT THE UT SPACE INSTITUTE**

At the University of Tennessee Space Institute near Tullahoma, graduate-level courses are offered in engineering fields such as aerospace, chemical, electrical and computer, engineering science and mechanics, industrial, mechanical engineering, engineering management, and mathematics and physics. All programs lead to the Master of Science degree. Also, Ph.D. programs are available in many of these fields. Information may be obtained from the Registrar, The University of Tennessee, Space Institute, Tullahoma, TN 37388.

**YEAR-IN-JAPAN M.S. PROGRAM**

This is a unique program allowing American engineering students to develop some understanding, both scientific and cultural, of Japan. It allows an M.S. candidate to obtain a degree from UT Knoxville while carrying out research at a Japanese university. The program requires approximately two years; one year is spent in Japan and the remaining period is spent at UT Knoxville to fulfill the course requirements and to write the thesis or project report, as appropriate to the particular department. The program is administered in the framework of each department’s regular graduate program, except that the research is done in Japan.

**CENTER OF EXCELLENCE FOR MATERIALS PROCESSING**

The Center for Materials Processing is one of the “Centers of Excellence” created by the State of Tennessee. It is an inter-disciplinary program designed to bring together individuals with appropriate expertise to solve important materials processing problems. It emphasizes (1) the development of desirable materials properties through the control of composition, molecular structure and microstructure, (2) measurement of process variables, and (3) control of those variables to ensure proper processing. The Center conducts basic research and teaching in materials processing and carries out research to improve existing processing technologies and transfer of research results to private industry. A major aspect of the Center is student participation in industry-sponsored research programs.

**College of Human Ecology**

Jacquelyn O. DeLoinge, Dean  
James D. Moran III, Associate Dean: Graduate Studies  
Frances Andrews, Associate Dean: Academic Administration

**Departments**

Child and Family Studies  
Nutrition and Food Sciences  
Textiles, Merchandising and Design

The University of Tennessee was one of the first institutions of higher education in the South to offer home economics, with the first class being offered in 1897. Initially called a School of Home Economics, it combined with Agriculture in 1947 to become the College of Agriculture and Home Economics. In 1959, the two colleges became separate units, although they continue to share resources. In 1965 the name was changed to Human Ecology, reflecting its focus on people interacting with their environments.

**College of Law**

Marilyn Yarbrough, Dean  
Richard S. Wirtz, Associate Dean  
Julia P. Hardin, Associate Dean  
Mary Jo Hoover, Associate Dean

The University of Tennessee College of Law commenced operations in 1890 and has continuously sought to provide high-quality legal education in a university community.

While the principal objective of the college is to prepare students for the private practice of law, its total mission is more broadly conceived. The college exposes students to the legal issues of our society enabling them to develop analytical skills with respect to decisional law and statutes, the ability to communicate effectively their knowledge of the law, an awareness of the historical growth of the law, a knowledgeable appreciation of the interrelationship of law and society, and the ability to use law as an implement of societal control and development. Students are thus equipped to serve their communities not only as advocates and counselors, but as policy makers and active, responsible citizens.

**THE PROFESSIONAL PROGRAM**

The program of the college has three dimensions: teaching and learning, research into and appraisal of our legal systems and institutions, and service to the community. Each plays a significant role in the college as a modern law center.

The teaching and learning element of legal education at the college involves a cooperative classroom interaction between faculty and students in the analytical study of a host of questions and problems found in today's legal profession. These involve decisional law, statutory interpretation, administrative regulation, techniques of trial and appellate advocacy, and the roles and responsibilities of the lawyer in advising and representing clients. While proper consideration is given to the problems of Tennessee law, the course of study is conducted with a view toward providing an awareness and understanding of the regional and national perspective to prepare students for service in any state.

The college is also directly involved in providing service to the community. A major element of public service is centered in the
Legal Clinic where students, under the guidance of skilled and experienced licensed practitioners, provide legal services to clients. Additionally, through research, consultation, and other service to legal institutions and groups within the state, the college seeks to participate in the development and improvement of the society in which its students may eventually practice law. The Public Law Institute is a primary example of this function.

In combination, the direction and objectives of the college lead to the development of a narrow technician, but, of a student of the law with the perspective, breadth, and understanding necessary to accomplish the many tasks assigned by society to the legal profession.

**GRADUATE PROGRAM**

Two dual degree programs are available in conjunction with the College of Law: the J.D.-M.B.A program with the College of Business Administration and the J.D.-M.P.A. program with the Department of Political Science. Refer to details under the respective field of instruction.

Graduate students in other disciplines may also take law courses upon approval of the College of Law and the major professor. See Law under Fields of Instruction.

**College of Liberal Arts**

Lorman A. Rainer, Dean
Charles O. Jackson, Associate Dean
Harry Jacobson, Associate Dean
Lee Magid, Associate Dean
Jack Armistead, Associate Dean

**Departments**

- Anthropology
- Art
- Audiology and Speech Pathology
- Biochemistry
- Botany
- Chemistry
- Classics
- Computer Science
- English
- Geography
- Geological Sciences
- Germanic and Slavic Languages
- History
- Interdisciplinary Programs
- Mathematics
- Microbiology
- Music
- Philosophy
- Physics and Astronomy
- Political Science
- Psychology
- Religious Studies
- Romance Languages
- Sociology
- Speech Communication
- Theatre
- Zoology

**Center for the Study of War and Society**

Child Behavior Institute
Forensic Anthropology Center
Hearing and Speech Center
Institute for Applied Microbiology
Institute for Resonance Ionization Spectroscopy
James R. Stokely Institute for Liberal Arts Education
Joint Institute for Heavy Ion Research
Latin American Studies Institute
Psychological Clinic
Science Alliance
Social Science Research Institute

The University of Tennessee began as a liberal arts institution. Shortly before the turn of the century, less emphasis was placed on the liberal education. However, the liberal arts continued to thrive, emerging as a college in 1904. Thus, the College of Liberal Arts is one of the oldest established colleges in the University.

The College of Liberal Arts consists of a wide array of academic disciplines and interdisciplinary programs. The central purposes of a liberal education include the encouragement of intellectual tolerance, a dedication to the quest for knowledge as a worthwhile goal in and of itself, and the development of a responsible, creative individual mind. These qualities enable one to develop an ability to reason and to express oneself clearly, an incentive to absorb emerging knowledge, and a competence to confront the uncertainties of human experience.

Faculty research and creative activity is the foundation on which education in this College is built. As a result of that endeavor, the lives of students are enriched and the world's body of knowledge grows.


**GENERAL INFORMATION**

Foreign Study Courses

Foreign study courses offered in some departments of the college provide an opportunity to undertake independent study outside the United States. Prior to departure the student must have a plan of study approved by the department head and a supervising faculty member of the department concerned. Credit will be given only upon fulfilling all requirements set by the department and may vary from 1-15 hours. The maximum credit that may be applied toward a degree in the college is established in each individual case by the department in which the student is working.

Off-Campus Study

Recognizing that learning is not restricted to formal classroom situations, the college provides for students to earn credit toward graduation for approved off-campus study. Such study may be undertaken only with prior approval of the faculty member and the department concerned. It may include certain kinds of work experiences, community involvement, or political campaigns. Credit per semester will vary from 1-15 hours. The maximum credit that may be applied toward a degree in the college is established in each individual case by the department in which the student is working.

**Independent Study**

Certain educational goals may best be met through independent study by an individual under the direction of a faculty member. Students who wish to do such independent work should obtain approval of the faculty members and the departments concerned prior to embarking upon their study. Credit per semester will vary from 1-15 hours. The maximum credit which may be applied toward a degree in the college is established in each individual case by the department in which the student is working.

**College of Medicine-Knoxville Unit**

Robert L. Summit, Dean
Reid I. Collmann, Associate Dean

**Department**

- Medical Biology

The College of Medicine traces its origin to the establishment of the Medical Department of the University of Nashville in 1851. Later, through a merger of four medical schools, it became The University of Tennessee College of Medicine and moved to Memphis in 1911. The major campus of the College of Medicine is located in Memphis, Tennessee. The college, however, is a statewide organization with other units in Chattanooga, Jackson, and Knoxville. The major aim of the College of Medicine-Knoxville Unit is the advancement of medical research.

In addition to the Department of Medical Biology listed here, the Knoxville Unit has several clinical departments with faculty dedicated to graduate and postgraduate medical education.

**GRADUATE PROGRAMS**

The faculty with the College of Veterinary Medicine participates in the graduate program leading to M.S. and Ph.D. degrees in Comparative and Experimental Medicine. Advanced degree students from other colleges can do thesis research in the department by arrangement with other life science departments at the University.

**College of Nursing**

Sylvia E. Hart, Dean
Mildred M. Fenske, Associate Dean for Graduate Programs
Johnnie N. Mozingo, Associate Dean for Undergraduate Programs
Barbara M. Reid, Associate Dean for Student Affairs
Maureen Groer, Director of Doctoral Program
Sandra P. Thomas, Director of Center for Nursing Research

**Facilities for Research and Service**

- Center for Nursing Practice
- Center for Nursing Research
The College of Nursing was established in July 1971. The Master's program was initiated in 1976 and approval for the doctoral program was granted in 1986. More specific information about the programs may be obtained under Nursing, Fields of Instruction, or by contacting the Director of M.S.N. or Ph.D. Program, The University of Tennessee, College of Nursing, 1200 Prentiss Blvd., Knoxville, TN 37996-4110, (615) 974-4151.

MASTER OF SCIENCE IN NURSING

The general purpose of the M.S.N. program is to prepare nurses at the graduate level to function as clinical specialists, teachers, or managers in a variety of health care or educational settings. The program is accredited by the National League for Nursing and is unconditionally approved by the Tennessee Board of Nursing. Students admitted to the program select a concentration in either adult health nursing, parent-child nursing, mental health nursing, primary care nursing (family nurse practitioner), or nursing administration.

THE DOCTORAL PROGRAM

The College of Nursing offers a doctoral program leading to the Ph.D. with a major in nursing, nurse practitioner), or nursing administration. This cooperative program offers three tracks: health nursing, primary care nursing (family nurse practitioner), or nursing administration.

THE DOCTORAL PROGRAM

The College of Nursing offers a doctoral program leading to the Ph.D. with a major in nursing. The doctoral program prepares nursing scholars capable of integrating research, theory, and practice into innovative programs as researchers, educators, and/or administrators. This cooperative program offered jointly with The University of Tennessee, Memphis College of Nursing, enables students to complete all or part of the program at either site. The dissertation must be completed in its entirety at one site.

College of Social Work

Eunice Shatz, Dean
William J. Bell, Acting Associate Dean, Nashville
James D. Orten, Acting Associate Dean, Knoxville
Nellie P. Tate, Associate Dean, Memphis
Paul M. Campbell, Director, Office of Social Work Research and Public Service

College of Veterinary Medicine

William H. Grau, Jr., Associate Dean
David F. Edwards, Interim Associate Dean

Departments

Animal Science-Veterinary Medicine
Environmental Practice
Microbiology-Veterinary Medicine
Pathobiology
Rural Practice
Urban Practice

The College of Veterinary Medicine, established in 1974, offers a professional curriculum leading to the Doctor of Veterinary Medicine (D.V.M.) degree. The college offers graduate studies leading to the Master of Science and the Doctor of Philosophy degrees. Residency training programs in the various clinical specialties are also offered.

The primary objective of the college is to educate veterinarians for private practice. However, the professional curriculum provides an excellent basic medical education, in addition to training in diagnosis, disease prevention, medical treatment, and surgery. Graduates are qualified to pursue careers in many facets of veterinary medicine and related health professions.

Most veterinarians are engaged in private practice and specifically in general practice which deals with the diseases of all kinds of animals. About one-fourth of the veterinarians in the United States are engaged exclusively in pet or companion animal practice. A growing number are concerned with the health problems of zoo animals, laboratory animals, wildlife, and aquatic species.

Veterinarians also find rewarding careers in the U.S. Public Health Service, the U.S. Army and Air Force, and in state, county, or local health agencies. A large number of veterinarians are employed by the U.S. Department of Agriculture and by state departments of agriculture for important work in livestock disease control, meat and poultry inspection, serum and vaccine production, and the protection of our country against the importation of foreign animal diseases.

Excellent opportunities exist for veterinarians interested in research, both research for the direct benefit of animals and research conducted with animals but for the benefit of humans. Such opportunities are available at colleges and universities and with governmental agencies, private research institutions, and biological and pharmaceutical companies.
FIELDS OF INSTRUCTION
Fields of Instruction

Accounting and Business Law

(College of Business Administration)

MAJORS

DEGREES

Accounting ........................................ M.Acc.
Business Administration .................. MBA, Ph.D.

Jan R. Williams, Head

THE MASTER OF ACCOUNTANCY PROGRAM

The objective of the Master of Accountancy (M.Acc.) program is to provide persons having an undergraduate accounting background and a high level of ability and motivation with the depth and understanding of accounting which 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, business, industry, and government.

Admission Requirements

Application deadlines for international students are: Fall, March 1; Spring, July 15; Summer, November 15. Application deadlines for U.S. citizens and permanent residents are: Fall, June 1; Spring, October 1; Summer, February 1. Although the program is designed for students who have completed an accredited baccalaureate degree program with a major in Accounting, those with outstanding undergraduate records in any area 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 are expected to have completed coursework in calculus and computer science. For students with no previous exposure to calculus, Mathematics 305 is available.

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 for the M.Acc. Program

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.

Accounting Core (9 hours): 511, 513, 521.

Accounting Concentration (12 hours):

1. Financial/Auditing: 512, 531, 519, one accounting elective.
3. Taxation: 531, 532, 533, 539.

Non-accounting Electives (9 hours):

Non-accounting courses taken in either other business or non-business areas, upon approval of M.Acc. advisor.

Transfer Credits

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

Other Requirements

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

CONCENTRATIONS

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

MAJOR CONCENTRATIONS

The concentration in controllership provides added accounting skills appropriate for those seeking employment in the controllership or general management functions of a variety of organizations. Although the controllership concentration provides broad preparation for the Certified Management Accountants' examination, it is not designed to meet the minimum educational requirements to take the Certified Public Accountants' examination. Minimum course requirements are three courses from the following: 504, 505, 522, 541.

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

ACADEMIC STANDARDS

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

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.

503 Managerial Accounting (3) Concepts and analyses relevant to internal decision-oriented users of accounting information for planning, decision making, controlling, and product costing. Prereq: 501.


505 Taxation for Business Decisions (4) Conceptual foundation and analysis of current issues in taxation; impact on use and management of financial and investment information applied to individual, corporate, partner

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

Professors:

Fisher, Bruce D., LL.M .... George Washington Townsend, Mahlon L. (Emeritus), J.D. .............. Tennessee

Assistant Professors:

Bentley, Denise D., J.D. .............. Vanderbilt Massingale, Cheryl S., MBA, J.D. ... Tennessee

GRADUATE COURSES

501 Legal, Ethical, and Societal Environment (3) Legal, ethical environment: recognized schools of jurisprudence (legal ethics), sources of law, anatomy of civil and criminal lawsuits; how regulations are made and enforced, constitutional rights and duties of business; antitrust law; Federal Trade Commission; product liability; consumer protection; employer-employee relations; securities regulation; environmental law, and international business law.

Advertising (College of Communications)

MAJOR DEGREES

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

Ronald E. Taylor, Head

Associate Professors:

Hovland, Roxanne, Ph.D. .............. Illinois Jackson, DeForrest, M.S. .............. Tennessee Stankey, Michael J., Ph.D. .............. Illinois Taylor, Ronald E., Ph.D. .............. Illinois

Assistant Professor:

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

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

GRADUATE COURSES

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

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

See Mechanical and Aerospace Engineering

Agricultural and Extension Education

(College of Agriculture)

MAJOR DEGREE

Agricultural and Extension Education ...... M.S.
Roy R. Lessly, Head

Professors:


Associate Professor:

Lessly, Roy R., Ed.D. ................. Oklahoma State

Assistant 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 Vocational Agriculture and staff employed by the Agricultural Extension Service. However, due to the flexibility of the program, it would be of value to agricultural mechanics facilities. Prereq: 435, 436 or consent of instructor.

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

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

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

524 Research Methodology (3) Social research design, hypothesis testing, sampling, survey construction, scaling, interviewing, data coding, basic descriptive and relational statistics, and presentation of results. Prereq: 436, 526 or consent of instructor.

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

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

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

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

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

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

531 Extension History, Philosophy and Objectives (2) Historical and philosophical foundation of adult education, and use of agricultural literature, key figures, issues, legislative movement, farmer organizations and programs. Cooperative Extension Service; origin, legislation and growth and nature of present day objectives and programs. Prereq: 411 or consent of instructor. Sp

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

593 Special Problems in Agricultural and Extension Education (1-4) Special research and/or special reports based on supervised independent study. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

Agricultural Economics and Rural Sociology

(College of Agriculture)

MAJOR DEGREES

Agricultural Economics ................. M.S., Ph.D.
Handy Williamson, Head

Professors:

40 Agricultural Economics and Rural Sociology

Klindt, T. H., Ph.D. ... Kentucky
Leuthold, F. O., Ph.D. ... Wisconsin
McLemore, D. L., Ph.D. ... Clemson
McManus, B. R., Ph.D. ... Purdue
Marlin, J. A. (Emeritus), Ph.D. ... Minnesota
Mundy, J. D., Ph.D. ... Tennessee
Pentecost, B. H., J. D. ... Tennessee
Raney, W. P. (Emeritus), Ph.D. ... Minnesota
Sappington, C. B. (Emeritus), Ph.D. ... Illinois
Whatley, T. J. (Emeritus), Ph.D. ... Purdue
Williamson, H., Ph.D. ... Missouri

Associate Professors:

English, B. C. Ph.D. ... Iowa State
Or, R. H., Ph.D. ... Illinois
Park, W. M., Ph.D. ... VPI
Roberts, R. K., Ph.D. ... Iowa State

Assistant Professors:

Jensen, K. L., Ph.D. ... Oklahoma State
Huffaker, R. G., Ph.D. ... California (Davis)
Pompeii, G. K., Ph.D. ... California (Davis)
VanTassell, L. W., Ph.D. ... Texas A&M

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

THE MASTER'S PROGRAM

Thesis Option

A candidate for the Master's degree must complete a minimum of 30 hours of graduate credit in courses approved by the student's Master's committee. Six hours of thesis may be counted toward this requirement. At least 24 hours of graduate credit must be earned in courses numbered at or above the 500 level. In the agricultural economics concentration, 12 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 27 hours must be in courses numbered at or above the 500 level. The program must include a minimum of 18 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 500- or 600-level courses. The student's committee must include a member of the faculty from the department who will be responsible for designating courses required for the minor.

THE DOCTORAL PROGRAM

A minimum of 78 hours of graduate credit beyond the B.S. degree, including 24 hours of dissertation research, but excluding any Master's research credit, is required. A minimum of 24 hours of agricultural economics, 15 hours of economic theory, and 9 hours of quantitative methods are required. The program must include a minimum of 8 hours in courses numbered at or above the 600 level (excluding dissertation credits). Comprehensive exams include four written exams and a final oral examination. The exam topics are selected from general agricultural economics, economic theory, quantitative methods, and the area of concentration. Provisions exist for waiving the economic theory exam with a sufficient academic record in specific economic theory courses.

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

Agricultural Economics

GRADUATE COURSES

412 Agricultural Finance (3) Macro-finance, financial objectives, acquisition of debt and equity funds, capital investments, capital allocation, credit analysis, borrower and lender loan application analysis, insurance strategies, computer applications, kinds and courses of agricultural credit, and financial intermediation. Prereq: Economics 201; junior standing or consent of instructor. F

430 Agricultural and Trade Policy (3) Values, goals, and policy process; historical development and current characteristics of commodity, credit, food, and trade policy; relationship between domestic and international agricultural policy. Prereq: 210 or consent of instructor. Sp

440 Agricultural Production Economics (3) Application of microeconomic theory to problems of resource allocation, enterprise selection, scale of operation and policy process; relationship between domestic and international agricultural policy. Prereq: 210 or consent of instructor. Sp

442 Farm Business Management II (3) Advanced topics and methods for farm business analysis using micro and mainframe computers; linear programming applications in farm planning; spreadsheet analysis of whole farm business; systems analysis and management control; risk analysis and management; income tax management; farm growth and intergenerational transfer. Prereq: 342, 34. Sp

450 Agricultural Price Analysis (3) Analysis of demand and supply mechanisms in agriculture; price determination; spatial equilibrium; temporal price patterns; pricing institutions. Prereq: 320 and Economics 311. F

452 Agribusiness Firm Management (3) Operations of firms selling farm supplies and merchandising agricultural products. Analytical tools and economic theories for decision making. Prereq: Economics 201; Sp

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

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

493 Independent Study in Agricultural Economics (1-3) Directed individual or team research and report writing. Off-campus intern experience and reporting. Special courses in specific topics. Student must arrange with instructor before registering. Graduate credit for non-majors only. Prereq: Junior standing. 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 for which he/she uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N only. E

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

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

524 Econometric Methods in Agricultural Economics (3) An introduction to the theoretical and empirical aspects of empirical methods to agricultural economic models, estimation of supply, demand and production functions; microeconomic forecasting models; interpretation of results. Prereq: Statistics 461 or consent of instructor. F

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

550 Advanced Agricultural Marketing (3) Analysis of structure, conduct and performance of agricultural 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: 460 or consent of instructor. Sp

570 Advanced Natural Resource Economics (3) Analysis of natural resource and environmental policies in agriculture, welfare economics, external effects and evaluation of public policy. Prereq: 470 and Economics 511 or consent of instructor. F

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

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

630 Agricultural Policy Analysis (3) Evaluation of public policy as related to agricultural industry and rural areas. Prereq: Economics 510 and 513 or consent of instructor. F

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

650 Operations Analysis in Marketing (2) Components and functions of operations system, levels of analysis and tools, operational efficiency, interregional competition. Prereq: 450 and 550 or consent of instructor. Sp
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 field. Each applicant will be advised about any prerequisite courses before entering a program. The student's program of study must be approved by his/her advisory committee and must comply with the requirements of The Graduate School. A completed departmental data sheet and three completed Graduate School Rating Forms are required in addition to The Graduate School application.

THE MASTER'S PROGRAMS

Agricultural Engineering Requirements

1. A total of at least 24 hours credit in graduate coursework in Agricultural Engineering Technology and related areas. The minimum requirements are 12 hours in agricultural engineering; 9 hours in other engineering, mathematics, physical and biological sciences, agricultural, or business areas (as approved by the advisory committee); and 3 optional hours from either one of these categories.

2. Active participation in graduate seminars conducted by the department. Resident students must register for a minimum of 2 hours in Agricultural Engineering 610 (included in the 24 hours credit of #1) and must attend the graduate seminar each semester whether registered or not.

3. A Master's thesis comprising 6 hours of Agricultural Engineering 500.

4. A final oral examination covering the thesis, related areas, and graduate coursework.

Agricultural Engineering Technology Requirements

1. A total of at least 24 hours in graduate coursework in Agricultural Engineering Technology and related areas. Minimum requirements are 12 hours in agricultural engineering technology; 9 hours in other agricultural, business, physical and biological science, or engineering-related areas (as approved by the graduate committee); and 3 optional hours from either one of these categories.

2. Active participation in graduate seminars conducted by the department. Resident students must register for a minimum of 2 hours in Agricultural Engineering Technology 552 (included in the 24 hours credit of #1) and must attend the graduate seminar each semester whether registered or not.

3. A Master's thesis comprising 6 hours of Agricultural Engineering Technology 500.

4. A final oral examination covering the thesis, related areas, and graduate coursework.

5. A minor in another subject area can be included in the program.

THE DOCTORAL PROGRAM

Concentrations for the doctoral program in Agricultural Engineering include agricultural power and machinery, agricultural structures and environment, agricultural electrical and electronic systems, food and process engineering, and soil and water conservation engineering. 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. Scores on the GRE aptitude and engineering tests also are required.

Departmental Requirements

1. A minimum of 72 hours credit beyond the Bachelor's degree, excluding hours for the Master's thesis. Of this, 24 hours must be 600 Doctoral Research and Dissertation.

2. Graduate courses in agricultural engineering comprising a minimum of 18 hours credit.

3. Supporting graduate courses (outside the Agricultural Engineering Department) in related engineering, agricultural, mathematics, and other scientific fields comprising at least 24 hours. The remaining minimum of 6 hours required for the degree may be taken either in agricultural engineering or related fields.

4. A minimum of 24 hours from coursework numbered greater than 500, of which at least 9 hours must be in courses numbered greater than 600.

5. Active participation in graduate seminars conducted by the department. Resident students must register for a minimum of 2 hours in Agricultural Engineering 610 and must attend the graduate seminar each semester whether registered or not.

6. Satisfactory performance in both written and oral comprehensive examinations prior to admission to candidacy. A final oral examination also is required which includes a defense of the dissertation and subject matter that the student's graduate advisory committee considers appropriate.

Agricultural Engineering

GRADUATE COURSES

430 Mobile Hydraulic Power System Design (2) Functional and operational characteristics of mobile hydraulic system components: pumps, valves and actuators; analysis and control of power transmission and control circuits. Prereq. Engineering Science and Mechanics 341. 1 hr and 1 lab. Sp, A

435 Design of Mechanisms for Agricultural Machines (2) Types of mechanisms; transmission angles; synthesis of plane mechanisms; introduction to space mechanisms. Prereq. Mechanical Engineering 465 or equivalent. 1 hr and 1 lab. Sp, A

440 Irrigation and Drainage Design (2) Design of irrigation and drainage systems; crop response, climate, water quantity and quality, and system characteristics. Prereq. 340 or equivalent. 2 hrs and 1 lab. Sp, A

445 Processing and Materials Handling Design (2) Development of systems and components for processing and utilization crops considering product characteristics, energy and mass balance, storage, handling and economic merit. Prereq: 330. 1 hr and 1 lab. Sp, A

450 Electrical Distribution and Utility Design (2) Design of on-farm electrical systems, control, motors, stray voltage, special electrical loads, and safety. Prereq: Electrical Engineering 260. 1 hr and 1 lab. Sp, A

455 Waste Management System Design (2) Waste renovation principles and livestock waste handling techniques; problem definition, feasibility study, analysis, synthesis, and preparation of plans and specifications. Prereq: Engineering Science and Mechanics 341, Plant and Soil Science 210, Industrial Engineering 405, English 659, 1 lab. Sp, A

460 Design of Agricultural Structures (2) Design fundamentals for wood, steel and concrete components, compression and tension members; beam and column...
Agricultural Engineering Technology

GRADUATE COURSES

442 Agricultural Waste Management and Pollution Control (3) Waste renovation fundamentals; characteristics of animal manure; techniques for collection, transporting, storing, and utilizing livestock waste. Prereq: Mathematics 121, 2 hrs and 1 lab. F

462 Agricultural Chemical Application Technology (3) Equipment for application of liquid, solid, and gaseous agricultural chemicals; system components; operational characteristics; calibration; selection and management; safety considerations; materials handling and disposal methods. Prereq: Physics 121 or consent of instructor. 2 hrs and 1 lab. Sp

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

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

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

520 Agricultural Engineering Instrumentation (3) Modern instrumentation techniques. Static and dynamic response of instrumentation; signal conditioning; temperature, moisture, optical radiation, displacement, strain, pressure, velocity, acceleration, and flow measurements; digital data acquisition and control. Prereq: 410 or equivalent. 2 hrs and 1 lab. Sp

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

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

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

580 Feedback and Control Systems (3) Differential equations for physical systems: solutions, transforms, and system response. Types of control, frequency response, system compensation, and system analysis. Application to agricultural systems. Prereq: Mathematics 231, Basic Engineering 101, 201, Electrical Engineering 302 or equivalent. 2 hrs and 1 lab. F

640 Research Problems in Agricultural Engineering (3) Research and manuscript preparation for a technical meeting presentation and submission to refereed journal. Manuscript content significantly different from thesis/dissertation and other reports. Student first author. E

650 Selected Topics in Agricultural Engineering (3) Lecture, group discussion, and individual study on specialized developments. May be repeated. Maximum 6 hrs. Sp
probationary (non-degree) basis and a minimum of 12 hours of graduate coursework must be completed the first term with a minimum grade-point average of 3.0 for admission to the M.S. program.

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

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

THE DOCTORAL PROGRAM

The doctoral program requires a minimum of 48 semester hours of coursework beyond the B.S. and a minimum of 24 hours of doctoral research and dissertation. Students must present their M.S. thesis research, their dissertation proposal, and the completed dissertation research in the departmental seminar. The 48 hours of coursework must include:

1. A minimum of 16 hours in related fields outside of animal science.
2. At least 24 hours credit at the 500 and 600 level, exclusive of doctoral research and dissertation, of which a minimum of 6 hours must be at the 600 level. Students in the nutrition, breeding, physiology, or anatomy concentration must complete 8 hours at the 600 level in the respective concentration or closely related area. Students in the management concentration must complete Animal Science 540 and 549, and 8 hours at the 500 or 600 level in two non-management concentrations for a total of 12 hours (including 581).
3. A minimum of 1 hour of Agriculture 512 in addition to that required at the M.S. level.
4. A minimum of 6 hours in 400-, 500-, or 600-level statistics courses approved for the ICGSP.

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

GRADUATE COURSES

481 Beef Cattle Production and Management (3) Integration of principles of nutrition, physiology, and breeding into complete beef cattle management programs. Structure of industry, enterprise establishment, systems of production, production practices and herd improvement programs. Alternatives evaluated: production response and economic returns. Prereq: Animal science sophomore or junior core courses or consent of instructor. 2 hrs and 1 lab. Sp

482 Dairy Cattle Production and Management (3) Integration of principles of nutrition, physiology, and breeding into complete dairy cattle management program. Structure of industry, enterprise establishment, systems of production, production practices and herd improvement programs. Alternatives evaluated: production response and economic returns. Prereq: Animal science sophomore and junior core courses or consent of instructor. 2 hrs and 1 lab. Sp

483 Pork Production and Management (3) Integration of principles of selection, nutrition, breeding, physiology, and marketing into complete pork production and management program. Structure of industry, enterprise establishment, systems of production, production practices and herd improvement program. Alternatives evaluated: production responses and economic returns. Prereq: Animal science sophomore and junior core courses or consent of instructor. 2 hrs and 1 lab. F

484 Poultry Production and Management (3) Structure of poultry enterprises: rearing, housing, feeding, processing, and marketing. Mixed management: layer, brace, and broiler systems. Prereq: Animal science sophomore and junior core courses or consent of instructor. 2 hrs and 1 lab. F

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

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

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

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

524 Advances in Mammary Physiology (3) Development, anatomy, and function of mammary glands; endocrine interactions associated with mammary development and function; factors affecting yield and composition of mammary secretions. Prereq: 322 or consent of instructor. Sp,A

531 Analytical Techniques in Animal Sciences (3) Physical and chemical analyses of feeds, ingredients, tissues, and biological fluids associated with nutrition, physiology and food products research. Prereq: Consent of instructor. 1 hr and 2 labs. F


533 Nonruminant Animal Nutrition (3) Physiological development and nutritional requirements of nonruminant animals during the life cycle. Concepts and methodology concerning nutrient requirements, interrelationships, availability and deficiencies of nutrients. Nongrowth and environmental effects on nutrient utilization; nutriti-
Anthropology

(College of Liberal Arts)

MAJOR DEGREES

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

William M. Bass, Head

Professors:

Bass, William M., Ph.D. .............. Pennsylvania
Faulkner, Charles H., Ph.D. .............. Indiana
Jantz, Richard L., Ph.D. .............. Kansas
Parmalee, Paul W., Ph.D. .............. Texas A&M
Smith, Fred H., Ph.D. .............. Michigan
Wheeler, Margaret C., Ph.D. .............. Yale

Associate Professors:

Harrison, Faye V., Ph.D. ............ Stanford
Harrison, Ira E., Ph.D. ............ Syracuse
Howell, Benita J., Ph.D. ............ Kentucky
Kippet, Walter E., Ph.D. ............ Missouri
Logan, Michael H., Ph.D. ............ Penn State
Schroedl, Gerard F., Ph.D. ............ Washington State
Simek, Jan F., Ph.D. ........ SUNY Binghamton

Assistant Professors:

Bass, Mary Ann, Ph.D. .............. Kansas State
Galloway, Alison, Ph.D. .............. Arizona
Wiley, P. S., Ph.D. .............. Tennessee

Research Associate Professor:

Chapman, Jefferson, Ph.D. .............. North Carolina

Research Assistant Professors:

Smith, Maria O., Ph.D. .............. Tennessee
Tartd, Suzette D., Ph.D. .............. Michigan State

The Department of Anthropology offers both the M.A. and Ph.D. degrees with concentrations in biological anthropology, archaeology, 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

For admission, an applicant must provide three letters of recommendation and a letter of intent. An undergraduate background in anthropology is required, but students lacking this may be admitted under special circumstances.

M.A. Requirements

1. A minimum of 30 hours for graduate credit. A minimum of 24 of these hours must be in anthropology, including the following:
   a. 510 and 560
   b. one of the following courses: 512, 513, 514, 515
   c. one of the following courses: 520, 531, 561, 564
   d. two of the following courses: 580, 581, 582, 583

These requirements must be met prior to taking the Graduate Evaluation Examination. 2. Successful completion of the departmentally developed Graduate Evaluation Examination (GEE). It is expected that it will be taken at the end of the third semester in residence. The GEE is given each year in January.

3. An introductory statistics course (usually Statistics 531) if such a course has not been previously taken.

4. Successful completion of the thesis and final oral examination.

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. Formulation of an advisory committee and establishment of a program of study in consultation with the committee.

2. No minimum credit hour requirement. Specific courses to be taken are determined by students and their advisory committees.

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 (200 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.

5. Written and oral comprehensive examinations in three areas of specialization to be determined by the committee.


ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.A. program in Anthropology is available to residents of the states of Louisiana, South Carolina or Virginia. The Ph.D. program is available to residents of Alabama, Arkansas, Louisiana, Mississippi, South Carolina, or West Virginia. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.

GRADUATE COURSES

410 Principles of Cultural Anthropology (3) Exploitation 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; investigations of language and language use in anthropological fieldwork. Prereq: 130 or Linguistics 200. (Same as Linguistics 411.)

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

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

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.

450 Current Trends in Anthropology (3) Analytical, integrative review of current directions of research and theory in anthropology.

460 Selected Topics in Archaeology (3) Regional or theoretical approaches, use of professional graduate students. Practical experience in laboratory study of archaeological materials. Prereq: 120 or consent of instructor. May be repeated. Maximum 6 hrs.

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 economics to rise of States. Mesolithic, Neolithic, and Metal Age lifeways in Africa, Europe, and Asia. Prereq: 120 or consent of instructor.

464 Principles of Zooarchaeology (3) Basic osteological studies of major vertebrate groups; aboriginal use of animals in subsistence and culture. Identification and interpretation of archaeologically derived molluscan and vertebrate remains; introduction to laboratory use of comparative collections. Prereq: 120 or consent of instructor.

465 Human Osteology (4) Examinative study of human skeletal remains. Prereq: 110 and consent of instructor. 3 hrs and 1 lab.

466 Horse Culture: Horses, Purpose and Function (3) (Same as Anthropology 155.)

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

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

469 Museology III: Field Projects (1-12) (Same as Art 483.)


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

472 Human Response to Environmental Stress (3) Physiological perception of stress from physical environment and physiological, anatomical and behavioral responses to stress. 500 Thesis (1-15) P/NP only. E

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

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

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

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

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

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

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

515 Medical Anthropology (3) Cultural impact on disease patterning, theories of disease causation, and models of therapy. Medical 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 and among populations. Prereq: 110, 120, 130, or consent of instructor. Recommended prerequisite: Basic nutrition course.

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

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

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

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

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.

560 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.

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

562 Problems in Old World Archaeology (3) (Same as Classics 552.)

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

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

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


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

584 Quantitative Methods in Biological Anthropology (3) Application of statistical procedures to biocultural problems; interpretation of statistical results. Linear models. Prereq: Statistics 532 or equivalent.

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

586 Bone Anatomy and Physiology (3) Examination of bone microstructure, cellular anatomy, hormonal regulation and micro and macroanatomical response to loading. Prereq: 480 or consent of instructor.

587 Laboratory in Forensic Anthropology (3) Discussion and lab experience with forensic anthropological techniques: radiographic, dental, hair analysis, hair microscopy, bone microscopy. Prereq: Human Orients, 480, 561 or consent of instructor. 2 hrs and 1 lab.

591 Foreign Study (1-15) See page 31.

592 Off-Campus Study (1-15) See page 31.

593 Independent Study (1-15) See page 31.

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

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

610 Seminar in Cultural Anthropology (3) Selected topics. As Seminar 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.

620 Seminar in Nutritional Anthropology (3) Analytical review of major theoretical viewpoints in nutritional anthropology. Prereq: 518 and consent of instructor.

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

691 Selected Topics in Paleoenthropology (3) Prereq: 563 and consent of instructor.

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

(Office of the Provost)

J. William Rudd, Dean
William J. Lauer, Associate Dean

Professors:
Andersen, G. I., M.Arch, Illinois
Conley, G. B., Arch., Harvard
Grieger, F., M. Arch, Pennsylvania
Kelso, R., M. S., Tennessee
Kersavage, J. A., D. Sc., Southern Cal
Lauer, W. J., M. S. Arch, Engr., Iowa State
Lester, A. J., M. Arch., Virginia
Lizon, P., Ph. D., Pennsylvania
Moffett, M. S., Ph. D., MIT
Robinson, M. A., M. Arch., Pennsylvania
Rudd, S. W., M. A., Northwestern
Shell, W. S., M. Arch., Columbia
Watson, J. S., M. Arch., Pennsylvania
Wodelhouse, L. M., Ph. D., St. Andrews

Associate Professors:
Herz, M. D., B. Arch., Columbia
Kinzey, S. A., M. Arch., Illinois
Martella, W. E., B. Arch., California
Naranocol, V., B. Arch., Belgrade
Rabun, J. S. M. A., Texas

Assistant Professors:
Bovill, C. H., M. Arch., Hawaii
Coddington, J. M., M. Arch., Pennsylvania
French, R. C., B. Arch., Tennessee
Kaplan, M. Arch., Harvard
Livingston, M. M. F. A., Wisconsin
Reno E., J. M., Arch., UCLA
Slucky, H., B. Arch., Kansas State von Beulow, P., B. Arch., Tennessee
Ware, S. M. Arch., Tennessee
Wells-Bowie, L., M. Arch., California
Wooley, D. L., M. Arch., Washington

The School of Architecture does not currently offer a graduate degree program; however, the courses listed below are available for graduate credit to students enrolled in other graduate programs.

Besides the undergraduate five-year Bachelor of Architecture degree program, the School of Architecture offers a three-year graduate program leading to a Bachelor of Architecture degree for students who already hold a Bachelor's degree or an advanced degree in another field.

This program begins with intensive initial studies in architecture and can be completed within three years. A minimum of 6 semesters' residency is required. The degree is the first professional degree recognized for purposes of eventual qualification for the license to practice architecture.

Applicants must provide a transcript of previous academic work and must have attained at least a 2.5 overall grade-point average. Appropriate goals and abilities must be shown by the applicant as well.

Second degree students are required to submit a portfolio which demonstrates a proficiency in freehand and orthographic drawing skills prior to taking Basic Architecture I. If an otherwise qualified student does not have these skills, he/she can come to the School of Archi-

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 B. Arch. program in Architecture is available to residents of the states of Maryland, South Carolina, or West Virginia. Additional information may be obtained from the Resident Assistant 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.

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

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

411 Architecture Since 1945 (3) Recent architectural developments and views of future.

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, discussion, and field trips. Historical research using primary material.

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

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


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

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

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

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


443 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: 342.

444 Advanced Environmental Control Systems (3) Intensive 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.

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

Art

(Office of the Provost)

Professors:
Blain, Sandra J., M. F. A. Wisconsin
Brazek, P. M., M. F. A., Yale
Clarke, R. A., M. S., Wisconsin
Cleaver, Dale G. (Emeritus), Ph. D., Chicago
Falsetti, Joseph S., M. S., OH State
Kennedy, William C., M. F. A., Wisconsin
Kurka, Don F., Ph. D., New York
Lee, B., M. F. A., Michigan
Peacock, D. M. F. A., Iowa
Stewart, F. C., M. F. A., Claremont

Associate Professors:
Wood, S. M. F. A., College of Liberal Arts

MAJOR

DEGREE

Art. M. F. A.
Assistant Professors:

Longobardi, Pam, M.F.A.............. Arizona State University. Prereq: Determined by department. May be repeated. Maximum 12 hrs.


424 Ceramics: Clay and Glazes (3) Clay chemistry, clay bodies, glaze theory, glaze calculation, intensive formulating, mixing and testing of clay bodies and glaze formulas. Prereq: 321 and 322.

425 History of Ceramics Seminar (3) Ceramics from ancient through contemporary. Ceramics sculpture, and vessel aesthetic. Slide lectures and individual presentations. May not be used toward art history requirement. Prereq: 321 and 322.


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


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

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

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


453 Advertising Illustration (3) Advertising illustration and techniques as applied to product illustration. Prereq: 354.

454 Editorial Illustration (3) Editorial illustration and techniques as applied to book, magazine, and newspaper illustration. Prereq: 453.

456 Graphic Design / Illustration Practicum (1-12) Practical experience in design or illustration field. Only by prearrangement with department. Prereq: Senior standing and consent of instructor. May be repeated. Maximum 12 hrs.

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


463 Lithography III (3-6) Individual projects through advanced color etching processes and techniques. Prereq: 363. May be repeated. Maximum 12 hrs.


469 Special Topics in Printmaking (3) Student- or instructor-initiated course offered at convenience of department.
514 Graduate Painting II (2-6) May be repeated. Maximum 10 hrs.

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

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

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

474 History of Modern Architecture in Europe and America (3) 19th-century styles. Sullivan and skyscraper. 20th-century: Viennese leaders, the Bauhaus, Gropius, Van der Rohe, Le Corbusier, and Wright. Aatto to Kahn, Tange and Metabolism, Archecham, Soleri, and Venturi.

475 History of the 19th-Century Painting in Europe and America (3) France: Neoclassicism, Romanticism, Friedrich, Constable, Turner, Corol and Barbizon landscape, Hudson River Group, Pre-Raphaelite Brotherhood, Manet, Courbet, Impressionism, Gaucks, Homer, Seurat through Cassanne.

476 History of 20th-Century Painting in Europe and America (3) Fauvism, Die Brucke, Cubism, Der Blaue Reiter, Futurism, Dada and Surrealism, geometric abstraction, social commentary painting, Abstract Expressionism in U.S. and parallellism in Europe: Pop, Op, Minimal and Concept art.

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

482 Museology II: Exhibition Planning and Installation (3) Exhibition concept development and implementation. Exhibition design and installation techniques. Publicity, production, mailing and training, shipping and storage. Prereq: 481 or consent of instructor. (Same as Anthropology 482.)

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

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

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

489 Studies in Art History (3) Concentration in individually assigned area. Prereq: 12 hrs 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 by graduate faculty. 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.

505 Graduate Fiber and Fabric I (2-6) May be repeated. Maximum 10 hrs.

506 Graduate Fiber and Fabric II (2-6) May be repeated. Maximum 10 hrs.

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

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

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

514 Graduate Painting II (2-6) May be repeated. Maximum 10 hrs.
ments are sufficiently flexible to allow programs to be tailored to the specific needs of the individual, all emphasize a balance between creative work in the arts discipline, advanced teaching techniques, and a study of the philosophical and historical foundations of the field.

For additional information, contact the head of the Department of Art and Music Education, Room 211-A Music Building: (615) 974-3331.

**Art Education**

The Master of Science program requires Art Education 510, 520, and 593; 6 hours of 500-level courses in art history; 6 hours of 500-level courses in studio art; Curriculum and Instruction 580; 6 hours of 500-level elective courses in education; and 6 hours of Thesis 500.

The thesis may be of the conventional type or an exhibition of original works of art produced under the direction of Art and Art Education faculty and accompanied by a written analytical and critical essay. This essay must include a) a philosophical statement, b) an explanation of process and media for each work presented, and c) a compositional analysis of each work. A comprehensive written examination will be required during the final semester of work.

**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 History and Philosophy of Art Education (3) United States from 1860's to present. Prereq: Consent of instructor.

520 Program Development in Art Education (3) Current trends and research in teaching of music in elementary and middle school. Prereq: Consent of instructor.

590 Special Topics in Art Education (1-6) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

593 Independent Study in Art Education (3-6) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

**Music Education**

The Master of Science requires Music Education 510 and 520: 9 hours of music education electives at the 500 level; 6 hours of Thesis 500; 6 hours of 500-level courses in music theory or history; 2 hours of applied music at either the 400 or 500 level; 2 hours of music ensemble at the 500 level; and 6 hours of music or music education electives at the 500 level.

A three credit research problem and three extra hours coursework in Music Education may be substituted for Thesis. If a larger thesis problem is desired, the thesis credit may be increased to 9 credit hours and 3 credit hours of Music Education electives may be dropped.

Diagnostic tests in theory, music history, music education, and applied music will be required. A final written and oral examination will be required.

**Astronomy**

See Physics and Astronomy

**Audiology and Speech Pathology**

(College of Liberal Arts)

<table>
<thead>
<tr>
<th>MAJORS</th>
<th>DEGREES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audiology</td>
<td>M.A.</td>
</tr>
<tr>
<td>Speech and Hearing Science</td>
<td>Ph.D.</td>
</tr>
<tr>
<td>Speech Pathology</td>
<td>M.A.</td>
</tr>
</tbody>
</table>

Patrick J. Carney, Head

**Professors:**

Adler, Sol, Ph.D. .................................................. Ohio State
Asp, Carl W., Ph.D. .................................................. Ohio State
Carney, Patrick J., Ph.D. .......................................... The Master's Program
Luper, Harold L., Ph.D. ............................................. Ohio State
Naberle, 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
Wallace, Glorjean L., Ph.D. ....................................... Northwestern

**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 200 hours as a graduate student, 375 total). An exception to this rule must be approved by the appropriate departmental committee. Enrollment in clinical practicum courses is required for all clinical practice experiences. If the undergraduate preparation does not include sufficient coursework in speech pathology, audiology, psychology, and related fields, the student may be required to make up such deficiencies.

Students may elect either the thesis or the non-thesis option. Students in both programs are required to take 541 in their first year. The Master's program with the thesis will include a minimum of 30 semester hours of approved graduate credit, including 6 hours of 500 level credit. Students in the non-thesis option program must present a total of 36 semester hours of approved graduate credit and pass a final written examination. A minimum of 24 hours must be at the 500 or 600 level, no more than 6 hours of thesis and no more than 6 hours of practicum. Students in the non-thesis option program must present a total of 36 semester hours of approved graduate credit and pass a final written examination. A minimum of 24 hours must be at the 500 or 600 level, no more than 6 of which may be practical. The decision as to choice of the thesis or non-thesis program is normally made following completion of 511 and a conference with the student's advisor.

**THE DOCTORAL PROGRAM**

The Ph.D. program in Speech and Hearing Science seeks to develop individuals for research or college teaching careers in the concentration areas of speech and language pathology, audiology, speech science, or hearing science. This degree program is
research oriented, with primary emphasis upon developing the scientific and cognitive skills which allow individuals to identify and independently study important questions concerning the human act of oral and aural communication.

Students will be expected to demonstrate their knowledge in the areas of:

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

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

The total program is a minimum of 60 semester hours, including a minimum of:

1. 24 semester hours in dissertation 600.
2. 6 semester hours in a research tool.
3. 6 semester hours in a cognate area outside the department.
4. 24 semester hours in 600-level coursework within the department of which:
   a. a minimum of 6 semester hours in the topic of major interest.
   b. a minimum of 6 semester hours in topic(s) of related interest.
   c. 2 semester hours in 611.
   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 specifics of the 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, Kentucky, South Carolina, or West Virginia. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.

GRADUATE COURSES

404 Appraisal of Speech and Language Disorders (3) Diagnostic procedures for children and adults with speech and language disorders including observation and practice with diagnostic tests. Prereq: Consent of instructor.

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

433 Clinical Practice in Speech-Language Pathology I (1-4) Prereq: 320, 331 or consent of instructor. Enrollment for fewer than 2 hrs must have prior departmental approval. (Same as Special Education 433.)

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

440 Voice Disorders (3) Etiology, diagnosis, and treatment of organic and functional voice disorders. Prereq: 304, 306, or consent of instructor. (Same as Special Education 440.)

455 Problems in Speech Pathology (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. Enrollment for less than 2 hrs must have prior departmental approval.


463 Practical Applications of Language Habilitation Techniques (3) Various methods and procedures in treating delayed/disordered preschoolers. Alternative/augmentative systems. Prereq: 461 or consent of instructor.

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

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

494 Introduction to Aural Rehabilitation (3) Rehabilitation of acoustically impaired having communication difficulties, residual hearing and other sensory modalities. Prereq: 473.

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

502 Registration for Use of Facilities (3-15) Required. Prereq: 304 or consent of instructor.

531 Seminar on Stuttering (3) Current research in diagnosis and management of articulation and voice disorders. Prereq: Undergraduate coursework in articulation and voice disorders or consent of instructor.

532 Seminar in Audiology (1-3) Prereq: Consent of instructor. May be repeated. Maximum 10 hrs.


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

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

551 Advanced Auditory Assessment (3) Theoretical and applied considerations of procedures used to identify lesions in auditory mechanism: behavioral assessment, acoustic immittance and electrophysiological techniques. Prereq: 473, 507 and 546.

552 Seminar in Speech Pathology (2-3) Current significant research in speech pathology. Topics vary. Prereq: 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.

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

557 Management and Supervision for Speech-Language-Hearing Professionals (3) Management systems, accountability, performance appraisal and clinical supervision for audiologists and speech 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 8 hrs.

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


591 Foreign Study (1-15) See page 31.

592 Off-Campus Study (1-15) See page 31.

593 Independent Study (1-15) See page 31.
Aviation Systems

(UT Space Institute)

MAJOR

Aviation Systems

DEGREE

B.S.

R. D. Kimberlin, Program Chair

Professors:

Collins, F. G., Ph.D. ....................... California

Wright, W., Ph.D. .......................... Washington

Mason, A. A., Ph.D. .......................... Tennessee

Roberts, R. M., Ph.D. ....................... AETF

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

Young, R. L., Ph.D. ......................... Northwestern

Associate Professors:

Kimberlin, R. D., M.S. ..................... Tennessee

Watts, C. F., M.S. ............................ Arizona

Assistant Professor:

Solies, U. P., Ph.D. .......................... Tennessee

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

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

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

THESIS OPTION

The thesis program involves satisfactory completion of the following requirements:

Research and Development Specialization

1. Twelve hours of 500-level courses in the major field of aviation systems.

2. Six hours in industrial engineering (engineering management).

3. Three hours in economics or finance.

4. Six hours of electives selected from the major field, mathematics or engineering.

5. Six hours of Aviation Systems 500 demonstrating the ability to conduct and report on an independent investigation.


NON-THESIS OPTION

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

Research and Development Specialization

1. Twelve hours of 500-level courses in the major field of aviation systems.

2. Six hours in industrial engineering (engineering management).

3. Twelve hours of electives in the major field, mathematics or engineering.

4. Three hours of an assigned project under Aviation Systems 510.

5. A comprehensive final written examination on all coursework submitted for the degree and defense of the project course paper.

Administration Specialization

1. Twelve hours of 500-level courses in the major field of aviation systems.

2. Three hours in industrial engineering (engineering management).

3. Three hours in economics or finance.

4. Twelve hours of electives in the major field, mathematics or engineering.

5. Three hours of an assigned project under Aviation Systems 510.

6. A comprehensive final written examination on all coursework submitted for the degree and defense of the project course paper.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S. program in Aviation Systems is available to residents of the states of Arkansas, Kentucky, Mississippi, South Carolina, or West Virginia. Additional information may be obtained from the Residency Assistant 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/N only.


506 Directed Research (1-4) Participation in ongoing or non-thesis research. Prereq: Consent of instructor. May be repeated. Maximum 15 hrs.

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

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

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

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

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

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

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


Biochemistry
(College of Liberal Arts)

MAJOR DEGREES

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

Wesley D. Wicks, Head

Professors:

Churchich, Jorge E., Ph.D. ............... Sheffield
Farkas, W., Ph.D. ......................... Duke
Feinberg, R. H. (Emeritus), Ph.D. ........ California
Hankins, Dan, Ph.D. ....................... Michigan State
Howell, Elizabeth E., Ph.D. .......... Michigan
Joshi, J. G., Ph.D. ....................... Poona
Koontz, John W., Ph.D. .................... Michigan
Koontz, John W., Ph.D. .................... Michigan
Koontz, John W., Ph.D. .................... Harvard

Associate Professor:

Koontz, John W., Ph.D. .................... Kentucky

Assistant Professors:

Feinberg, R. H. (Emeritus), Ph.D. ........ California
Howell, Elizabeth E., Ph.D. .......... Michigan
Joshi, J. G., Ph.D. ....................... Poona
Koontz, John W., Ph.D. .................... Michigan

Adjunct Faculty:

Farkas, W., Ph.D. ......................... Duke
Georgiou, S., Ph.D. ....................... Manchester
Kennel, S., Ph.D. ......................... California (San Diego)

THE MASTER'S PROGRAM

1. At least one year each of Introductory Organic Chemistry with laboratory* and approved physical chemistry.

2. A minimum of 6 semester hours of approved courses beyond the introductory level and including the subject areas of genetics and physiology.

3. Biochemistry 511-12 and 515-16.

4. At least 6 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 subjects of genetics and physiology.

2. Biochemistry 511-12 and 515-16.

3. At least 3 hours of approved graduate courses in physics, chemistry, or other physical science; for example, Chemistry 550, 551, 552, Physics 521, 522, 551. No survey courses will be accepted.

4. At least 6 hours of topics offered in 521 and 621.

5. Participation in 601 and 603 during the entire period of residence.

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

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

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.

GRADUATE COURSES

410 Cellular and Comparative Biochemistry (4) Electrophoretic behavior; chemistry and structure of proteins; enzyme behavior and biological function; catalysis and energy capture; synthetic metabolism; nucleic acids and 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, 471-special report; kinetics; enzyme-catalyzed reactions. 481-Elementary quantum chemistry; interactions of light with biological molecules; optical and magnetic spectroscopy; light scattering; case studies of selected macromolecules. Prereq: Calculus, Organic Chemistry, General Biology or consent of instructor. (Same as Chemistry 471-81) F,Sp

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. Degree completed may be used toward degree requirements. May be repeated. S/N only. E

511 Advanced Concepts in Protein Structure, Protein Function and Intermediary Metabolism (4) Protein structure and function; enzyme kinetics; intermediary metabolism; membrane structure and function. Original literature and review articles; contemporary experimental advances. 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. Prereq knowledge in 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 primarily for graduate students and instructors. Consent of instructor.

516 Experimental Techniques II (3) Laboratory rotations. Students work in laboratories of faculty members in clearly defined project. Written proposal and oral report. Primarily for graduate students. Prereq: 515. Sp

521 Special Topics (1-3) Registration only by prior arrangement with department. May be repeated. Maximum 9 hrs.

525 Graduate Research Participation (1-6) Required every semester in residence. S/NC only. Maximum 12 hrs. E

561 Environmental Toxicology (5) Basic concepts in toxicology; molecular toxicity and detoxification; reproductive toxicity; mutagenesis, teratogenesis, carcinogenesis; pathologic changes and environmental impact. Prereq: 410, Chemistry 350-60-69 or consent of instructor. (Same as Ecology 561.) F

562 Techniques in Environmental Toxicology (1) Experimental techniques for assessment of presence, toxicity, and impacts of pollutants in global ecosystem. Laboratory exercises on analytical, biochemical, and bioassay methods in toxicological studies. Prereq: 419 (or quantitative analysis) 561 and Chemistry 350-60-69. (Same as Ecology 562.) Sp

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

601 Advanced Biochemistry Seminar (1) Invited speakers. Topics in biochemistry; advanced analytical chemistry; current areas of research. Required every semester in residence. S/N only. F,Sp

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

604 Current Topics in Environmental Toxicology (1) Critical reviews of research problems and methods in environmental toxicology, behavioral toxicology, bio-chemical and ecologic 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/N only. F,Sp

605 Current Topics in Regulation of Protein Function (1) Current research in regulation of proteins by phosphorylation-dephosphorylation allosteric interac-
Biomedical Sciences

(Office of the Provost)

MAJOR DEGREES

Biomedical Sciences M.S., Ph.D.

Raymond A. Popp, Director

Professor:

Olins, Donald E., Ph.D. Rockefeller

Research Professor:

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

Urbachber, Edward C., Ph.D. Pennsylvania

Research Associate Professor:

Ch'ang, Lan-Yang, Ph.D. Vanderbilt

Research Assistant Professor:

Foote, Robert S., Ph.D. Duke

Shared Faculty:

Not all faculty listed are necessarily available in teaching and/or research roles in every academic year.

Bunick, Gerald J., Ph.D. Pennsylvania

Cook, John S., Ph.D. Princeton

Fry, R. J. M., M.D. Dublin

Fujimura, Robert K., Ph.D. Wisconsin

Gehs, C. W., Ph.D. Oklahoma

Hartman, Fred C., Ph.D. Tennessee

Jacobson, K. Bruce, Ph.D. Johns Hopkins

Kennel, Steve, Ph.D. California (San Diego)

Kennedy, Francis T., Ph.D. Johns Hopkins

Larimer, Frank W., Ph.D. Florida State

Lee, Kai-Lin, Ph.D. Tulane

Littlefield, Gayle, Ph.D. Georgia

Marchok, Ann C., Ph.D. Connecticut

Mazur, Peter, Ph.D. Harvard

Mitra, Sankar, Ph.D. Wisconsin

Murial, Richard, Ph.D. Georgia

Niyogi, Sallik K., Ph.D. Northwestern

Popp, Raymond A., Ph.D. Michigan

Preston, R. Julian, Ph.D. Reading

Reichard, James D., Ph.D. Harvard

Richmond, G. R., Ph.D. New Mexico

Rinchik, Eugene M., Ph.D. Duke

Russell, Liane B., Ph.D. Chicago

Sega, G. A., Ph.D. Louisiana State

Shugart, Lee H., Ph.D. Tennessee

Snyder, Fred L., Ph.D. North Dakota

Solomon, A., M.D. Duke

Stevens, Audrey L., Ph.D. Western Reserve

Terzaghi-Howe, Peggy D. Sc. Harvard

Vo-Dinh, Tuan, Ph.D. Swiss Fed IT

Waters, Larry C., Ph.D. Georgia

Woychik, Richard P., Ph.D. Case Western

Yang, Wen K., M.D., Ph.D. Tulane

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 the latest in 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 biology, and radiation biology. Included are such subjects as immunology, protein and enzyme chemistry, nuclear science, cytology, radiation and environmental biology, virology, developmental biology, experimental pathology, microbial and mammalian genetics, mutagenesis, and problems of aging.

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 Director, University of Tennessee-Oak Ridge Graduate School of Biomedical Sciences, Biology Division, ORNL, Box 2008, Oak Ridge, Tennessee 37831-8077.

THE DOCTORAL PROGRAM

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 Director, University of Tennessee-Oak Ridge Graduate School of Biomedical Sciences, Biology Division, ORNL, Box 2008, 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); Cell Biology (518-19); Genomics (515); Molecular Genetics (517); Cell Biology (518-19); Com-
Botany

(College of Liberal Arts)

MAJOR

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

Karen W. Hughes, Head

Professors:

Caponetti, J. D., Ph.D. ...................... Harvard
Otebsch, E. C., Ph.D. ....................... Duke
DeSelm, H. R. (Emeritus), Ph.D. ........ Ohio State
Evans, A. M., Ph.D. ......................... Michigan
Herron, W. R. (Distinguished Prof.), 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
McCorrime, J. F., Ph.D. .................... Emory
Mullin, B., Ph.D. .......................... NC State
Norris, F. H. (Emeritus), Ph.D. .......... Ohio State
Petersen, R. H. (Distinguished Prof.), Ph.D. . Columbia
Sharp, A. J. (Emeritus), (Distinguished Prof.), Ph.D. .... OH State
Smith, W. O., Ph.D. ....................... Duke
Wall, P. A. (Emeritus), Ph.D. ............. University of Arkansas
Texas

Associate Professors:

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

Lecturer:

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

The Department of Botany offers the Master of Science and Doctor of Philosophy degrees with concentrations in anatomy, bacteriology, biochemical genetics, ecology, genetics, lichenology, morphology, mycology, physiology, pharmacology, and taxonomy.

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

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

ADMISSION REQUIREMENTS

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

1. Bachelor's degree: a B.A. or B.S. from an accredited college or university with 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: 8 semester hours; physics highly recommended.

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

Evidence of a broad undergraduate background, an ability to do work of graduate quality, and an interest in the study of plant science are considered to be much more important than the particular courses taken as an undergraduate. Accordingly, students lacking specific prerequisite courses but otherwise qualified may be admitted to graduate 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-tem committee during the first meeting with the student.

THE MASTER'S PROGRAM

The program for the Master of Science is patterned to fit the needs of students who desire a less extensive course of study than the Ph.D. program. However, they 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 normal route taken by botany students for the M.S. In accordance with the emphasis of the University and the department on research, it involves writing and defending a thesis to describe the results of a completed research project of
original work. It is important that the entering student promptly identify a major professor and a suitable research project. (It may be either a terminal degree or a preliminary step to studying for a Ph.D. degree.)

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

Satisfactory completion of 34 semester hours of approved graduate courses of which 30 semester hours must be in botany including Botany 503. At least two-thirds of the hours must be at the 500 level or higher.

2. Satisfactory completion of two hours at the 600 level.

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

4. Satisfactory performance on a final written examination on all work offered for the degree. The student's committee may also require that an oral examination follow the written examination.

The Doctoral Program

The Doctor of Philosophy program is patterned after professional training that involves extensive teaching and/or ancillary services; consult major professor and department head.

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 (3) Field experience and taxonomy of special plant groups. Topics vary: Bryology, lichenology, pteridology, agrostology, mycology, physiology, aquatic vascular plants, synanthrology, woody plants, and botanical photography. May be repeated under different topics. Maximum 9 hrs.


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.

426 Paleobotany and Palynology (3) (Same as Geology 426.)

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 organ culture; media preparation and maintenance of cultures. Prereq: 110-20 or Biology 110-20 or equivalent and Chemistry 120-30 or equivalent. Recommended prerequisite: 310-20, 311, 412, 430; 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, A.

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

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

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

507 Biological Illustration (3) Principles and applications of photography (B/W and Color) photomacro- and photomicrography, drawing, graphics and video for recording and presentation for research and publication of data in pictorial and graphic form.

509 Morphology and Evolution of Basidiomycetes (4) Structure and function of fungal and sexual life cycles as applied to evolution in group. Cultures and specimens in laboratory. Prereq: 310 or equivalent.

510 Taxonomy of Grasses and Grass-like Plants (3) Collection, identification, classification of grasses, sedges and rushes, phylogeny of the grass subfamily and tribes: cereals, 350 or consent of instructor. F, A.

516 Biosystematics (3) Major experimental methods in systematics and application to specific types of systematic problems. Cytotaxonomy, numerical taxonomy, chemotaxonomy.

521-22 Advanced Plant Physiology I, II (3, 3) 521- Plant biochemistry and metabolism: respiration, photosynthesis, carbon partitioning, and biosynthesis of specialized plant products (fatty acids, flavonoids, and plant growth regulators. 522—Growth and differentiation of plants at molecular, cellular and organismic levels. Hormonal regulation of growth; macromolecular interpretation of differentiation, dormancy, germination, flowering and senescence. Prereq: Introduction to Biochemistry or an equivalent and consent of Instructor in Plant Physiology or Cell Biology.

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

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

536 Plant Communities and Plant Geography (4) Plants in communities and their classification and ordination; geographic distribution of vegetation; phytoclimatic and phytosociologic aspects. Prereq: 431. (Same as Geography 536.)

537 Natural Resource Management and Environmental Assessment in International Nations (3) (Same as Ecology 537 and Planning 535.)

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


555 Seminar in Quaternary Studies (3) (Same as Geology 555 and Zoology 555.)

565 Phytoplankton Ecology (3) Interaction between environment and phytoplankton. Nutrient uptake, primary production, competition, ecological theory applied to phytoplankton communities, and physiological adaptation to populations to environment. Prereq: 310 or consent of instructor.

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

578 Plant Cell Biology (4) Plant cellular organization, structure and function, interaction of cellular components and correlation of their structures and functions. Principles and application of analytical and experimental laboratory procedures in cell biology research. Prereq: Biology 220 or equivalent. Recommended prerequisite: Biochemistry 410-10. 3 hrs and 1 lab. F.

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

591 Cytoecogenetics (3) Chromosome structure and behavior during mitotic and meiotic divisions in relation to structural changes, genetic controls, hybridization, speciation, and polyploidy. Laboratory emphasis on normal and aberrant meiotic systems and somatic chromosome and normal mitotic systems from plants and animals. Prereq: 310 and at least 6 additional hrs in biological sciences, (Same as Forestry 581.) Sp, A.

582 Methods and Instrumentation in Laboratory Investigations (1) Principle, application, and theoretical background in various research methods, ion exchange resins, adsorption spectrometry, disc electrophoresis, particle size, X-ray, atomic and gas chromatography, automatic analyzers, microscopy, culture methods, use and detection of radioisotopes. Prereq: Chemistry 350, 360, or Zoology 121, 122. May be repeated. Maximum 5 hrs. S/N only.

583 The Field Research Program (3) Conceptualization, planning, and implementing field research. Crite- ria for choosing instruments, sampling methodologies, locations for study of populations, communities, and ecosystem. Field practice. Development and critique of formal research proposal like those required by granting agencies. Prereq: 431, or 535 or 573.

585 Methods and Instrumentation in Field Investigations (1) Appropriate methods and instrumentation. Topics vary. May be repeated with consent of instructor. Maximum 5 hrs. S/N only.

590 Developmental Plant Morphology (3) Developmental morphology of plants from vegetative and reproductive organogenesis, and of organ determination and differentiation. Prereq: 310, 320 or 412 and 321 or 521 or consent of instructor. 2 hrs and 1 lab. F, A.

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

606-07 Advanced Topics in Botanical Sciences (1-3, 1-3) Experimental and theoretical science, instrumentation, morphology and systematic of vascular plants, crypto- gamic botany, cytology and cell biology, genetics, plant physiology, paleontology and ecology. May be repeated. Maximum 12 hrs.
623 Ecosystems of the World (2) Characterization of world and regional ecosystems; special characteristics of ecosystem function. F, A

637 Applied Ecology (3) (Same as Ecology 637.)

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

Broadcasting
(College of Communications)

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

Norman R. Swan, Head

Professors:
Holt, Darrel W. (Emeritus), Ph.D. Northwestern
Howard, Herbert H., Ph.D. Ohio
Swan, Norman R., Ph.D. Missouri

Associate Professor:
Swan, Norman R., Ph.D. Missouri

Assistant Professors:
Buchman, Joseph, Ph.D. Indiana
Manning-Miller, Carmen, Ph.D. Indiana
Ziegler, Dhyana, Ph.D. Southern Illinois

Adjunct Professor:
Nelson, Lindsay, B.A. Tennessee

The Department of Broadcasting 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

410 Television News (3) Writing, reporting, performing, and producing news for television. Experience as reporter/producer for television news program. Electronic news gathering equipment and techniques, video editing. Prereq: 310. 1 hr and 4 labs. E

420 Radio-TV Sales and Promotion (3) Problems and practices of television, radio, and cable sales and promotion. Case studies in sales, sales management, pricing, rate cards, use of rating, and sales presentation. Effective station promotion techniques. Prereq: 320 F

430 Producing for Television (3) Principles of television studio and field production, both technical and creative. Writing, producing, shooting, and editing video stories and programs, 3/4" cameras, recorders, and editing system. Prereq: 330. E


490 Radio & Television Management (3) Business policies and practices of broadcast operations, departmental function, cost and income analysis, leadership styles and techniques, mid-level management. Capstone course to be taken in student's last semester. Prereq: 275, 310, 320, 330. E

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

570 Radio & Television Research (3) Various techniques used by stations and consultants in broadcast research. Applied audience research. Deciding which method to use, interpreting results, and applying research to management decision making. Prereq: Communications 512 or 612, or consent of instructor. Sp

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

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

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

598 Internship (3) Full-time (30-40 hrs per week) work experience in news, production, or sales and management with non-university professional organization. Educational experience beyond that available at university. Final term paper. No retroactive credit for previous work experience. Prereq: Senior or graduate standing, completion of at least 18 hrs of broadcasting courses, GPA 3.0 or better, and consent of department head.

Business Administration
(College of Business Administration)

MAJOR DEGREES
Business Administration M.B.A., J.D.-M.B.A., Ph.D.

The College of Business Administration offers two college-wide programs, the MBA and the Ph.D. with a major in Business Administration. A dual degree program is available with the College of Law leading to the J.D.-M.B.A.

To obtain application materials, write or call: Associate Dean for Graduate Business Programs, Suite 527, Stokely Management Center, College of Business Administration, The University of Tennessee, Knoxville, TN 37996-0550, Telephone: (615) 974-5033.

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 Virginia; the MBA is available to residents of Arkansas, Louisiana, or Virginia; and the Ph.D. and MBA concentration in logistics and transportation is available to residents of West Virginia.

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.

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. For full-time students, the MBA program is a two-year, lock-step program with students beginning in the fall of each year and graduating in the spring, two years hence. During the summer between the first and second year, students must complete an internship with a company using those skills acquired during the first year of the MBA program.

The complete MBA program with a concentration in management or new venture analysis and entrepreneurship is offered for part-time evening students. The part-time program has the same admissions requirements, curriculum, and faculty as the full-time program. Part-time students enter in the fall semester and take approximately 4 years to complete the program. Part-time students are required to successfully complete six hours of graduate credit per semester.

The program consists of 14 MBA core courses and 5 concentration/elective courses. Each course is 3 semester hours of graduate credit with the exceptions of Business Administration 501 and 503, which are one semester hour of graduate credit each.

Admission Requirements
Applications are accepted for fall semester only. The application deadlines for fall semester are March 1 for international students and April 1 for others. Applications by U.S. citizens and permanent residents received after April 1 will be considered as space allows.

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

For admission to the MBA program, consideration is given to (1) applicant's academic record with particular attention to the last two years of undergraduate work and previous graduate studies, (2) scores on the GMAT and the Test of English as a Foreign Language (TOEFL) for those whose native language is not English, (3) work experience and other activities that demonstrate potential for leadership, and (4) recommendations from professors and work supervisors. The admission decision is based on all factors which make up the total application; therefore, there is no automatic cut-off for either grade point average or GMAT scores.
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. Those electing the management science or statistics concentration must have completed two years of college-level calculus.

MBA Core

The following courses are required in each student's program. For full-time students, the sequence of core courses is:

Third semester: Economics 503, Business Administration 506.

The same courses, but in a different sequence, comprise the core for part-time students.

Concentration and Electives

A student's program may be indicated on the MBA Program Application or this declaration may be deferred until after matriculation. In any event, selection must be made no later than completion of 18 hours of MBA program coursework. In some cases selection of an area early in the program is encouraged to facilitate proper course sequencing. Requests for changes in concentration area must be submitted for approval to the Office of Graduate Business Programs.

Among the 5 courses in the concentration/elective block, at least 3 but not more than 4 must be in one of the following concentration areas. For specific courses required in concentration areas, see the appropriate field of instruction.

- Controllership
- Economics
- Finance
- Forest Industries Management
- Management
- Management Science
- Marketing
- New Venture Analysis and Entrepreneurship
- Statistics
- Logistics and Transportation

The remaining elective courses (1 to 2) must be in fields outside the concentration area, normally selected from MBA courses offered in other departments of the college. Courses outside the College of Business Administration as well as courses listed in the Graduate Catalog numbered below 500 may be included in this block only with written prior permission via formal petition to the Office of Graduate Business Programs.

Transfer Credits

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

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

The maximum number of hours that may be transferred is 6 semester hours. Transfer credit will be considered upon formal petition to the Associate Dean for 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 for Graduate Programs 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 C average (3.0) or above in MBA core courses required in his/her program, a B average or higher in courses comprising the concentration area, and a B average or higher in the overall program. The student must demonstrate competency in these areas in a comprehensive exam administered in the capstone course, Business Administration 509.

BUSINESS ADMINISTRATION CONCENTRATION

For complete listing of MBA program requirements, see above.

MBA Concentration: New Venture Analysis and Entrepreneurship

The concentration is comprised of three specific 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 to both the full- and part-time student 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 Liberal Arts. Students in this program take their first three years of coursework in Liberal Arts, 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 Liberal Arts departments. They may use one Economics course only to fulfill distribution requirements, and they are required to take a year of calculus as the only prerequisite to the MBA.

Admission requirements are higher than those normally expected of MBA applicants.

Desired qualifications include a minimum of 3.4 GPA and a GMAT score of 600 or higher.

Students interested in the program are counseled initially in the Liberal Arts Advising Center regarding arts and Liberal Arts requirements. At the end of their second year, they have a conference with the Associate Dean for 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. Students take 3 hours of graduate coursework during their senior year under the senior privilege rule, which requires them to notify The Graduate School in advance of the course for graduate credit. Upon successful completion of the fifth year, 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 conferred dual degree of the Doctor of Jurisprudence and the Master of Business Administration. The dual program saves the student approximately one semester over the time that would be required to earn both degrees independently.

The establishment of the dual program recognizes the increasingly complex body of knowledge necessary to the creative conduct of business and business-related law. The program is designed to accommodate the interests of students who (a) contemplate a career in public service and want to acquire the skills and perspective of the lawyer and the business-oriented manager, (b) contemplate a career in public service 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 of both colleges. Such approval will be granted, provided that dual program studies be started prior to entry into the last 28 semester hours of J.D. coursework and prior to entry into the second year of the MBA program. Students interested in entering the dual degree program should submit a letter of application to the Dual Program Committee.

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

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

The College of Law will award up to 9 semester hours of credit toward the J.D. for acceptable performance in approved graduate-level courses offered by the College of Business Administration. The College of Business Administration will award up to 12 semester hours of credit toward the MBA for acceptable performance in approved courses offered in the College of Law, 3 hours of which will replace 3 hours of Business Law 501, an MBA core requirement. 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’s registration form must be approved by the Associate Dean for Graduate Business Programs.

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

Approved Dual Credit
MBA courses to be counted toward the J.D. program must include Accounting 501, 503 or a more advanced graduate accounting course and 6 semester hours approved by the College of Law. Law courses to be counted toward the MBA must be selected from those approved by the Associate Dean for Graduate Business Programs.

THE DOCTORAL PROGRAM
The primary objective of the Ph.D. in Business Administration is to prepare a select number of qualified students for 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 while completing the first year 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: Accounting, Finance, Management (Operations Management and Strategic Management), Marketing, Logistics and Transportation.

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

Degree Requirements
Doctoral students must file a program of study that has been approved by their temporary doctoral advisory committee and the Associate Dean for Graduate Business Programs by the end of the first semester of coursework after entry into the program. This committee is nominated by the department chairperson in a student’s intended area of concentration, subject to the Graduate Council’s policies and procedures. Following are specific degree requirements:

1. Students must complete at least three years of full-time coursework beyond the baccalaureate degree, with two years of residence on the Knoxville campus.

2. Students must complete appropriate courses at the graduate level, or other approved concentrations of coursework, in the following areas:

   - Accounting
   - Behavioral Science
   - Business Policy
   - Computer Science
   - Economics
   - Finance
   - Legal Environment
   - Management
   - Marketing
   - Statistics

All work in the above areas is subject to approval by the temporary doctoral advisory committee and the Associate Dean for Graduate Business Programs. Specific majors may have prerequisites not listed above.

3. Basic Core: Business Law 501 (or approved substitute) is required, except that Management 567 (or equivalent) may be substituted with prior approval.

4. Research Tools: A minimum of 9 semester hours of graduate research methods must be completed. At least 6 semester hours in statistics courses beyond Statistics 531 are required. The remaining 3 semester hours may be completed in additional statistics courses (not to include Statistics 531) or in other areas such as research methodology, management science, computer science, econometrics, and psychometrics.

5. Concentrations: The concentration is the focal point of the Ph.D. program. Students are expected to master the literature and research techniques in the concentration area and to do quality research as evidenced by the preparation of an acceptable dissertation. A minimum of 12 semester hours of coursework is required, including at least 9 hours of doctoral seminars. Graduate work taken in the concentration at other institutions is considered by the temporary doctoral advisory committee in approving the specific coursework required. Available concentrations are: accounting, finance, management (operations management and strategic management), marketing, and logistics/transportation. A related area in another school or college of the University.
Written examinations may be supplemented with the Ph.D. The concentration area examination is the concentration and cognate areas are Comprehensive Examinations the results of original research demonstrating the doctoral committee should be indicated. The date of acceptance of the research proposal by be included. Under "Other Requirements," the (business functional areas, basic disciplines, each of the fields required for the degree must include a listing of all courses taken in at least one full semester prior to the date the completion of comprehensive examinations, and "B" average in coursework, successful "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 for Graduate Business Programs before submission to The Graduate School.

Dissertation

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

Chemical Engineering (College of Engineering)

MAJOR DEGREES
Chemical Engineering M.S., Ph.D.
Joseph J. Perona, Head

Professors:
Bogue, Donald C., Ph.D. Delaware Byers, Charles H. (Adjunct), Ph.D. California
Black, Edward S., Ph.D. California Crawford, Lloyd W. (UTSI), Ph.D. Cincinnati
Culberson, Oran L. (Emeritus), Ph.D. Donaldson, Terry L. (Adjunct), Ph.D. Pennsylvania
Fellers, John F., Ph.D. Akron Frazier, George C., Jr. (Condra Prof.), D.Eng. Johns Hopkins
Holmes, John M. (Emeritus), Ph.D. Tennessee Hus, Hisen-Wen, Ph.D. Wisconsin
Johnson, Homer F. (Emeritus), Ph.D. Yale
Moore, Charles F., Ph.D. Louisiana State Perona, Joseph J., Ph.D. Northwestern
Scott, Charles D. (Adjunct), Ph.D. Tennessee Thomas, Carl O., Ph.D. Tennessee
Watson, Jack S., Ph.D. Tennessee

Associate Professors:
Basaran, Osman A., Ph.D. Minnesota Bienkowski, Paul R., Ph.D. Purdue
Blackburn, James W. (Research), Ph.D. Tennessee Bruins, Duane D., Ph.D. Houston Cochran, Henry D. (Adjunct), Ph.D. MIT
Counce, Robert M., Ph.D. University of Tennessee Hansen, Marion G., Ph.D. Wisconsin
Scott, Timothy C. (Adjunct), Ph.D. Wisconsin Sheth, Atul C. (UTSI), Ph.D. Northwestern

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

THE MASTER'S PROGRAM

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

1. A total of at least 21 hours in graduate coursework in chemical engineering and related areas excluding thesis. The minimum requirements are 15 hours in chemical engineering; 3 hours in other engineering, scientific, or business areas (as approved by the departmental faculty); and 3 optional hours from either one 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. Under certain conditions, a candidate may apply for a non-thesis program. To be eligible, a candidate must show evidence of significant professional experience after the baccalaureate degree; at least five years of industrial experience or research publications would be examples of such evidence. The departmental faculty will consider each application individually. Upon acceptance, the requirements for completion of the non-thesis option are as follows:

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

2. Completion of a critical review of the literature and other sources in an area related to chemical engineering (CHE 690).

3. A written comprehensive examination covering the major field and an oral examination covering the review paper and related areas.

THE DOCTORAL PROGRAM

Students applying for entrance into the doctoral program must submit evidence of ability to perform and report independent research to the satisfaction of the department. The Master's thesis may be offered as such evidence. Department requirements consist of the satisfactory completion of:

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

2. Supporting courses in related scientific and engineering fields amounting to approximately 24 semester hours, subject to approval by the student's faculty committee. These
related fields will normally include chemistry, mathematical physics, and engineering.

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

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

**GRADUATE COURSES**

401 Chemical Engineering Data Analysis (3) Experimental data; identification of system extremes; statistical properties of samples; empirical modeling of processes; statistical process control; optimization techniques.

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


485 Hydrocarbon Processing (3) Chemical and physical properties of selected petroleums and those processes utilized in conversion of raw material into various fuels and selected chemical feedstocks. Prereq: 340.

486 Coal Processing to Liquid Fuels (3) Characterization and conversion of coal and coals with respect to current gasification and liquefaction technologies; modeling of conversion processes and estimation of product yields and associated water, oxygen, and energy requirements; catalytic hydrogenation and reactor design considerations. Prereq: Chemical Engineering 485.

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

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

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

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

506 Approximate Methods in Chemical Engineering (3) Chemical engineering problems requiring approximate solution; introduction to some approximate methods. Prereq: 505.

507 Application of Numerical Linear Algebra in Systems and Control Engineering (3) Fundamental concepts of linear algebra to problems in systems and control areas. Geometric and physical interpretations of relevant concepts: least square problems, LU, QR, and SVD decompositions of matrix, eigenvalue problems and similarity reductions in solving difference and differential equations. Numerical computational aspects of various algorithms. Application of linear algebra concepts in optimization, matrix factorizations, introduction to linear programming, Computer 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 solutions; composition relationship between phases, solution behavior and application to macromolecules; introduction to microscopic approach to thermodynamics.

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

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

551 Chemical Reactor Analysis (3) Rate models for heterogeneous reactions, properties of porous catalytic reactors, reactor design, reactor description, unit operations. Prereq: Consent of instructor.

552 Eulerian and Lagrangian reactor design methods with emphasis on separations as unified subject. Prereq: 551.

556 Principles of Chemical Separations (3) Fundamental aspects of chemical and biochemical separations methods with emphasis on separations as unified field. Use of models in operation, optimization and control. Prereq: Consent of instructor.

561 Advanced Topics of Process Dynamics and Control (3) Prereq: 556.

567 Modeling and Design of Bioreactor Systems (3) Cross-disciplinary course combining basic concepts in microbiology, biochemistry, reaction kinetics, and biochemical and environmental engineering. Commercial processes, biochemistry, reactor design and operation of both batch and continuous commercial bioreactors. Important design considerations: analytical methods and bio-sensors, oxygen and heat transfer, growth parameters, genetic engineering and cloning, advanced bioreactor concepts with emphasis on continuous operation. Columnar systems with immobilized biocatalyst. Fundamental understanding of bioreactor kinetics and system dynamics, process control and optimization. Prereq: 565.

570 Technical Review and Assessment (3) Preparation of critical review of literature in area related to chemical engineering. Limited to candidates in non-thesis option. Prereq: Consent of instructor.

580 Process System Reliability and Safety (3) (Same as Nuclear Engineering 580.)

586 Measurement Science I (3) (Same as Nuclear Engineering 586. Civil Engineering 588, Electrical and Computer Engineering 588. Engineering Science M.S. and 588, Mechanical Engineering 588, and Aerospace Engineering 588.)

589 Measurement Science II (3) (Same as Nuclear Engineering 589. Civil Engineering 589, Electrical and Computer Engineering 589. Engineering Science and Mechanics 589, Mechanical Engineering 589, and Aerospace Engineering 589.)

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

591 Advanced Topics of Chemical Engineering (3) May be repeated. Maximum 6 hrs.

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

625 Venture Analysis (3) One or more chemical engineering processes or products selected as basis for proposed new business venture. Case study with attention to markets, manufacturing needs, cost estimation, and management and financial planning. To support decisions by managers or potential investors. Prereq: 525 or equivalent.

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


656 Advanced Topics of 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 mechanisms, 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 of Chemical Engineering (3) May be repeated. Maximum 6 hrs.

### Chemistry

**College of Liberal Arts**

**MAJOR**

**DEGREES**

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

Gleb Mamantov, Head

Professors:

Baker, D. C. (Distinguished Scientist), Ph.D. ..................... Ohio State

Blor, J. C., Ph.D. .......................... Manchester

Bowman, N. S. (Emeritus), Ph.D. ............... Princeton

Bull, William E., Ph.D. ......... Illinois

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

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

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

Eastham, J. F., Ph.D. ......... California

Fletcher, W. H. (Emeritus), Ph.D. ........ Minnesota

Grimm, F. A., Ph.D. .............. Cornell

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

Kabalka, G. W., Ph.D. ............... Purdue

Kleinfeiler, D. C., Ph.D. ............... Princeton

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

Magel, L. J., Ph.D. ............... Tennessee

Magel, R. M., Ph.D. ............... Yale

Mamantov, Gleb (Distinguished Prof.), Ph.D.  .......... Louisiana State

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

Peterson, J. R., Ph.D. ............... California
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 at least 6 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. (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 including the presentation of at least one of the following sequences: 510-11-12, 530-31-32, 550-51-52-53-54, 570-71-72-73, and 590-94-95. At least 14 hours of this graduate coursework must be at the 500 level or above. Three of the additional physics hours can be used to satisfy the 18 hours requirement in item 6.

GRADUATE COURSES

430 Advanced Inorganic Chemistry (3) Atomic and molecular structure, bonding theories, descriptive chemistry of elements, kinetics and mechanism of inorganic reactions, applications of modern techniques for characterization, coordination and organometallic chemistry. Prereq. 230. F or S. 431 Radioactivity and Its Application (2) Radioactive materials in technical 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 473S or both for 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-Kinetics of chemical reaction; introduction to quantum mechanics and applications to electronic structure of atoms and molecules; molecular spectroscopy. Prereq. General chemistry, fundamentals or elements of physics, and calculus. E

479-89 Physical Chemistry Laboratory (2.2) Experiments on topics discussed in 471-81 or 473-83. Prereq or coreq: Corresponding courses 471 or 473 for 479 and 483 or 483 for 489. 1 lab. E

484 Advanced Physical Chemistry (3) Chemical dynamics, statistical thermodynamics, quantum mechanics of atomic systems, crystal structure and solid state. Prereq. 481 or 483. F

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

502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when the student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. Maximum 6 hrs. S/NC only.

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

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

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

512 Electroanalytical Chemistry (3) Fundamentals of electrode processes; principles and practice of electroanalytical techniques in quantitative chemical analysis and applied to inorganic 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

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

532 Experimental Methods of Inorganic Chemistry (3) Electronic, infrared, Raman, microwave, NMR, ESR, nuclear quadrupole, Mössbauer, mass, and photolysis 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 melts, 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


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

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

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

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

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

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

592 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when the student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. Maximum 6 hrs. S/NC only.

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

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

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

592 Electroanalytical Chemistry (3) Fundamentals of electrode processes; principles and practice of electroanalytical techniques in quantitative chemical analysis and applied to inorganic chemical systems. Prereq. 1 yr of physical chemistry.

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

5930 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

5931 Characteristics of Inorganic Compounds (3) Descriptive chemistry of elements, structure, reactions, kinetics, mechanisms, equilibria, and spectra of coordination, organometallic, bioinorganic compounds. Prereq. 530. Sp

5932 Experimental Methods of Inorganic Chemistry (3) Electronic, infrared, Raman, microwave, NMR, ESR, nuclear quadrupole, Mössbauer, mass, and photolysis spectroscopies for characterization of inorganic compounds. Prereq. 530. F

5940 Nuclear and Radiochemistry (3) Nuclear properties, radioactivity, radioactive decay processes, nuclear structure and models, nuclear reactions, radiations and melts, radiation detection. Prereq. 1 yr of physical chemistry.

5950 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


5952 Organic Reaction Mechanisms (3) Techniques and principles in study of organic reaction mechanisms; applications and interpretations in polar, radical, and pericyclic reactions; reactive intermediates. Prereq. 550. F

5953 Spectroscopic Characterization of Organic Compounds (2) Structural elucidation using spectroscopic methods: magnetic resonance, infrared, ultraviolet, and mass spectrometry. Prereq. 360 or equivalent. F

5954 Organic Spectroscopy Laboratory (1) Use of IR, UV, MS, and multinuclear NMR spectrometers. Development of problem-solving ability in area of spectroscopic characterization of organic molecules. Prereq. 360 or equivalent. Coreq. 553. Sp

5970 Quantum Chemistry and Spectroscopy (3) Basic principles of quantum mechanics and their applications to molecular orbital theory, molecular structure, and spectroscopy; introduction to group theory. Prereq. 1 yr of physical chemistry. F
571 Advanced Quantum Chemistry and Spectroscopy (3) Prereq: 570 or consent of instructor. Sp.

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

573 Chemical Kinetics and Transport (3) Time-dependent 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: 530-31-32 or consent of instructor. May be repeated. Maximum 12 hrs.

650 Selected Topics in Organic Chemistry (3) Topics of current significance. Prereq: Two of 55051-52 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.

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

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

ADMISSION REQUIREMENTS

A completed file for review includes a College of Human Ecology application, Graduate Record Examination (GRE) scores, transcripts, letters of recommendation, personal statement, and vita. Applicants will be considered for admission to the master of science degree only. All students are required to take the following: 3 hours of 500-level research methods, 3 hours of 500-level statistics, 6 hours of CFS courses in the area of specialization, 6 hours of thesis credit and an oral comprehensive examination.

The doctoral program in Human Ecology prepares scholars in the concentration areas of child development and family studies. The strength of the doctoral program is based on three major components: the integration of child development and family studies within the context of human ecology and related areas, concentration in one of the two primary concentrations: 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 for addressing those questions.

Requirements include:

1. Minimum 13 credits in child and family studies required foundation courses: 510, 511, 550, 570, 571;
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;

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.

Specializations in the child development concentration consist of early childhood education, early childhood special education, early childhood education, and child development, or family studies. Specializations in the family studies concentration consist of family life intervention and family science. Thesis and non-thesis options are available in both concentrations.

All students in the child development concentration must enroll in CFS 510, 511, 533, and 571. At least 6 hours in a cognate area outside the department must be completed. Thesis

Students are required to take the following: 3 hours of 500-level research methods, 3 hours of 500-level statistics, 6 hours of CFS courses in the area of specialization, 6 hours of thesis credit and an oral comprehensive examination. Non-thesis students are required to take the following: 3 hours of 500-level research methods, statistical methods, or interpretation of methods and statistics; CFS 564, 565; 9 hours of CFS courses in the area of specialization; and a written comprehensive examination.

Students in the family studies concentration must enroll in CFS 550, 571, and 540 or 560. At least 5 hours in a cognate area outside the department are required. Thesis students are required to take the following: 3 hours of 500-level research methods, 3 hours of 500-level statistics, 6 hours of CFS courses in the area of specialization, 6 hours of thesis credit and an oral comprehensive examination. Non-thesis students are required to take the following: 3 hours of 500-level research methods, statistical methods, or interpretation of methods and statistics; CFS 564, 565; 9 hours of CFS courses in the area of specialization; and a written comprehensive examination.

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

THE PH.D. CONCENTRATION

The doctoral program in Human Ecology prepares scholars in the concentration areas of child development and family studies. The strength of the doctoral program is based on three major components: the integration of child development and family studies within the context of human ecology and related areas, concentration in one of the two primary concentrations: 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 for addressing those questions.

Requirements include:

1. Minimum 13 credits in child and family studies required foundation courses: 510, 511, 550, 570, 571;
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;

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 Survey of Theory and Research in Child Development (3) Theoretical models and research literature in child development (conception through adolescence); application to research, interaction 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, emerging, and emerging issues in early childhood education. Prereq: 510 or equivalent or consent of instructor. Sp

520 Development and Evaluation of Curriculum in Early Childhood Education (3) Current, emerging, and emerging issues in early childhood education. Prereq: 510 or equivalent or consent of instructor. Sp

521 Organizational Management in Early Childhood Education (3) Designing, implementing, and evaluating physical and human resources in educational environments. Development of skills in educational organization, interpersonal relations, and leadership. Prereq: 512 or equivalent or consent of instructor. F

522 Naturalistic Interventions for Parents and Teachers of Young Children (3) Common problems faced by parents and teachers; methods available to modify problem behavior. Prereq: 510 or equivalent or consent of instructor. F

530 Families of Handicapped Children (3) Developmental nature of families' experiences in caring for handicapped and nonhandicapped children. Prereq: 510 or equivalent or consent of instructor. F

533 Peer Relations (3) Significance of peers and its influence on socialization. Development of social skills and consequences of peer acceptance or rejection. Prereq: 510 or equivalent or consent of instructor. F

540 Parent-Child Relations (3) Influence of parents on children, influence of children on parents, reciprocal interaction between parents and children, applications of systems models, child abuse, and impact of divorce on children. Prereq: 550 or equivalent or consent of instructor. F

556 Survey of Theory & Research in Family Studies (3) Research issues and literature in family studies; use of family conceptual frameworks, development of theoretical models and application to research and family life programs. F

560 Marital Dyad (3) Communication, power, sexuality, marital stability, and marital satisfaction. Prereq: 550 or equivalent or consent of instructor. F

561 Family Resource Management and Decisionmaking (3) Management concepts, development, and application to family situations. Prereq: 550 or equivalent or consent of instructor. F

562 Families in Crisis (3) Family processes during times of crisis. Vulnerabilities and coping mechanisms of families. Prereq: 550 or equivalent. Sp

563 Family Life Education Programs (3) Planning, implementing, and evaluating programs in marital, parent-child, and family relationships, and parent-child education. Prereq: Consent of instructor. (Same as Home Economics Education 563.) F,A

564 Practicum in Human Development or Family Studies II (3) School and community programs concerned with education for human development and family living. Course requirements completed. Prereq: Consent of instructor. S/NC only. E

565 Practicum in Human Development or Family Studies III (3) School and community programs concerned with education for human development and family living. Committee approved and supervised written project. Prereq: 564 and consent of instructor. E

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


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

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

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

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

591 Assessment of Family Behavior (3) Analysis of methods and measures used in family science research. Prereq: 551 or equivalent or consent of instructor. F,A

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

610 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. E

620 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.

630 Advanced Study in Infant and Early Childhood Development (3) Normative and nonnormative development during infancy and early childhood years: physical, emotional, social, and psychological aspects. Prereq: 510 or equivalent or consent of instructor. F,A

631 Adolescent Development in Families (3) Normative and nonnormative adolescent development: physical, cognitive, moral, social, familial, sexual, and personal aspects. Prereq: 510 or equivalent or consent of instructor. F,A

632 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. Sp,A

Civil Engineering (College of Engineering) MAJORS DEGREES

Civil Engineering ........................................ M.S., Ph.D. Environmental Engineering ........................................ M.S.

Gregory D. Reed, Head

Professors:

Burdette, Edwin G. (Fred N. Peebles Prof.). PE, Ph.D. ......................... Illinois

Chatterjee, Arun, PE, Ph.D. ......................... NC State

Davis, Wayne T., Ph.D. ......................... Tennessee

Glush, Misgan (Goodrich Chair of Excellence), PE, Ph.D. ......................... Illinois

Goodpasture, David W., PE, Ph.D. ......................... Illinois

Greco, William L., PE, Ph.D. ......................... Michigan State

Heathington, Kenneth W., PE, Ph.D. ......................... Northwestern

Humphreys, J. B., PE, Ph.D. ......................... Texas A&M

Johnson, H. L., PE, M.S. ......................... Tennessee

Miller, William A. (Granger Prof.), PE, Ph.D. ......................... Georgia Tech

Reed, Gregory D., PE, Ph.D. ......................... Arkansas

Tschantz, Bruce A. (Condra Prof.), PE, Ph.D. ......................... New Mexico State

Weeter, D. W., PE, Ph.D. ......................... Purdue

Wegmann, F. J., Ph.D. ......................... Northwestern

Associate Professors:

Alavian, V., Ph.D. ......................... Wisconsin

Bennett, R. M., PE, Ph.D. ......................... Illinois

Drumm, E. C., PE, Ph.D. ......................... Arizona

Frederick, B. J., PE, B.C.E. ......................... Clarkson

Hansen, J. H., Ph.D. ......................... Missouri

Knessel, G. J., J.D. ......................... Tennessee

Kro, A. B., M.S. ......................... Tennessee

Robinson, R. Bruce (Fisher Prof.), PE, Ph.D. ......................... Iowa State

Smoot, James L., PE, Ph.D. ......................... VPI

Tiry, R. F. (Emeritus), PE, B.S. ......................... Marquette

Kane, W. F., Ph.D. ......................... VPI

Lecturers:

Corum, J. M., Ph.D. ......................... Illinois

Lundy, M. E., J.D. ......................... Tennessee

Wright, J. M., M.S. ......................... Tennessee

The Department of Civil Engineering offers degrees leading to the Master of Science and Doctor of Philosophy in Civil Engineering and Environmental Engineering. The Department offers undergraduate, graduate and Ph.D. programs in various fields of Civil Engineering, including structural engineering, transportation engineering, geotechnical engineering, environmental engineering, and construction engineering.

THE MASTER'S PROGRAM

The Master of Science degree is awarded to students who meet the requirements of the Department of Civil Engineering. The requirements for the Master of Science degree are as follows:

- Completion of a minimum of 33 graduate credits
- A minimum GPA of 3.0
- Completion of a thesis or project

The thesis option requires the student to complete a thesis under the direction of a faculty member. The project option requires the student to complete a project under the direction of a faculty member.

Thesis Option: A minimum of 30 semester hours, including 6 hours of thesis, is required.

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

Environmental Engineering  
For a Master of Science with a major in Environmental Engineering, normally a Bachelor's degree in a field of engineering is required. For a student who does not have an engineering background, the following minimum prerequisite courses will be required: Basic Engineering or Computer Science 101; Basic Engineering 121, 131; Engineering Science and Mechanics 231, 321; Civil Engineering 390, 395, 398; Mathematics 141, 142, 231, 241; Chemistry 120, 130. In general, these must be completed before courses for graduate credit can be taken.  

The Department of 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 24 sem. hrs. of approved coursework. Students who have completed a course at the graduate level may be recommended for approval by the student's committee to substitute a minor for a graduate course. Normally, the 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 are as follows:  
1. A minimum of 72 semester hours beyond the Bachelor's degree, exclusive of credit for the M.S. thesis. Of this number, a minimum of 24 semester hours in 600 Doctoral Research and Dissertation will be required.  
2. A minimum of 24 semester hours of graduate courses in civil engineering, exclusive of thesis or dissertation credit, at least 6 hours of which must be 600-level courses.  
3. Supporting courses in related scientific and engineering fields, amounting to approximately 24 semester hours, subject to approval by the student's faculty committee. These related fields will normally include such disciplines as mechanics, chemistry, mathematics, microbiology, physics, and other engineering fields. A minimum of 9 semester hours of mathematics will be required beyond the civil engineering undergraduate requirements.  
4. One foreign language if the student's faculty committee feels that a 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.  

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 is available to residents of the state of Alabama. Additional information may be obtained from the Residency 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; problems of professional registration and ethics. Prereq: Senior standing.  
410 Land Surveying (3) Procedures of locating proper- ties; evaluating evidence; procedures to describe prop- erty, to create plats, and to prepare plats, laws of land surveying. Prereq: 210.  
421 Portland Cement and Asphaltic Concrete (3) Aggregate properties and tests; tests of Portland cement concrete, mix design methods for concrete and asphalt, concrete admixtures, tests of asphalt and asphalt mixes, and nondestructive testing. Prereq: 321. 2 hrs and 1 lab.  
451 Highway Engineering (3) Design, construction, operation, and maintenance of highway facilities; appli- cation 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. Runway con- figuration, airport facilities and terminal layout and design. Railroad capacity, geometrics and system layout and design. Prereq: 210, 251, 352.  
461 Analysis of Framed Structures (3) Maximum stress due to member loads; use of influence lines; lateral forces due to earth/wind/loads; use of analysis of portal, building frames, and space frames; matrix methods; use of computer in structural analysis. Prereq: Analysis of Framed Structures I.  
472 Steel Design (3) Design of plate girders and com- posite beams; consideration of members subjected to combined stresses; design of typical framed building, connections. Prereq: 471.  
474 Reinforced Concrete Design (3) Reinforced con- crete continuous beams and floor slabs, columns with combined axial loads and bending, footings and retaining walls. Prereq: 471.  
485 Principles of Geohydrology (3) (Same as Geo- logical Sciences 485.)  
490 Water Resources Project Design (3) Coherent development of multipurpose reservoir and dam project, data acquisition; spillway and powerhouse designs; earth and gravity dam stability analyses; drains and filters; maintenance and operation principles; and dam safety concepts, dam break analyses. Prereq: 390, 395.  
494 Urban Drainage Engineering (3) Design and management of stormwater conveyance and control structures. Application of hydraulic and hydraulic prin- ciples to design of drainage systems for urban, strip mining, and highway development; design of inlet struc- tures, ditches, culverts, and detention/retention basins; application of commonly-used computer runoff models; evaluation of land-use on streamflow quantity and qual- ity. Prereq: 390, 395.  
495 Water Resources Development and Manage- ment (3) Project economics related to water resources project development and planning and management. Institutional frame- work: water law; evaluation procedures for selecting among development alternatives; multi-objective planning, principles of engi- neering economics, benefit-cost analysis, and cost allo- cation methods; environmental impact assessment pro- cedures; decisions using risk-based methods; case studies. Prereq: Senior standing.  
500 Thesis (1-15) FNP 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  
506 Seminar (1) Reports on current research in civil engineering at UTK. Prereq: Graduate standing.  
510 Urban Systems: Engineering and Management (3) Various urban systems usually under responsibility of city manager and/or city engineer: streets, lighting, wa- ter, sewerage, refuse collection. Personnel manage- ment, finance, planning and public relations. Prereq: Graduate standing.  
531 Soil Stabilization (3) Mechanical stabilization of soil by: compaction, vibrate compaction, and blending of soils with admixtures, waterproofing and modifying of soils and additives. 2 hrs and 1 lab.  
535 Advanced Foundations and Retaining Struc- tures (3) Planning subsurface investigations; bearing capacity and settlement of shallow foundations on lay- ered deposits; geotechnical aspects of pile design; sheetpiles, foundation design with pressure-meter, lateral earth pressures and design of retaining structures and sheetpiles. Prereq: 355.  
539 Geomechanics Seminar (1) Seminar topics in materials, geotechnical engineering and geomechanics. Graduate student research contributions and practical applications presented by practicing engineers from community. Prereq: Graduate standing and consent of advisor. May not apply toward degree. May be repeated. S/NC only.  
541 Construction Management II (3) Management organization of heavy and building construction projects. Prereq: 340.  
543 Construction Estimating (3) Project costs, esti- mation and takeoff techniques, market cost conditions, and feasibility of design to cost. Prereq: 340 or consent of instructor.  
551 Traffic Engineering-Characteristics (3) Drivervehicle-roadway system; traffic flow modeling; elements of transportation/highway safety. Prereq: Graduate standing.

552 Traffic Engineering-Operations (3) Signs, signals and marketing; short-term operations; controllers; signal timing and phased operations; traffic system operation; identification and correction of high-accident locations and system deficiencies. Prereq: 551 or 452.

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

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

555 Public Transit Planning (3) Characteristics of transit modes—conventional and paratransit; operational design of transit services; route planning and scheduling; cost analysis; mode choice models; performance evaluation; transit surveys; organization and financing. Prereq: Graduate standing. May be repeated. Prereq: Consent of instructor.

564 Urban Transportation Planning (3) Data collection and analysis as basis for accident prevention on control programs; roadside hardware design and clash testing. Prereq: 552 or graduate standing.

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

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

561 Matrix Formulation of Structural Problems (3) Review of matrix algebra, vectors, solution techniques; direct stiffness analysis of plates, trusses, general members, and structures composed of general members. Prereq. 361.

562 Analysis and Design of Plate Structures (3) Plate bending theory; interaction of plate bending and shear; design of bridge and building floors and structural plate components. Prereq. 361.

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

564 Finite Element Structural Analysis (3) Application of finite element method to structural analysis; problems of stress, strain, analysis, and stress and strain asympotic, and three-dimensional elements; use of typical computer programs. Prereq: 561.

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

566 Structural Reliability (3) Application of probability theory and statistics to evaluating reliability of structures; development of safety factors and probability based design criteria. Prereq: Graduate standing.

571 Behavior of Steel Structures (3) Behavior of structural steel members due to static and fatigue loads; shear and torsion; relation between research results and specifications for design. Prereq: 471.

572 Connections for Structural Steel Frames (3) Design, analysis and behavior of connections for structural steel frames. Simple, rigid and semi-rigid connection; column bases and column splices. Prereq: 472.

573 Prestressed Concrete (3) Properties of pre-stressing materials; methods of pretensioning and posttensioning; design and behavior of simple and continuous beams and slabs. Prereq: 471.

574 Behavior of Reinforced Concrete Members (3) Moment-curvature and load-deflection relationships for reinforced concrete beams, beams subjected to bending and axial load; shear and torsion; relation between research results and specifications for design. Prereq: 471.

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

586 Measurement Science I (3) (Same as Nuclear Engineering 588, Chemical Engineering 588, Engineering Science and Mechanics 558, Electrical and Computer Engineering 588, Mechanical Engineering 588, and Aerospace Engineering 588.)

589 Measurement Science II (3) (Same as Nuclear Engineering 589, Chemical Engineering 589, Engineering Science and Mechanics 558, Electrical and Computer Engineering 588, Mechanical Engineering 589, and Aerospace Engineering 589.)

590 Special Problems in Civil Engineering (1-6) Enrollement limited to civil engineering students in non-thesis programs. May be taken for S/NC only. Prereq: Consent of instructor.

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

600 Doctoral Research and Dissertation (3-15) P/NP only. May be repeated. Prereq: Consent of instructor.

620 Open Channel Hydraulics (3) Open channel flow principles, properties, and classifications; uniform and gradually varied flow theory and applications; open channel design, radar and thermal imagery with application to natural and man-made water bodies. Prereq: Consent of instructor.

639 Soil Dynamics (3) Behavior of soils and soil-structure systems under time dependent loading; wave propagation in elastic media; principles of seismic refractioportion methods; effects of earthquakes and vibrating machines on soils and foundations; dynamic and cyclic soil testing and determination of soil parameters. Prereq: 335 and 565 or Engineering Science and Mechanics 431.

651 Analysis Techniques for Transportation Systems (3) Theory of transportation systems, traffic flow and network analysis; state of the art and new modeling techniques. Prereq: 554 or 555.

652 Analysis Techniques for Transportation Systems (3) Advanced topics of application of mathematical, statistical and computer science techniques in modeling and analysis of transportation systems. Prereq: 551.

666 Advanced Structural Reliability (3) Monte Carlo methods; structural system reliability, random processes; dynamic loads on structures. Prereq: 566.

671 Behavior of Steel Bridges and Buildings (3) Behavior, analysis and design of plate girders, columns, and composite members subjected to static and dynamic loading. Prereq: 571.

674 Behavior of Reinforced Concrete Beams and Slabs (3) Strength and behavior of statically indeterminate reinforced concrete beams and frames; flexural responses and bending moment curvature relationships. Prereq: 571.

686 Advanced Traffic Assignment (3) Microcomputer applications, featuring HEC-2 model for traffic engineering. Prereq: Graduate standing.

702 Registration for Use of Facilities (3-15) Required 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.

708 Seminar (1) Reports on current research in environmental engineering at UTK. Prereq: Graduate standing. Prereq: Consent of instructor.

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

720 Open Channel Hydraulics (3) Open channel flow principles, properties, and classifications; uniform and gradually varied flow theory and applications; open channel design, radar and thermal imagery with application to natural and man-made water bodies. Prereq: Consent of instructor.

722 Floodplain and Urban Flood Management (3) Review of national, regional, and local flood problems; state of the art flood damage reduction alternatives: structural and non-structural; institutional responses; policies, programs, organizations, regulations, and legal aspects; floodplain hydrology and hydraulics, HEC-1, HEC-2, floodway encroachment, flood hazard zone and damage potential determinations; cast studies. Prereq: Civil Engineering 390 or consent of instructor for non-majors.

724 Sediment Transport (3) Sediment properties and measurements; principles of dynamics of suspended and bed sediment transport in erodible channels; erosion control, transportation, and deposition of sediments, and sedimentation and bed sediment transport in alluvial systems. Prereq: 565 or graduate standing.


735 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: Hydrologies or 485 or consent of instructor.

740 Remote Sensing for Transportation and Facilities Siting (3) Principles of remote sensing; sources of and data collection 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.

741 Remote Sensing Data Acquisition and Analysis (3) Active and passive sensors, automated analog and digital data collection and interpretation systems; image enhancement and classification techniques for aerial photos and thermal imagery; techniques for multi-spectral data analysis, atmospheric pollution and stress assessment. Prereq: Consent of instructor.

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

752 Biological Treatment Theory (3) Theory and design applications of biological processes to treatment of wastewater and solid wastes. Prereq: Civil Engineering 380. 2 hrs and 1 lab.
553 Environmental Engineering Chemistry (3) Theoretical, applied and analytical chemistry related to generation, measurement and treatment of environmental contaminants. Prereq: Chemistry 130: 2 hrs and 1 lab.

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

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

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

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

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

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

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

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

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

596 Special Readings (1-4) Readings related to current developments in field. May be repeated.

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

630 Advanced Stormwater Modeling (3) Advanced topics in stormwater modeling; stormwater quality modeling; advanced applications of available stormwater computer models. Prereq: 530.

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


653 Pollutant Fate Modeling and Risk Assessment (3) Application of scientific principles concerning movement and fate of chemicals at interfaces of air, water, and earth and solids 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.

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 (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.

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

Classics

(Class of Liberal Arts)

Harry G. Rutledge, 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. Vanderbuilt
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 departments 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. Sp.

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

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 6 hrs.

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

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

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

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

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.

Classics

(Class of Liberal Arts)

Harry G. Rutledge, Head

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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.

Communications

(Class of Communications)

MAJOR

DEGREES

Communications M.S., Ph.D.


Associate Professors: Bowles, Dorothy, Ph.D. Wisconsin Houvland, Roxanne, Ph.D. Illinois Miller, M. Mark, Ph.D. Michigan State Moore, Barbara A., Ph.D. Ohio Stankey, Michael J., Ph.D. Illinois Taylor, Ronald E., Ph.D. Illinois

Assistant Professors: Buchman, Joseph, Ph.D. Indiana Caudill, C. Edward, Ph.D. North Carolina Hoy, Maria, Ph.D. Oklahoma State Manning-Miller, Carmen, Ph.D. Indiana Ziegler, Dhyana, Ph.D. Southern Illinois

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: Assistant Dean for Graduate Studies, College of Communications, 98 Communications Building, The University of Tennessee, Knoxville, TN 379960313.

ADMISSION REQUIREMENTS

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

A baccalaureate degree in communications or a related field is recommended. Admission is possible with other baccalaureate degrees.

However, all applicants without the appropriate background are required to take up to 18 semester hours of prerequisite and corequisite courses as determined by the department in which the student is enrolled. Students may take a proficiency test on any prerequisite course, subject to review by the Master's or Doctoral Committee of the College of Communications.

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

ACADEMIC COMMON MARKET

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

ACADEMIC STANDARDS

A student in the College of Communications whose graduate grade-point average, not including incomplete grades, is below 3.0 at any time after the end of the first 12 semester hours of graduate credit will be placed on probation. A student on probation will be dropped from the program unless his or her cumulative graduate grade-point average is 3.0 or higher at the end of the probationary period. The probationary period is defined as the next 12 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 Assistant Dean for Graduate Studies of the College of Communications on the recommendation of the student's faculty committee.

THE MASTER'S PROGRAM

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

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, majors in advertising, broadcasting, journalism (publications), and public relations. A minimum of 31 hours of approved graduate work is required:

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

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

3. Three-hour elective from a list provided by the department in area of concentration.

4. Six hours of thesis work (Communications 500), including a thesis seminar.

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

A student's internship experience requires approval by his/her advisor. Credit will be given through Advertising 598, Broadcasting 598, or Journalism 598 only in acquiring basic skills in one of the areas of concentration.

The program follows a broad-based multi-media emphasis on communications management and public relations. A minimum of 31 hours of credit for the equivalent of 15 weeks of full-time professional experience. This credit is to be included in the student's 31-hour M.S. program. Previous professional experience will be evaluated by the student's committee.

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

After completion of the formal program of coursework and thesis research, the student must pass an oral examination conducted by the student's committee.

Communications majors in the M.S. program must demonstrate ability to use a typesetter proficiently within their first semester in residence.

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 not required for entry into or completion of the doctoral program. Program planning, however, will permit the Master's degree to be earned if desired.

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 Bachelor's degree. Those holding Master's degrees should anticipate two or more years of full-time study for completion of the Ph.D.

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

1. A 3.0 (4.0 system) grade-point average in undergraduate studies, or 3.5 for graduate work if applicant holds 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.

1. Twenty-eight hours of core courses--Communications 610, 612, 620, 640, 641; 6 hours of statistics*; and three of the following courses: Communications 622, 632, 642, 652, and 692.

2. Fifteen hours in a primary concentration (advertising, broadcasting, journalism, public relations, or speech communications).

3. Twelve hours in a second concentration (outside the College of Communications).

4. Nine hours of electives*.

5. Twenty-four hours of dissertation.

Specific courses to be taken require the approval of the student's advising committee.

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

Each doctoral student's progress will be reviewed annually by the Doctoral Committee of the College of Communications. Results will be reported to the student by his/her program advisor, who will convey the committee's recommendation concerning the student's remaining in the program (non-binding) and suggestions for improvement in performance. Candidates without prior teaching experience must register for Communications 521, Tutorial in Communications Teaching.

Planed course offerings in the College of Communications for a full calendar year are published in the College newsletter preceding November. This information is available from the Dean's Office, 302 Communications Building, 974-3631. See also courses listed under Advertising, Broadcasting, and Journalism.

GRADUATE COURSES

400 Mass Communications Law and Ethics (3) Legal issues directly affecting the mass media: libel, privacy, free press—fair trial, judicial controls, governmental regulations. Ethical standards and practices of mass media in America. Prereq: Writing for Mass Communication or consent of instructor. E

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

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

510 Orientation to Master's Studies (1) Degree and thesis requirements. Committee formation and program planning. Overview of research methods and informational sources. Tutorial or group instruction. Consent of instructor or admission to program. S/N only. F

512 Fundamentals of Media Research (3) Applications of communications research techniques for management. Gathering and analysis of data for assessing media audiences and message impacts. Prereq; Consent of instructor or admission to program. Sp

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

540 Theory for Media Management (3) Selected research hypotheses and theories in literature of mass
Comparative and Experimental Medicine

(Major of the Provost)

MAJOR DEGREES

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

L. N. D. Polgitter, Chair

Joint Graduate Coordinating Committee:

Fuhr, J. E., Ph.D., Medical Biology
Lawler, J. E., Ph.D., Psychology
Lozzio, C., M.D., Medical Biology
Polgitter, L. N. D., 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 pathology, immunopathology, aberrant metabolism, oncology, and genetic disorders. The Ph.D. program is open to approved graduate students seeking training in this area and is especially useful for individuals with professional degrees. For the student with an undergraduate biological science background, the Comparative and Experimental Medicine program provides an unusual opportunity to study disease processes common in humans and animals from a multidisciplinary perspective. The scope of this intercollegiate program, which pools faculty resources from both veterinary and human medicine, is broadened by faculty members representing animal science and numerous areas of the life sciences. The interdisciplinary training environment includes such diverse support as facilities and personnel at the Veterinary Teaching Hospital, the Oak Ridge National Laboratory, Knoxville Zoological Park, Hemophilia Clinic, Birth Defect Center, Aberrant Metabolism Laboratory, and Hematology and Oncology services.

For specific course listings, see Veterinary Medicine and Medical Biology under Fields of Instruction.

ADMISSION REQUIREMENTS

General Requirements

Admission requirements of The Graduate School of UT Knoxville will apply. In addition, all applicants will be required to furnish three letters of recommendation from individuals who are familiar with their scholastic or professional records.

Requirements for Admission to the Master of Science Degree Program

Applicants will be required to have a professional degree in one of the medical sciences (M.D., D.D.S., D.V.M.) or a baccalaureate degree with coursework including chemistry through organic; mathematics through calculus; one year of physics; and one year of basic biology plus an additional half-year of more advanced study in the field of biology including courses such as biochemistry, mammalian anatomy, histology, cell biology, or others that are appropriate for individuals aspiring to research careers in biomedical science.

Applicants for admission to the Master of Science program whose backgrounds include no formal training in the biomedical field beyond the baccalaureate degree will be required to present evidence of satisfactory performance on the Graduate Record Examination.

Requirements for Admission to the Doctor of Philosophy Program

Applicants will generally be expected to have a Master's degree in one of the biological sciences or a professional degree in one of the medical sciences.

Selected individuals having baccalaureate degrees with strong backgrounds in the physical and biological sciences may be admitted upon presenting evidence of satisfactory performance on the Graduate Record Examination.

Exceptions to the above requirements may be made at the discretion of the Admissions Committee if the minimal requirements of The Graduate School have been met. Applicants who are admitted to graduate programs but who are lacking in course requirements will be required to correct these deficiencies early in their graduate programs.

For additional information, write to the Office of Research and Graduate Programs, 1071, Knoxville, TN 37901.

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 Ph.D. programs in Comparative and Experimental Medicine are available to residents of some states. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.
Assistant Professors:
Blair, J. R., S., Ph.D. ........................................... Pittsburgh
Lee, Siu-Fai, Ph.D. ........................................... University of Utah
Florida
Mutchler, David, Ph.D. ......................................... Duke
Straight, David W., Ph.D. ........................................ Texas
Vose, M. D., Ph.D. ................................................... Texas
Zemankova, M., Ph.D. ................................................. Florida State

Instructor:
Mayo, J. W., M.S ................................................... Tennessee

THE MASTER'S PROGRAM

One year of college mathematics beyond algebra and trigonometry is 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. 511, which is the prerequisite to 011, is required.

Graduate coursework outside the department are allowed but which must be 500 level or above. 511, which is the prerequisite to 011, is required.

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 Dissemination) and 24 hours of graduate courses beyond the equivalent of a Master's degree (beyond 30 graduate credit hours) graded A-F. The 24 hours of courses must include at least six semester hours of 600-level courses taken in computer science at UT Knoxville. The student's advisor and committee will establish the specific course requirements. The comprehensive examination consists of a departmental written examination and a subsequent oral examination conducted by the student's committee.

GRADUATE COURSES

401 Applications of Computer Graphics (3) Commercial software, techniques, hardware. Prereq: 100 or 101 or 102. Not for credit for computer science majors. 3 hr lab required.

402 Applications of Artificial Intelligence (3) Commercial software, techniques, hardware. Prereq: 100 or 101 or 102. Not for credit for computer science majors. 3 hr lab required.

403 Applications of Microcomputers (3) Microcomputers, DOS, commercial software and hardware. Prereq: 100 or 101 or 102. Not for credit for computer science majors. 3 hr lab required.

404 Applications of Database Systems (3) Commercial software and systems. Prereq: 100 or 101 or 102. Not for credit for computer science majors. 3 hr lab required.

421 Introduction to Artificial Intelligence (3) Basic techniques of heuristic search, gaming, and theorem proving. Prereq: 320. 3 hr lab required.

422 Expert Systems (3) Production rule model and its extension into many-valued and fuzzy logics. Deriving explanations, examples of expert systems and building expert systems. Other methodologies--frames, scripts, decision expressions. Prereq: 421. 3 hr lab required.

423 Natural Language Processing (3) Phase-structured and slot grammars, error-correcting interfaces and semantics. Articles in database and expert systems. Prereq: 381 and 421.

424 Robotics Software (3) Software for robotic control. Prereq: 331 and Mathematics 142. 3 hr lab required.

425 Functional Languages (3) Functional, applicative and object-oriented languages, LISP and SMALL TALK, used for research applications. Prereq: 111, 112 and Mathematics 222. 3 hr lab required.

432 Computer Graphics (3) Interactive computer graphics. Transformations, perspectives, shading, vector generation. Graphics hardware and software, hardware and software techniques for designing computer graphics. Prereq: 331. 3 hr lab required.

433 Computer Systems Architecture (3) Parallel processing, memory, I/O, pipelining, specialized architectures. Prereq: 331 and 360.


451 Pattern Recognition and Analysis (3) Elements of pattern recognition, learning algorithms, decision theory, classification rules. Prereq: 111, 112 and 320. 3 hr lab required.

452 Image Processing and Analysis (3) Techniques for digitizing, storing, processing, and displaying images. Image enhancement, restoration. Prereq: 451. 3 hr lab required.

460 Human Factors in Software (3) Interface between people and machines and the use of software in intended environment. Prereq: 111 and 112.


462 Software Engineering (3) Exploration of software design and application process from initial requirement and specification statements to coding, testing, implementation, and maintenance. Prereq: 111 and 112.

463 Programming Languages (3) Study and comparison of programming languages and their environments. Human interfaces, formalisms, domain of applicability, object manipulation, syntax. Prereq: 111 and 112.


465 Parallel Computation I (3) Examination of non-numerical algorithms for parallel computation, operating systems, design and classification of parallel processors, compilers, concurrent computation. Prereq: 343.


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

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


482 Graph Theory and Applications (3) Planarity, network flow, critical paths. Prereq: 111, 112 and 311.

483 Information Theory (3) Theory of communication. Entropy, efficient transmission and storage of information, noiseless and noisy channels, coding. Prereq: 111, 112 and 311.
494 Special Topics in Computer Science (1-3) May be repeated. Maximum 9 hrs.

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

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

511 Immigration to Computer Science (5) Advanced programming techniques in high-level language; control of input/output devices; file systems; machine organization and assembly language programming; data structures and analysis of algorithms. Computing laboratory. Prereq: Course in programming.

521 Artificial Intelligence (3) Heuristic search, automatic theorem proving, symbolic methods, semantic information processing, representation theory. Prereq: 511 and 513.

522 Cybernetics (3) Various functions in living systems and their actual or potential realization in computers. Prereq: 511 and 513.

523 Machine Learning (3) Algorithms whereby computers exhibit aspects of learning or inference about their environment. Supervised and unsupervised methods; decision pattern analysis; explicit and implicit structures. Prereq: 521.

525 Software Engineering (3) Survey of key ideas in software engineering; formal methods, tools, testing, reliability; structured design and development; management and history of the field.

532 Boolean Algebra, Logic Design and Microprocessors (3) Boolean algebra. Combinational and sequential logic design. Microprocessors. Hardware lab. Prereq: One or more college mathematics beyond algebra and trigonometry.

535 Computer Architecture (3) Parallel processing control methods, pipelining, vector processors, functional units, memory organization and control, data flow, reduced instruction sets, symbolic processors. Prereq: 511 and 513.


538 Computer Networks (3) Design and operation of networks. Hardware and software systems; communications subsystems. Prereq: 511 and 513.

541 Database Management Systems (3) Data model theory, optimization, and normalization; intelligent database systems; comparison of implementations; analysis of distributed and networked databases. Techniques for evaluation of performance, integrity, security and reliability. Prereq: 511.

544 Information Storage and Retrieval (3) Organization, storage and retrieval of bibliographic data; analysis of commercial IR system; information analysis and retrieval; dictionary and thesaurus construction; statistical and syntactic approaches to content analysis. Prereq: 511.

551 Pattern Analysis (3) Decision-theoretic and structural pattern analysis. Deterministic and statistical decision rules, feature extraction and representation; syntactic and semantic methods, relational models. Prereq: 513 and course in probability or statistics.

552 Image Analysis (3) Techniques of computer image processing and understanding. Prereq: 551.

562 Language Design (3) Description, structure, and design philosophies of high-level languages. Names, types, control and data structures; abstraction and modularity. Design project. Prereq: 511.


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

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

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

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

581 Design and Analysis of Algorithms (3) Analysis of algorithms and relevance of analysis to design of efficient computer algorithms. Sorting, searching, graph algorithms, pattern matching, dynamic programming, efficient approximation algorithms.


593 Independent Study (1-15) Maximum 6 hrs toward degree requirements.

594 Special Topics in Computer Science (1-3) May be repeated. Maximum 6 hrs.

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

620 Advanced Topics in Intelligent Systems (1-6) Prereq: Consent of instructor. May be repeated with consent of department.

630 Advanced Topics in Computer Systems (1-6) Prereq: Consent of instructor. May be repeated with consent of department.

640 Advanced Topics in Databases/Information Retrieval (1-6) Prereq: Consent of instructor. May be repeated with consent of department.

650 Advanced Topics in Pattern/Image Analysis (1-6) Prereq: Consent of instructor. May be repeated with consent of department.

655 Advanced Topics in Artificial Intelligence (1-6) Prereq: Consent of instructor. May be repeated with consent of department.

670 Advanced Topics in Numerical Mathematics (1-6) Prereq: Consent of instructor. May be repeated with consent of department.

680 Advanced Topics in Theories and Foundations (1-6) Prereq: Consent of instructor. May be repeated with consent of department.

690 Advanced Topics in Computer Science (1-6) Prereq: Consent of instructor. May be repeated with consent of department.

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**Curriculum and Instruction**

(College of Education)

**MAJOR**

**DEGREES**

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

Education: Ph.D.

Theodore W. Hipple, Head

**Professors:**

Alexander, J. E., Ed.D. .......................... Kentucky
Allison, C. B., Ph.D. ............................. Oklahoma
Bellon, Jery J., Ed.D. ............................. California
Blair, Kermitt J., Ph.D. .......................... Ohio State
Butts, William L., Ed.D. ........................ Texas Tech
Christensen, Mark A., Ph.D. ........................ Kansas
Davis, A. R., Ph.D. ............................. Ohio State
Dessart, Donald J., Ph.D. .......................... Maryland
Dearth, E. Dale, Ed.D. .......................... Colorado
Frandsen, Henry, Ph.D. .......................... Illinois
French, R. L., Ph.D. .............................. Ohio State
Hipple, Theodore W., Ph.D. ........................ Illinois
Howard, R., Ph.D. .............................. Ohio State
Huff, F., Ph.D. ................................. Ohio State
Jost, Karl J., Ed.D. .............................. Oklahoma
Knight, Lester N., Ph.D. ........................ Texas
Malik, Anand, Ed.D. .............................. Columbia
Mays, N., Ph.D. ................................. Southern Illinois
McIntyre, Lonnie D., Ed.D. ........................ Indiana
Myer, M. E., Ph.D. .............................. Florida
Ray, John R., Ed.D. .............................. Tennessee
Roese, E. G., Ph.D. .............................. Ohio State
Rowell, C. Glennon, Ed.D. ........................ George Peabody
Slawson, W. S., Ed.D. .......................... Virginia
Terwilliger, Paul N., Ed.D. ........................ Penn State
Thurman, Robert S., Ed.D. ........................ George Peabody
Turner, T. N., Ed.D. .............................. Penn State
Wieniewski, Richard, Ed.D. ........................ Wayne State

**Associate Professors:**

Cagle, Lynn C., Ed.D. .............................. Georgia
Chance, Charles A., Ph.D. ........................ Ohio State
Grant, A. D., Ph.D. .............................. Wisconsin
Heathington, Betty S., Ed.D. ........................ Tennessee
Hodge, R. L., Ph.D. .............................. Texas
Ryan, Thomas K., Ed.D. .......................... Ball State
Wiley, Patricia D., Ed.D. .......................... Houston
Wright, J., Ph.D. ................................. North Carolina

**Assistant Professors:**

Austin, R. A., Ph.D. .............................. Florida State
Bennett, Kathleen, Ed.D. ........................ Cincinnati
Hatch, J. Amos, Ph.D. ............................ Florida
Hendricks, D. A., Ph.D. .......................... Alabama

Graduate programs are designed to improve scholarship and educational competence in a number of areas leading to the Master of Science, the Specialist in Education, the Doctor of Education, and the Doctor of Philosophy with a major in Education.

**THE MASTER’S PROGRAM**

For the Master of Science, thesis and non-thesis options are available in the Curriculum and Instruction major with concentration in the following areas: curriculum, elementary education, English education, foreign language education, instructional media and technology, mathematics education, reading education, science education, and social science education. The non-thesis option requires the completion of 33 semester hours of coursework. The thesis option requires the completion of 30 semester hours including six hours of Thesis 500.

**THE SPECIALIST PROGRAM**

The Educational Specialist degree program with a major in Curriculum and Instruction encompasses concentrations in the following areas: curriculum, elementary education, English education, foreign language education, instructional media and technology, mathematics education, reading education, science education, social science education.

**THE DOCTORAL PROGRAM**

The Ed.D. program in Curriculum and Instruction may include concentration upon the following fields: curriculum, social foundations, educational research, elementary education,
English education, foreign language education, mathematics education, science education, social science education.

The Doctor of Philosophy with a major in Education includes concentrations and specializations as listed under Education. For further information, write the Department of Curriculum and Instruction.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of southern states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S. program (concentration in foreign language education only) in Curriculum and Instruction is available to residents of the state of Louisiana who may wish to obtain this information. F

GRADUATE COURSES

404 Problems in Improvement of Instruction (1-3) Special conferences, workshops, or in-service programs. Prereq: 5 hrs. S/NC only. E

421 Elementary and Middle School Science and Social Studies Instruction (3) Methods and materials for teaching science and social studies. Development of functional relationships and entities of two fields. Not open to students with recent course in background in teaching science and/or social studies. Prereq: Admission to teacher education. F,Sp

429 Language Arts/Reading Instruction in Elementary and Middle Schools (3) Language and language development as applied to teaching of oracy (listening-speaking) and aspects of literacy (reading process/readiness and writing). Not open to students with recent course in language arts methods. Prereq: Admission to teacher education. F,Sp

430 Elementary and Middle School Developmental Reading Instruction (3) Word recognition (including phonics), comprehension, evaluation, and materials. Not open to students with recent course in reading methods. Prereq: Admission to teacher education. F,Sp

434 Topics in Reading Education (1-4) Prereq: Admission to teacher education and course in reading education. May be repeated. Maximum 6 hrs. E

443 Elementary and Middle School Mathematics Instruction (3) Preparation for helping children learn mathematics. Unit planning, daily planning, grouping, general factors related to classroom management. Not open to students with recent course in teaching of elementary school mathematics. Cannot apply toward M.S. degree. Prereq: Admission to teacher education. F,Sp

445 Early Childhood Education: Program Development and Teaching in Kindergarten (3) Curriculum planning, classroom organization and management practices for teaching young children; relationship of kindergarten to total elementary school. Prereq: Admission to teacher education. E

451 Education in Cultural Perspective (3) Contribution of anthropological concepts (primarily concepts of culture) to understanding of education processes, problems, and thought in our society and others.

454 Teaching Strategies and Issues in Social Studies Education (3) Goals, objectives, techniques, materials, and evaluation; directed observation in public schools, preparation of teaching plans and materials; simulated teaching experiences. Prereq: Admission to Teacher Education Program.

456 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 in teaching and learning language, and literacy. Prereq: Admission to Teacher Education Program.

460 Teaching Reading and Literature in the Secondary School (3) Approaches for teaching basic reading skills and ways of teaching literature. Sp

461 Developing Reading Skills in Content Fields (3) Techniques for teaching and study skills in content areas of school program. Extensive assessment of textbooks. Middle school and high school. E

475 Utilization of Instructional Media (3) Basic concepts of communication and instructional development for improving instruction through use of media. (Same as Library and Information Science 475.) E

486 Teaching Mathematics, Grades 7-12 (3) Preparation of teaching plans, evaluation, materials for teaching mathematics; teaching simulation and directed observation in schools. Prereq: Admission to Teacher Education Program.

486 Introduction to Instructional Computing (3) Classroom uses of computers, applications for teachers, overview of computer operation and software for teachers of all grades. F,Sp

496 Teaching Science Grades 7-12 (3) Methods, materials, recent trends in science and environmental education programs in middle 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

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

504 Studies and Theory in Language Development (3) Studies and theory of language development in children. Prereq: Elementary school language arts course or consent of instructor. F

507 Teaching Poetry Grades 7-12 (3) Research and theory in applications to teaching of poetry. Design of strategies and materials for teaching and writing and reading of poetry. Review of texts and materials. F

508 Teaching Composition in the Secondary School (3) Teaching narration, description, exposition, and argumentation; writing process and marking of student papers. Sp

509 Teaching Fiction in the Secondary School (3) Teaching of novels and short stories. 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 or letter grade. 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 or letter grade. E

519 Educational Specialist Research and Thesis (2) May be repeated. Maximum 4 hrs. P/NP only. E

519 Educational Specialist Research and Thesis (2) P/NP only. E

520 Techniques of Research in Education (3) Study and application.

521 Teaching Social Studies in Elementary and Middle Schools (3) Planning and techniques. Trains in curriculum, development of concepts and generalizations, integration of social sciences. Prereq: Course in teaching of social studies or consent of instructor. F

522 Teaching Mathematics in Elementary and Middle Schools (3) Instructional strategies for helping elementary school children learn mathematics. Examination, development and use of materials for creating active learning environment. Prereq: 443 or equivalent or consent of instructor. F,Sp

523 Diagnosis and Correction of Children's Difficulties in Learning Mathematics (3) Children's difficulties in mathematics. Identification of classroom teacher correct difficulties. Prereq: 522 or equivalent or consent of instructor. Sp

524 Teaching for Creative Thinking and Expression (3) Creativity of teacher and development of student creativity. Development of creative potential against academic curriculum. Creative problem solving and methods for developing creative skills. Prereq: Consent of instructor. F

525 Strategies, Programs and Materials for Teaching Elementary Social Studies (3) Analysis of new and innovative social studies program materials and techniques. Exploration of current trends in social studies education. Prereq: Previous course in teaching of social studies or consent of instructor. Sp

526 Philosophy of Education (3) Truth, knowledge, and valuation in relation to work of schools. F,Sp

527 Elementary School Curriculum (3) Examination, evaluation and application of curriculum designs in elementary school. Trends and issues which affect elementary education. Prereq: Consent of instructor. F,Sp

528 Teaching Language Arts Elementary and Middle Schools (3) Recent trends and methods in teaching elementary language arts (except reading). Prereq: Course in language arts or consent of instructor. F,Sp

529 Practicum in Diagnosis and Remediation of Difficulties in Learning Mathematics (2) Assessment and practicum experience with children having difficulties in learning elementary school mathematics. Prereq: 523 or consent of instructor. May be repeated. Maximum 4 hrs. Sp

530 Teaching Reading in Elementary and Middle Schools (3) Trends in methods, materials, basic approaches, skill development and assessment procedures for teaching reading at elementary school level. Prereq: Course in teaching of reading or consent of instructor. F,Sp

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

532 Instructional Research: Analysis and Application (3) Analysis of research on instruction. Translation and application of research on instruction in educational performance. Prereq: Consent of instructor. F,Sp

533 Reading in Middle and Secondary Schools: Research and Theory (3) Analysis of components of effective middle and secondary school reading programs. Attention to research and theoretical bases. Prereq: Course in reading education or consent of instructor. F

534 Seminar in Reading Education (1-6) May be repeated. Maximum 6 hrs. E

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. E

536 Psychology of Reading (3) Reading act, relation of sensory processes to learning, and learning, role of reading, role of reading in child's overall intellectual development. Affective and cultural factors. Prereq: 500-level course in reading education or consent of instructor. F

537 Diagnosis and Correction of Classroom Reading Problems (3) Procedures, methodologies and materials for diagnosing and correcting classroom reading problems. Prereq: Consent of instructor. E

538 Practicum in Diagnosis of Reading Problems (2) Theoretical and practical applications of specific reading diagnostic instruments; testing of elementary and/or secondary school students, preparing case study reports, and conducting parent conferences. Prereq: E
Curriculum and Instruction

Course in diagnosis and correction of classroom reading problems or consent of instructor. May be repeated. Maximum 4 hrs. Sp.

539 Practicum in Remediation of Reading Problems (2) Sabbatical leave, teaching methodology in working with elementary and/or secondary school students on one-to-one or small group basis. Prereq: Course in diagnosis high correlation of reading problems or consent of instructor. May be repeated. Maximum 4 hrs. Sp.

540 Topics in Improvement of Instruction (1-3) Specialized research, conferences, workshops, and inservice programs. May be repeated. Maximum 6 hrs. S/NC only. E.

541 The High School Curriculum (3) Identification of problems associated with curriculum study. Tennessee curriculum framework, assessment of trends in programs of local, regional, and national significance. E.


543 Foundations of Educational Policy (3) Relationship between theory, policy, and practice; educational policies that arise from philosophical and practical considerations relative to human nature, to educational purpose, to content of curriculum and to methods and techniques for conducting educational enterprise. F. Su.

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

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. F.

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

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

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

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.

552 Developmental Reading Practicum (2) Diagnosing and correcting reading developmental and corrective reading needs. Prereq: Course in diagnosis and correction of reading problems or consent of instructor. May be repeated. Maximum 4 hrs. Su.

557 The Junior High and Middle School Curriculum (3) Research and teaching methodology in junior high and middle school. Characteristics of students, curriculum designs, instructional patterns, and organization and structure of junior high and middle schools. Sp., Su.

558 Curriculum Planning and Development (3) Foundations and principles of curriculum planning and development. Historical analysis of curriculum theory, principles of planning and development, and classroom applications for improved learning. E.

561 Educational Statistics (3) Applications of descriptive and inferential statistics to educational and instructional problems. Use of electronic calculators in educational research. Prereq: One year of college mathematics, an elementary course in statistics, or consent of instructor. F.

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

564 Curriculum for Early Childhood Education (K-3) (3) Theoretical foundations and current research in child care and teaching methodology in kindergartens and pre-kindergarten grades; application to local school setting. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. Sp., Su.

565 Programs, Materials and Strategies in Teaching Elementary Science (3) Analysis of new and innovative science program materials. Instructional strategies and current curricular issues inherent in use of materials. Prereq: Graduate course in elementary science, at least one year teaching experience, or consent of instructor. Sp.

566 Administering Instructional Media Programs (3) Leadership roles and responsibilities of professional media administrator in a variety of organizational settings. F.

567 Application of Theory in Early Childhood Education (K-3) (3) Principles and practices from selected theoretical orientations. Prereq: Course in early childhood education, selection or consent of instructor. May be repeated. Maximum 6 hrs. F., Su.

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


573 Utilization of Educational Television and Radio (3) Television and radio as instructional and training media. Selection or evaluating instructional/teaching 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, instructional, research, and classroom management applications from microcomputers to super computers. Prereq: Consent of instructor. F.


579 Career Development: Workshop (1-6) E.

580 Techniques for Research in Curriculum and Instruction (3) Fundamentals of research methodology applicable to curriculum, instruction, and other areas of educational inquiry. Critical reading of research and development of skills needed for proposal development. E.


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, demonstration, and applications. Prereq: 581. F.

587 Teaching Foreign Languages in Secondary Schools (3) Advanced instructional techniques and evaluation procedures; materials analysis and preparation; tests, issues, and research in modern foreign languages and Latin. Prereq: Consent of instructor.

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 Teaching of Natural Science and Environmental Science (3) Strategies, laboratory techniques, assessment, current programs and professional guidelines for middle, junior and senior high schools, and community colleges. Prereq: Consent of instructor. F.

597 Teaching Drama Grades 7-13 (3) Strategies and materials for teaching dramatics, performing and writing of plays, reading of scripts. H.

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. E.

599 Seminar in Social Studies Education (3) Research, trends, and issues in secondary social studies. Su.

600 Doctoral Research and Dissertation (3-15) F/P/No Pet. E.


602 Seminar in Reading Education (1-6) May be repeated. Maximum 6 hrs. E.

603 Advanced Studies and Theoretical Models of Reading (3) Research on reading processes. Current theoretical models related to how learners process print. Prereq: 500-level courses in reading education or consent of instructor. Sp.

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

605 Organizing and Administering Reading Programs (3) Analyzing and synthesizing instructional, learning, and materials components into classroom, school and system programs. Prereq: 2 500-level courses in reading education or consent of instructor. Su.

606 Research in Elementary Education (3) Analysis of research in elementary education with application to classroom teaching. Prereq: research course. Su.

608 Seminar in Philosophy of Education (3) Selected philosophical issues in education. Prereq: 2 courses in history or philosophy of education. May be repeated with consent of instructor. F.

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.

623 Programs for Curriculum Improvement (3) Research methodology; application to descriptive ethnographic curricular materials. Critical reading of research, methodological development in descriptive and ethnographic areas. Sp.
625 Seminar in History of Education (3) Selected historical issues in education. Prereq: 2 courses in history or philosophy of education. May be repeated with consent of instructor. Sp

628 Advanced Studies in Elementary School Science (2) Current research in elementary school science as a basis for classroom practice. Prereq: Graduate course in science education or equivalent or consent of instructor. May be repeated. Maximum 4 hrs. E

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

640 The Dynamics of Educational Change (3) Interdisciplinary approach to change process in education. Prereq: Consent of instructor. Sp

648 Topics in Sociology of Education (3) May be repeated. Sp

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

651 Advanced Studies in Elementary School Languages (3) Selected issues in elementary school language arts. Prereq: Graduate course in elementary school language arts, or consent of instructor. Sp

652 Advanced Studies in Educational Anthropology and/or Sociology (3) Ethnographic methods applied to formal and non-formal educational settings. Analysis of selected research in field. Prereq: 451, 2 courses in cultural anthropology, or consent of instructor. Sp

669 Instructional Media Research (3) Identification, location, and collection of developmental and experimental research on instructional media. Application of research. Sp

571 Advanced Educational Statistics (3) Applications of parametric and non-parametric statistical inference to educational and instructional problems. Use of microcomputers in educational research. Prereq: 561. Sp, Su

672 Interpretation and Application 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 framework to design evaluation studies for various educational programs. Prereq: Consent of instructor. Sp

676 Curriculum Theory (3) Inclusive curriculum theories and approaches, implications for structure and design of educational programs. Nature and function of theoretical 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

685 Educational Leadership: Theory and Practice (3) Theories of leadership applied to variety of educational settings. Prereq: Consent of instructor. F, Su

689 Internship (1-3) Experiences in application of principles and practices of curriculum development and instructional improvement. Prereq: Program prerequisites and consent of instructor. May be repeated. Maximum 9 hrs. S/NC pending. E

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

694 Supervised Readings (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

696 Advanced Studies in Secondary Science and Environmental Education (3) Trends in science and environmental programs, materials methods and research for middle, junior and senior high schools, and community programs. Prereq: 596 or equivalent and consent of instructor. Sp

Ecology (College of Liberal Arts)

MAJOR DEGREES

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

Dewey L. Bunting, Director J. Larry Wilson, Associate Director Paul A. Delcourt, Associate Director

Shared Faculty:

Amundsen, C. C., Ph.D., Botany Bartell, Steve, Ph.D., ORNL Blylock, B. G., Ph.D., ORNL Boake, Christine R. B., Ph.D., Zoology Buckner, E. R., Ph.D., Forestry, Wildlife & Fisheries

Bunting, Dewey L., Ph.D., Zoology Burghardt, G. M., Ph.D., Psychology Carter, James R., Ph.D., Geography Clebsch, E. E. C., Ph.D., Botany Coutant, C. C., Ph.D., ORNL DeAngelis, D. L., Ph.D., ORNL Dearden, B. L., Ph.D., Forestry, Wildlife & Fisheries


Reed, R. M., Ph.D., ORNL Rehder, J. B., Ph.D., Geography Reichle, D. E., Ph.D., ORNL Rennie, J. C., Ph.D., Forestry, Wildlife & Fisheries Reynolds, John H., Ph.D., Plant & Soil Science Riechert, Susan E., Ph.D., Zoology Sayler, Gary S., Ph.D., Microbiology Schorbaum, S. E., Ph.D., Forestry, Wildlife & Fisheries Smith, W. O., Ph.D., Botany Stacey, G., Ph.D., Microbiology Stewart, A., Ph.D., ORNL Strange, R. J., Ph.D., Forestry, Wildlife & Fisheries

Van Hook, R. L., Ph.D., ORNL VanWinkle, W., Ph.D., ORNL Vaughn, G., Ph.D., Zoology Walton, B. T., Ph.D., ORNL Wehly, E. L., Ph.D., Chemistry West, D. C., Ph.D., ORNL White, David C., Ph.D., Microbiology Wilson, J. L., Ph.D., Forestry, Wildlife & Fisheries Witherspoon, J. P., Ph.D., ORNL Woods, F. W., Ph.D., Forestry, Wildlife & Fisheries

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 lakes and wild rivers provide locally 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 (physics 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 and the Ecology Program. Inquiries concerning the admission requirements should be directed 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 and 574 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.
537 Natural Resource Management and Environmental Assessment  
and evaluation of environmental impact statements and  
grams at UT Knoxville on an in-state tuition  
sharing graduate programs allows legal resi-  
membership, who should have an appointment in the  
major professor as chairperson, one additional  
members. Doctoral committees consist of 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  
faculty from other departments.

ACADEMIC COMMON MARKET

An agreement among southern states for  
sharing graduate programs allows legal resi-  
dents of some states to enroll in certain pro-  
grams at UT Knoxville on an in-state tuition  
basis. The Ph.D. program in Ecology is avail-  
able to residents of the state of Alabama.  
Additional information may be obtained from the  
Residency Assistant 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/C only. E

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

530 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.

530 Implementation of Environmental Policy (3) Goals and problems of environmental legislation, National Environmental Policy Act; purpose, preparation, and evaluation of environmental impact statements and similar multidisciplinary studies. Prereq: 520 or 573 or course work or experience in environmental law.

537 Natural Resource Management and Environmental Assessment in Developing Nations (3) Assessment of environmental and resource development issues. Scientific basis for integrated resource management and environmental assessment in developing nations. Prereq: General ecology or equivalent. (Same as Planning 553 and Botany 537.)

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.)

562 Techniques in Environmental Toxicology (1) (Same as Biochemistry 562.)

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

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

600 Doctoral Research and Dissertation (1-15) 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.

637 Applied Ecology (3) Review of contemporary and historical issues. Analysis of scientific basis of environmental assessment and natural resource management. Analysis of career and career planning in applied ecology. Prereq: 573-74 or equivalent or consent of instructor. (Same as Botany 637.)

Economics

(College of Business Administration)

MAJORS

DEGREES

Economics................................. M.A., Ph.D.
Business Administration.............. MBA

Anne Mayhew, Head

Professors:

Bohm, Robert A., Ph.D. Washington (St. Louis)
Bowley, Roger L., Ph.D. ................... Texas
Carroll, Sidney L., Ph.D. .............. Harvard
Chang, Hui S., Ph.D. ................. Vanderbilt
Cole, William E., Ph.D. .......... Texas
Davidson, Paul (J. Fred Holly Chair),  
Ph.D. ...................... Pennsylvania
Feiwel, George R. (Distinguished Prof.),  
Ph.D. ......................... McGill
Fox, William F., Ph.D. ................ Ohio State
Garrison, Charles B., Ph.D. ......... Kentucky
Herzog, Henry W., Ph.D. .......... Maryland
Jensen, Hans E., Ph.D. ........... Texas
Lee, Feng-Yao, Ph.D. ............... Michigan State
Mayhew, Anne, Ph.D. ............... Texas
Moore, John R. (Distinguished Prof.),  
Ph.D. ....................... Cornell
Neale, Walter C., Ph.D. ............. London
Quiry, K. E. (Emeritus), Ph.D. ...... Kentucky
Schlottman, Alan M.,  
Ph.D. .......................... Washington (St. Louis)
Spiva, George A., Ph.D. ........... Texas

Associate Professors:

Clark, Don P., Ph.D. ............. Michigan State
Glustoff, Errol, Ph.D. ................ Stanford
Mayo, John W., Ph.D. .......... Washington (St. Louis)
Phillips, Keith E., Ph.D. .......... Washington

Assistant Professors:

Gauger, Jean A., Ph.D. .......... Iowa State
Kunkin, Matthew, Ph.D. .......... Wisconsin
Mandy, David M., Ph.D. .......... Illinois
Murray, M. N., Ph.D. ........... Syracuse

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 Associate Dean for Graduate Programs, College of Business Administration.

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 established by the degree program for full-time students and the next two semester's coursework established by the degree program for part-time students.

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 or on scores from the GMAT. 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. The remaining 6 hours must be in one field of economics. Of the 30 hours, a maximum of 9 hours in courses approved by the department may be taken in fields other than economics. Students electing the non-thesis option are required to pass a final comprehensive examination. The thesis option requires 30 hours of coursework at the 400 level or above, including at least 24 hours at the 500 level or above, 6 hours of which may be thesis hours. Of the remaining 18 hours at the 500 level or above, at least 15 hours must be in economics and must include 511, 512, 513, and 514. A maximum of 8 hours may be in an area other than economics.

THE DOCTORAL PROGRAM

Admission to the Ph.D. program is based on promise of outstanding scholarship as demonstrated by previous academic performance and by scores achieved on the general portion of the GRE or on the GMAT. Requirements for successful completion of the program consist of the four components listed below.

1. Students are required to complete the following core requirements:
a. Economic Theory: Microeconomic theory by comprehensive examination or by completion of 511, 512 with a B- average or higher, and macroeconomic theory by comprehensive examination or by completion of 513, 514 with a B- average or higher.


c. Mathematical and Quantitative Economics: 581, 582. The 582 requirement may be waived for students completing 681, 682.

Students must achieve a grade average of B or higher over the courses offered to fulfill requirements in subparagraphs b and c, or, as an alternative, may petition to satisfy either or both of these two core areas by some other means such as a comprehensive written examination.

2. Students are required to demonstrate their competence by comprehensive examination in two fields of specialization with the approval of the department, at least one of which must be selected from the following: comparative systems, economic development, economic history, economics of labor and human resources, international organization, international political economy, finance, and regional and urban economics.

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

4. Students are required to complete a dissertation, including an oral defense, to give at least 24 hours of graduate credit (600).

BUSINESS ADMINISTRATION

CONCENTRATION

For complete listing of MBA program requirements, see Business Administration.

MBA Concentration: Economics.

Minimum course requirements are as approved by the area MBA faculty advisor.

GRADUATE COURSES

400 Special Topics (3) Topics vary. Prereq: Determined by department.

413 Macroeconomic Fluctuations (3) Analysis of historical data, methods of analyzing macro-economic fluctuations, theoretical explanations of cycles, and role of monetary and fiscal policies in aggregate economy. Prereq: Intermediate Macroeconomics 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, principal developments of second half of 20th century. Major writing requirement. Prereq: 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. Prereq: 201. This course includes a major writing requirement. It may be repeated when topic varies. Maximum 9 hrs.


442 Analytical Labor economics (3) Problems connected with labor market. Intensive treatment of small number of topics: Health economics, economic education, economics of discrimination, natural rate of unemployment, wage-price guidelines, or job search models. Major writing requirement. Prereq: 341.

462 Economics of Resources and Environmental Policy (3) Economic analysis of environmental policy and allocation of resources. Benefits and costs of development of natural resources and impacts of growth on environment. Major writing requirement. Prereq: 201.

471 Public Finance: Optimal Government Functions and Expenditure Analysis (3) Principles of collective consumption, external effects, public investment, social decision making. Prereq: 201.

472 Public Finance: Taxation and Intergovernmental Relations (3) Analysis of individual and corporate income taxes, federal, state, and local taxes. Topics vary: Latin America, Asia, Soviet Union and Eastern Europe. Analysis of major economic strategies, policies, and problems. Prereq: 201 or equivalent and consent of instructor.

482 Introduction to Mathematical Economics (3) Application of algebra, matrix algebra, differential and integral calculus to micro and macroeconomics. Prereq: 201 and Mathematics 121-22 or 141-42.

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

501 Managerial Economics (3) Application of economic concepts to business decision making. Analysis and forecasting of demand, cost analysis, pricing behavior, and behavior of optimizing techniques.

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.

503 Business Conditions Analysis (3) Macroeconomic environment of firm. Determination of level of output, employment and prices for economy as whole. Interpretations of economic data of individual firms. Role of forecasting techniques and stabilization policies.

510 Fundamentals of Microeconomics (3) Theory of consumer behavior and demand: theory of production and cost, behavior of the firm in perfectly competitive and monopolistic market conditions. Not available for students with credit for 511. Prereq: 311 or equivalent.


513-14 Macroeconomic Theory (3,3) Determination of national income, prices, and employment. Results using Keynesian, non-market-clearing, monetarist, and rational expectations paradigms.


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

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

562 Labor Relations and Collective Bargaining (3) Same as Management 562.


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

612 Advanced Microeconomic Theory (3) Prereq: 512 or equivalent.

613 Advanced Macroeconomic Theory (3) Prereq: 521 or equivalent.


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

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


534 Comparative Economic Systems (3) Study and appraisal of alternative economic systems in comparative perspective.

641 Labor Economics (3) Theory of labor markets and wage determination under competitive conditions. Labor markets under conditions which interfere with competition, unions and discrimination. Human capital and estimation of return to schooling. Topics vary. Prereq: 311 and 313 or equivalent.

642 Labor History and Legislation (3) Development of organized labor as 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-a-vis their employers.

511 Monetary Theory (3) Study of money, credit, and liquidity as related to real output determination, interest rates, employment, and prices. Prereq: 513.

512 Topics in Monetary Theory (3) Advanced monetary theory. Issues in current monetary theory and policy. Student participation. Prereq: 615.

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

652 Methods of Regional and Urban Analysis (3) Theory of regional and 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.

653 Environmental and Resource Economics (3) Topics in environmental quality, natural resource allocation by private markets, and issues in formulating public policy toward environmental problems.


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

681-82 Econometric Methods (3,3) Theory and techniques of statistical testing of economic hypotheses and
construction and estimation of econometric models. Review of classical least squares regression model, and approaches to simultaneous equation models with application to current econometric research. Prereq: 582 or equivalent.

960 Workshop (3) Advanced topics in economics. Student participation. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

Education

(College of Education)

MAJOR DEGREE
Education Ph.D.

THE DOCTORAL PROGRAM

The Ph.D. program with a major in Education provides six concentrations. The departments participating in the Ph.D. program are Curriculum and Instruction; Educational Leadership; Educational and Counseling Psychology; Health, Leisure, and Safety; Physical Education and Dance; Special Services Education; and Technological and Adult Education.

The program requirements, concentrations and specializations are:

Requirements Minimum Hours
Research Area 14
Foreign or Computer Language (demonstrate proficiency) 6
General Core Requirements
Courses in history of education, philosophy of education (two areas must be represented) 4
Courses in learning theory, curriculum theory, and administrative theory (three areas must be represented) 6
Trans-college seminar—three consecutive semesters (including summer) 3
Alternative Core Requirements
Courses in philosophy of science 3
Trans-college Seminar—three consecutive semesters (including summer) 3
Seminar in area of specialization 3
Courses in learning theory/group or independent study 3
Concentrations
Primary Concentration—A minimum of 16 hours normally selected from one or two specializations within the primary concentration 16
Supporting Specialization—A minimum of 9 hours selected from a specialization in a concentration other than the primary concentration 9
Cognate
A minimum of 6 hours selected from outside the college in addition to the designated research courses 6
Dissertation 24

CONCENTRATIONS

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. Technological and adult education
8. 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: Adapted Physical Education Exercise Physiology/Fitness
3. Socio-Cultural Foundations of Sport: History Philosophy Sociology

Health Education Specializations:
1. Public health
2. Safety

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 Education is available to residents of the states of Georgia or South Carolina. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.

See College of Education for additional departmental listings.

GRADUATE COURSES

601 Trans-College Seminar (1) Introduction to Ph.D. program in Education: research requirements, meaning of scholarship in academic and issues/problems in education. Minimum of two consecutive semesters preceded or followed by summer term required of all Ph.D. students. Prereq: Admission to Ph.D. program or consent of Ph.D. program coordinator. May be repeated.

Maximum 3 hrs. May not be used to meet 600 requirement. S/NC only.

Educational and Counseling Psychology

(College of Education)

MAJORS

DEGREES

Concentration in Counselor Education: M.S., Ed.S., Ed.D.

Guide to the Doctoral Program in Educational Psychology: M.S., Ed.S.

Concentration in Educational Psychology: Ed.D.

Concentration in School Psychology: Ed.D.

The Department of Educational and Counseling Psychology offers graduate programs leading to the following: Master of Science with a major in Educational Psychology; concentrations in educational psychology and community agency counseling; Master of Science with a major in Guidance, concentrations in elementary guidance, secondary guidance, and school counseling; Educational Specialist with a major in Educational Psychology and Guidance, concentrations in counselor education and educational psychology. The department also participates in the college-wide Ph.D. program with a major in Education. The concentration area is theory and practice of educational and personal adjustment with specializations in counselor education, counseling psychology, educational psychology, and school psychology.

Several programs in the department are accredited. The Ed.D. counseling education concentration is accredited by the Council for Accreditation of Counseling and Related Educa-
tional Programs; counseling psychology by the American Psychological Association; and school psychology by the National Association for School Psychology. Also, the school counseling and school psychology programs have the approval of the National Council for Accreditation of Teacher Education. The community agency counseling and guidance programs are accredited by the Council for Accreditation of Counseling and Related Edu-

The master's programs

Admission requirements include up-to-date scores from the GRE, departmental admissions application form and letters of recom-
mendation. All programs include thesis and non-thesis options. The programs in educational psychology and in guidance require 36 and 42 hours, respectively. Community agency and school psychology require 40 and 42 hours to meet certification standards. Students should check with the department office for these requirements. The programs in community agency counseling and in guidance each require supervised practicum and internship experi-

The educational specialist

Program

Admission requirements include up-to-date scores from the GRE, the departmental ad-
misions application form and letters of recom-
mendation. All programs include thesis and non-thesis options. The program in school psychology requires a minimum of 66 hours. When students are admitted to the Ed.S. programs in educational psychology, school counseling or community agency counseling, it is assumed that they have completed a Master's degree. In this case, the minimum hours beyond the Master's required to complete the Ed.S. are as follows: educational psychology - 24; school counseling, 22; and community agency counsel-
ing, 25. The specialist programs require supervised practicum and internship experi-

The doctoral programs

The Ph.D. with a major in Education in-
cludes concentrations and specializations as listed under Education. For students applying to the Ph.D. program in education located in this department, two applications are required: one for the Ph.D. in Education program and one for the department that specifies which specialization is desired (i.e., counseling psychology, counselor education, educational psychology, or school psychology). Applicants for the Ed.D. with a concentration in either counselor education or educational psychology fill out only the departmental application form. Departmental admissions requirements include up-to-date scores from the GRE; the department admissions application form; letters of recommendation; a writing sample; and, in the case of the counselor education program only, an audio or video-taped sample of the appli-
cant's counseling work with a client.

The following minimum number of hours is required in each program concentration/ specialization: counseling psychology - 98; counselor education - 98; educational psychology, Ph.D. - 92, Ed.D. - 89; school psychology, Ph.D. - 97. Residency for the Ph.D. programs is three consecutive semesters of full-time coursework and two consecutive semesters for the Ed.D. The Ph.D. 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 required for each program concentration. Pre-
dissertation research participation is a require-
ment in the Ph.D. program. The concentrations/ specializations in counseling psychology, counselor education, and school psychology each require a year-long counseling practicum sequence and the equivalent of a year's full-time work as an intern in an appropriate counseling setting. The concentrations/specializations in educational psychology and counselor education each also require supervised practicum experi-

Graduate courses

404 Special Topics (1-3) Instructor-initiated course offered at convenience of department on topics of cur-
rent interest. May be repeated. Maximum 15 hrs. S/N or letter grade. E

410 Sex Role Development: Implications for Educa-
tion and Counseling (3) Theories and research con-
cerning development of person's sex role and its rele-
vance in educational and counseling settings. E

431 Personality and Mental Health (3) Various per-
spectives of mental health with application to education and other social institutions. E

432 The Disadvantaged Student: Psychosocial educa-
tional perspectives (3) Theory and research regarding etiology, psychosocial behavior and appropriate inter-

460 Self-Management in the Helping Professions (3) Applications of self-management strategies to career, social, emotional, and health domains for both helping professionals and their clients. Prereq: Introduction to psychology or consent of instructor. S/N or letter grade. E

493 Independent Study (1-15) Independent inves-
tigation of problems, research and practice in the field of psychology. Prereq: Consent of instructor. E

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

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

503 Problems in Lieu of Thesis (1-3) May be repeated. Maximum 12 hrs. S/N only. E

504 Special Topics (1-3) Instructor-initiated course offered at convenience of department on topics of cur-
rent interest. May be repeated. Maximum 15 hrs. S/N or letter grade. E

510 Psychological Theories of Human Development

Applied to Education (3) Theory and research on emotional, social, and intellectual development over life span with applications to educational and therapeutic settings. Sp

511 Cognitive Development: Implications for Educa-
tion (3) Applications of theory and research related to higher mental problem-solving. Prereq: 510 or consent of instructor. F

515 Educational Applications of Behavioral Theo-
ries of Learning (3) Behavioral theories and research, conditioning, observational learning, and ethological learning as systems apply to student motivation, discipline and learning. Sp, Su

516 Educational Applications of Cognitive Learning Theories (3) Cognitive theory and research, social learning, attribution and information processing as sys-
tems apply to education. Prereq: 515 or consent of instructor. F

518 Educational Specialist Research and Thesis (1-
5) May be repeated. Maximum 27 hrs. S/N 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 par-

525 Formal Measurement in Education and Counsel-
ing (3) Principles of test construction and item analysis. Survey of standardized tests of intelligence, achieve-
ment, aptitude, vocational interest, attitudes and person-
ality. Prereq: 520 or equivalent. F, Su

526 Informal Methods of Assessment (3) Deve-
lopment and use of rating scales, check-lists, ob-

540 Seminar in School Psychology (3) Essentials of theory and practice of school psychology as professional specialty. Consideration of current and current issues in school psychology. S/N only. Sp

541 Psychoeducational Assessment (3) Direct, psy-
chometric and naturalistic assessment methods in learn-
ing environments. Prereq: 520, consent of instructor. Psy-

542 Practicum in Psychoeducational Assessment (3) Application of assessment skills to children in learning environments. Coreq: 541 or consent of instructor. May be repeated. Maximum 6 hrs. S/N only. F, Sp

545 Psychoeducational Consultation (3) Use of two or three-person models of consultation in educational and therapeutic settings. Prereq: 542. E

546 Practicum in Consultation (3) Application of con-
sulting skills to educational settings. Coreq: 544. Sp

549 Internship in School Psychology (1-6) Su-
pervised employment in departmentally approved school psychology internship sites. Prereq: Enrollment in school psychology program and consent of instructor. May be repeated. Maximum 12 hrs. (Same as Psychol-
gy 549.) S/N only. E

550 Development and Operation of Pupil Personnel Services (3) History, philosophy, trends, standards of preparation, certification of personnel and role identity of counselors and other personnel service specialists. Program ad-

551 Theory and Practice of Counseling (3) Philo-
sophical bases of helping relationship, development of counselor and client self awareness, counseling theory/techniques. E

Educational and Counseling Psychology
MAJORS

DEGREES

College Student Personnel .......................... M.S.
Educational Administration and Supervision .............. M.S., Ed.S., Ed.D.
Education ........................................ Ph.D.

Mary Jane Connelly, Head

Professors:

Coffield, William H. (Emeritus), Ph.D. ........ Iowa
Goddard, Joseph P., Ed.D. .................. Tennessee
Harris, G. W., Jr., Ph.D. .................. Michigan
Lovell, J. T. (Emeritus), Ed.D. ............ Florida
McInnis, Malcolm C., Jr., Ph.D. ....... Florida State
Peccolo, C. M. (Emeritus), Ph.D. ........ Iowa
Petitbone, Timothy J. ......... New Mexico State
Roney, Robert K., Ed.D. ............ Tennessee
Stollar, Dewey H. (Emeritus), Ph.D. .... Ohio State
Truisky, Francis M. (Emeritus), Ed.D. . Stanford
Ubben, Gerald C., Ph.D. ........ Minnesota
Venditti, Fred P. (Emeritus), Ed.D. ....... Northern Colorado

Associate Professors:

Askew, Jerry W. (Adjunct), Ph.D. .......... Iowa
Connelly, Mary Jane, Ed.D. .................. VPI
Gross, Francis M. (Adjunct), Ed.D. ........ Tennessee
High, Katherine N. (Adjunct), Ed.D. ......... Tennessee
Husen, Peter M., Ed.D. ....................... Stanford
Mertz, Norma T., Ed.D. .................. Columbia
Quaries, Dan R., Ed.D. ..................... Tennessee

Assistant Professor:

Gubbs, James J., M.S. ............ Indiana State

The Department of Educational Leadership offers graduate programs leading to the Master of Science with majors in Educational Administration and Supervision and in College Student Personnel (higher education), the Specialist in Education, the Doctor of Education with a major in Educational Administration and Supervision, and the Doctor of Philosophy with a major in Education. Specializations may be developed in research, major central office positions, the principalship, and in other educational and social agencies.

The Ed.D. program also offers a concentration in higher education. The instructional 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.

For additional information, contact the department head.
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. Application deadlines are February 1, July 1, and October 1.

THE MASTER'S PROGRAM IN EDUCATIONAL ADMINISTRATION AND SUPERVISION

Thesis Option

A minimum of 33 credit hours including 6 hours of Thesis 500 is required. A major consists of a minimum of 18 hours. An internship is highly recommended but not required. A final oral examination is required with a written exam at the option of the committee.

Non-Thesis Option

A minimum of 36 credit hours is required with a minimum of 18 hours in the major. An internship is highly recommended but not required. A final written comprehensive examination is required with an oral exam at the option of the committee.

THE MASTER'S PROGRAM IN COLLEGE STUDENT PERSONNEL

This program 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 39 hours, which includes 6 hours of practicum experience, is required in either option.

Students entering any of the M.S. 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 department.

THE EDUCATIONAL SPECIALIST PROGRAM

Thesis Option

A minimum of 60 hours beyond the baccalaureate degree including 6 hours of Educational Administration and Supervision 518 is required. Six hours must be in a cognate area within the college and 6 hours outside the college. An internship is highly recommended but not required. A written comprehensive examination is given as well as an oral exam over the thesis.

Non-Thesis Option

A minimum of 60 hours beyond the baccalaureate degree including 6 hours of Educational Administration and Supervision 503 is required. Six hours must be in a cognate area within the college and 6 hours outside the college. An internship is highly recommended but not required. A written comprehensive examination is given as well as an oral exam over the problem papers.

THE DOCTORAL PROGRAM

For the Ed.D. program, 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 8-9 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 residency. 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 Ph.D. with a major in Education includes concentrations and specializations as listed under Education.

Educational Administration and Supervision

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. May be repeated. Not toward degree requirements. May be repeated. S/NC only. E

503 Problems in Lieu of Thesis (3-6) May be repeated. S/NC only. E

513 Administrative and Organizational Theory in Education (3) Introduction to theoretical administrative and organizational foundations of management and leadership of educational programs and institutions. F,Su

515 Human Relations and Communication in Administration (3) Development and use of effective interpersonal communication skills and channels, intergroup relations, supportive work climates, personnel motivation, conflict management skills, and role of values, attitudes, and expectations in administration. F,Su

516 Research for School Administrators (3) Descriptive, experimental, and quasi-experimental designs to help students without quantitative backgrounds to read and understand technical professional literature. Introduction to statistical of research design, data collection, and evaluation procedures. Sp,Su

518 Educational Specialist Research and Thesis (3-6) May be repeated. Maximum 6 hrs. P/NP only. E

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 school setting. Prereq: M.S. Introductory core or consent of instructor. F,Su

547 Educational Facility Planning (3) Concepts and skills for development, evaluation, construction, renovation, maintenance, and operations of quality educational environments and facilities. Prereq: M.S. Introductory core or consent of instructor. Sp,Su

548 Introductory Supervision and Personnel (3) Basic supervisory and personnel concepts and related competencies; building (or micro-organizational) level; interviewing; personnel planning, collecting and maintaining employee information, supervision of instructional and non-instructional personnel, clinical supervision, staff evaluation, and staff development. Prereq: Introductory M.S. core or consent of instructor. Sp,Su

553 Strategies of Educational Planning (3) Processes for improving supervision 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 school administrators and teachers; problems concerning law and public education. Prereq: M.S. introductory core or consent of instructor. F,Su

560 Internship in Educational Administration (3) Field experience in appropriate educational setting working directly with administrator. At end of planned program of study. Placement by department assignment. Some on-campus classes in conjunction with 583 or 582. Prereq: 21 hrs in educational administration and supervision or consent of instructor. F,Su

583 Educational Leadership--Principalship (3) Knowledge, skills and relationships for principal to be effective instructional leader. Simulation materials and field-based activities. Culminating course with internship and problems paper. At end of planned program of study. Prereq: 21 hrs in educational administration and supervision or consent of instructor. F,Su

590 Special Topics (3) May be repeated. E

592 Field Problems in Educational Administration and Supervision (3) Topic to be assigned. May be repeated. S/NC or letter grade. E

593 Independent Study in Educational Administration (3) Prereq: Consent of instructor. May be repeated. E

595 Elementary Principals Seminar (1-3) For in-service training of elementary school administrators. Development, problems, programs, and trends of elementary schools. Prereqs: Presently elementary school administrator or consent of instructor. May be repeated. S/NC 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. Prereq: Presently middle school administrator or consent of instructor. May be repeated. S/NC or letter grade. F,Su


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

604 Seminar in Educational Administration and Supervision (1) Current educational issues, problems and research. Required two consecutive semesters during doctoral residency. May be repeated. S/NC only. E

610 Internship in Educational Administration (3) Opportunity for doctoral students and advanced graduate students to gain experience in performance of critical tasks of educational administration under supervision of practitioner and University representative. May be repeated at discretion of student's committee. Maximum 12 hrs. S/NC only. E

611 Current Issues in Educational Administration (1-3) Current topics for practicing school administrators, selected from seminars presented by specialists. Prereq: Presently school supervisor or administrator, or consent of instructor. May be repeated. S/NC 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 multi-variate techniques and applications to various research designs. Prereq: 614 or consent of instructor. Sp
616 Research Methods (3) Overview of descriptive and experimental research designs: data collection, analysis, and interpretation for survey studies and school surveys. Conduct of survey. Prereq: Basic statistics and computer skills or consent of instructor. E
622 Programs for the Professional Preparation of Educational Administrators and Supervisors (3) Exploring designs and methodology for training school administrators at both pre-service and in-service levels. F
629 Seminar in Politics of Education (3) Political theories and practices as they affect operation 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 inquiry. Prereq: 529, 616 or equivalent or consent of instructor. F
638 Advanced Supervision (3) Supervision at district level; roles, responsibilities, and operations: goal development, institutional supervision, staff development, curriculum development, program evaluation, and personnel evaluation. Prereq: 548 or consent of instructor. F,Su
644 Educational Finance and Business Management (3) Contemporary educational finance policies and their influence upon education, nation and citizens. Superintendency team concept, management of school logistical services. Prereq: 544 or consent of instructor. F,Su
646 School Personnel Administration (3) Personnel administration functions for professional and supporting staff in public schools. 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
653 Seminar in Educational Planning Methods (3) Exploration of alternative futures and advanced planning methodologies. Sophisticated planning/forecasting techniques. Prereq: 553 or consent of instructor. F,Su
655 State-Federal Relations in Education (3) Interrelationships of federal, state, and local responsibilities and organizations for analysis by analysis of traditional, legal, fiscal and functional aspects of educational partnership. Funding partnerships; discussion of grant proposal development processes. Sp
656 Legal Foundations of Public Education (3) School law; constitutional foundations as they relate to public education at state and local levels. F,Su
658 Conflict Management (3) Social conflict and its management. Causes of interpersonal, intergroup, and organizational conflict, 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
660 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
667 Seminar in Educational Facility Planning (3) Concepts and techniques for evaluating educational facilities, conducting comprehensive school surveys, and developing educational specifications. Prereq: 547 or consent of instructor. Sp
690 Specialized Seminar (3) Prereq: Consent of instructor. May be repeated. E
693 Independent Study in Educational Administration and Supervision (3) Prereq: Consent of instructor. May be repeated. E

Higher Education

GRADUATE COURSES

455 Seminar in Student Leadership (1) Knowledge and skills in leadership roles for resident assistants, student government leaders, student activities, and other student organizations. Topics to be assigned. May be repeated. 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
503 Problems in Lieu of Thesis (3-6) May be repeated. S/NC only. E
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
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. F
572 Theory and Practice in Student Personnel Services (3) Theoretical framework of college student personnel services and practical application of theory in student services environment. Applicable administrative theory, human development theory and evaluation assessment techniques. Sp
586 The Community-Junior College (3) History and role of two-year college, major functions, organization and administration, problems and issues. Sp
593 Independent Study (3) Prereq: Consent of supervisory instructor. May be repeated. S/NC or letter grade. E
599 Practicum in College Student Personnel (1-6) Prereq: Consent of instructor. May be repeated. S/NC only. E
619 Administration and Governance of Higher Education (3) Trends, structure and process of collegiate governance. Development of understanding of administrative theory and practice in higher education. Prereq: 543 or consent of instructor. Sp
630 Special Topics (1-3) May be repeated. E
640 College and University Law (3) Legal precedent affecting organizations, administration, and finance of higher education. Academic freedom, faculty termination, religion, tort liability, administrative law, academic due process and affirmative action in employment. Sp
645 Curriculum and Instruction in Undergraduate Higher Education (3) Content and organization of institutional strategies and curricular structure in higher education. F,Su
650 Fiscal Problems in Higher Education (3) Revenue sources, appropriation process, budget procedures, cost analysis, and fiscal management in public and independent colleges and universities. Sp
693 Independent Study (3) Prereq: Consent of supervisory instructor. May be repeated. S/NC or letter grade. E
695 Practicum in Higher Education (1-6) Supervised practicum in selected areas of education administration. Prereq: Consent of instructor. May be repeated. S/NC only. 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

Electrical and Computer Engineering

(College of Engineering)

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

Joseph M. Googe, Head

Professors:
Ables, J., M., Ph.D. Wisconsin
Bailey, J., Milton, Ph.D. Georgia Tech
Birdwell, J., Douglas, Ph.D. MIT
Bishop, Asa, Jr., Ph.D. Clemson
Blalock, T., Vaughn, Ph.D. Tennessee
Bodenheimer, Robert E., Ph.D. Northwestern
Bose, Bimal K. (Condra Chair of Excellence), Calculutta
Boudin, Donald W., Ph.D. Vanderbilt
Cunningham, James W. (UTSI), Tennessee
Gonzalez, Rafael C. (Distinguished Prof.), Ph.D. Florida
Gooche, Joseph M., Ph.D. Georgia Tech
Green, Walter L., Ph.D. Texas A&M
Hoffman, Graham W., Ph.D. Harvard
Hung, James C. (Distinguished Prof.), Ph.D. New York
Kennedy, Eldredge J., Ph.D. Tennessee
Lawler, Jack S., Ph.D. Michigan State
Leffell, Will O. (Emeritus), M.S. Tennessee
Neff, Herbert P., Ph.D. Auburn
Pace, Marshall O., Ph.D. Georgia Tech
Pierce, J. Frank (Distinguished Prof.) (Emeritus), Ph.D. Pittsburgh
Rochelle, Robert W. (Emeritus), Ph.D. Maryland
Roth, J. Reece, Ph.D. Cornell
Symonds, Frederick W., Ph.D. Nottingham
Tillman, James D. (Emeritus), Ph.D. Auburn
Weaver, Charles H. (Emeritus), Ph.D. Wisconsin

Associate Professors:
Beitz, Donald A. (UTSI), Ph.D. Tennessee
Bomar, Bruce W. (UTSI), Ph.D. Tennessee
Joseph, Roy D. (UTSI), Ph.D. Case Western
Rosenberg, David, Ph.D. New York
Rochelle, James M., Ph.D. Tennessee
Trivedi, Mohan M., Ph.D. Utah State
Waller, J. Wayne, Ph.D. Tennessee

Assistant Professor:
Abdi, M. A., Ph.D. Tennessee
Brazkovic, Dragana, Ph.D. Florida
Crilly, Paul B., Ph.D. New Mexico State
Koch, Daniel, Ph.D. Missouri (Rolla)
Smith, L. Montgomery (UTSI), Ph.D. Tennessee

Lecturers:
Adams, Raymond K., M.S., P.E. Tennessee
Martin, Clyde D., Jr., M.S. Tennessee
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 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 taken during a one-year academic year of full-time study, or the degree may be obtained in two or three years of study in the evening. Graduate assistantships are available for outstanding students, who may obtain the Master's degree in one calendar year.

Admission Requirements

Students applying for admission to the Master of Science program and who hold a B.S. in Electrical Engineering are considered for admission on an individual basis. The minimum expectation is an undergraduate cumulative grade-point average of 3.0 out of 4.0 and a GPA of 3.0 for the senior year. A TOEFL score of 580 is required for international students.

Students who hold the B.S. or B.A. in a field other than electrical engineering are also expected to have a minimum cumulative grade-point average of 3.0 and a minimum senior year average of 3.0 in that field. These students should also have a background equivalent to that obtained by earning credit with a minimum 3.0 grade-point average in the Electrical Engineering courses normally taken at the 200 and 300 levels in the Bachelor's program in this department, and two senior electrical and computer engineering courses (and any labs associated with them) in the student's area of interest. Students from fields other than electrical engineering who have met the admission standards except for this background will be admitted only as non-degree students until they have completed coursework to provide this background.

Master's Degree Requirements

Specific degree requirements which must be met include:

1. Electrical 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 on 400-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, electromagnetics, computer engineering, power systems, solid-state electronics, and control systems. Applicants must submit scores on the General Graduate Record Exam. Specific departmental requirements for the Ph.D. include the following:

1. A Master of Science or Master of Engineering degree.
   a. A minimum of 24 semester hours of work in electrical and computer engineering courses at the 500 and 600 levels.
   b. A minimum of 9 semester hours of 600-level coursework. At least 3 semester hours of this work must be in an area other than the student's major area.
   c. A minimum of 12 hours of mathematics courses approved by the Electrical and Computer Engineering Graduate Commit-tee. All 12 hours must be 400-level or above, and at least 6 hours must be at 500-level or above.
3. One foreign language if the student's faculty committee feels that a reading knowledge of a foreign language is crucial to the student's research efforts.
4. Satisfactory performance on both a qualifying and comprehensive examination. The qualifying examination is prepared by the electrical and computer engineering faculty and consists of a 3-hour written examination in each of four areas. Areas (1) mathematics and transform methods, and (2) basic electrical network analysis, are required of all Ph.D. students. Areas (3) and (4) are usually chosen from two of the graduate courses in the department and cover material from undergraduate courses and first year graduate courses. A student who fails the qualifying examination must take and pass the examination the next time it is offered to remain in the Ph.D. program. The qualifying examination is normally taken after the completion of 24 hours of graduate coursework or immediately after completion of a Master's degree. A minimum of 18 hours of graduate coursework must be completed after the student has taken the qualifying examination the first time.
   a. The comprehensive examination is prepared by the student's doctoral committee and consists of a 3-hour written examination in the student's major area, a 2-hour written examination in a related area, and an oral examination. The comprehensive examination is normally taken at least six months after passing the qualifying examination. Part of the comprehensive oral examination will be a defense of a formal written dissertation proposal. The comprehensive examination must be passed and the dissertation proposal accepted by the student's doctoral committee before the student is reported as ready for admission to candidacy for the Ph.D.
   b. Participation in departmental seminars.


Many of the electrical and computer engineering courses are offered in the evening. Engineers working in industry are encouraged to participate in the department's graduate program. Departmental graduate programs are also available at the Space Institute, Tullahoma. Departmental actions regarding a graduate student may be appealed in writing, first to the Department Graduate Committee and then to the Department Faculty.

GRADUATE COURSES

Courses required in the Electrical and Computer Engineering electives for the program cannot be used in either the M.S. or Ph.D. programs. No 400-level course may be used toward a graduate degree in Electrical and Computer Engineering except when required by the program.

405 Digital Signal Processing and Filter Design

409 Digital Signal Processing and Filter Design Laboratory

411 System Modeling and Simulation

416 Passive and Active Network Synthesis

421 Electric Energy Systems

422 Machines

423 Power Electronics

424 Power Electronics Circuits

425 Direct Electrical Energy Conversion

426 Machines Lab

429 Power Electronics Lab

431 Digital and Analog Integrated Electronics

Electrical and Computer Engineering 81
application in conventional devices. Differential equa-
tions for rotating machinery. Prereq: 422 or equivalent.

529 Advanced Electrical Machines II (3) Park's trans-
form and two-axis model, transient behavior of
529 Advanced Analog Electronics I (3) Physical op-
erational amplifiers, op-amps; second-order devices:
diodes, bipolar transistors, J-FETS, and MOS-FETS:
Small-signal equivalent circuits and noise models of
active devices. Project laboratory. Prereq: 451, 432,
531 Advanced Analog Electronics II (3) Design and
analysis of linear wide-band low-noise feedback amplifi-
eries and radio-frequency amplifiers for discrete, mono-
532 Advanced Analog Electronics II (3) Design and
analysis of linear wide-band low-noise feedback amplifi-
eries and radio-frequency amplifiers for discrete, mono-
lithic and hybrid devices; voltage and current regulators,
switching regulators. Use of specialized electronic sys-
tems in high-fidelity signal processors. Advanced topics from
541 Electromagnetic Fields (3) Maxwell's equations,
special relativity, wave reflection and transmission,
generalized media, guided waves, radiation from current
542 Radiation and Propagation (3) Linear antennas,
loop antennas, aperture antennas, optical transfer func-
tion. Canonical problems of modern geometrical theory
directions. Diffraction and geometric optics approximation,
and accountings of far fields and near fields due to edge and surface
543 Information Systems I (3) Mathematical treatment
of information transmission in communication systems;
modulation and demodulation; discrete and analog sys-
tems. System performance with noise and bandwidth
544 Information Systems II (3) Wiener's theory of
digital filter design in real time and real frequency; digital
545 Introductory Microwave Networks and Components
(3) Scattering and transfer representation for
multiports; unilateral and bilateral microwave and milli-
546 Digital Communications and Spread Spectrum
Systems (3) Digital data transmission systems in pres-
ence of noise. Signal processing methods and optimum
547 Quantum Electronics I (3) Interaction of electro-
548 Measurement Science II (3) (Same as Nuclear
Engineering 589.)
549 Special Topics in Systems Theory II (3) Topics of
550 Special Topics in Microwave Networks (3) Analysis of
electric energy systems. Prereq: Consent of instructor.
551 Special Topics in Nonlinear Oscillators (3) Analysis
of nonlinear O.D.E.'s, geometric analysis and numerical
552 Plasma Diagnostics II (3) Laboratory instruction in
operation of plasma diagnostic instruments in plasma
diagnostic techniques and integration of measured data
with design procedures. Prereq: Consent of instructor.
651 Computer-Aided Design of VLSI Systems I (3)
Fabrication of micromechanical devices; computer architecture design; algorithmic state machines; partitioning; structured design methodology. Prereq: 551-2 or consent of instructor.

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

653 Advanced Plasma Physics I (3) Basic concepts of high temperature plasma physics. Magnetohydrodynamics and kinetic descriptions of plasma, plasma transport, plasma waves, equilibrium, and stability. Prereq: Physics 541-2, 461-2 or 563-4, or consent of instructor. (Same as Physics 663.)

654 Advanced Plasma Physics II (3) Plasma heating and radiation phenomena. Advanced topics of current interest. Must be taken in sequence. Prereq: 653. (Same as Physics 664.)

671 Image Processing and Robotics I (3) Three-dimensional scene modeling and recognition, multi-sensor systems. Prereq: 572 or 573 or consent of instructor.

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

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

681-82 Quantum Electronics (3,3) Prereq: Consent of instructor.

691 Advanced Graduate Seminar (1) Research in department. May be repeated. S/NC or letter grade. Maximum 9 hrs.

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

**Engineering Science and Mechanics**

(College of Engineering)

**MAJOR DEGREES**

Engineering Science ........................ M.S., Ph.D.

Jerry E. Stoneking, Head

Professors:

Antar, B. (UTSI), Ph.D. .................. Texas
Carley, T. G., PE, Ph.D. ................... Illinois
Forrester, J. H., PE, Ph.D. ............... Iowa State
Fortey, J. W., PE, Ph.D. ................... Doctorate

Frost, W. (UTSI), Ph.D. ..................... Toulouse (France)
Jendrucko, R. J., PE, Ph.D. ............... Virginia
Keffer, D. R. (UTSI), Ph.D. ................ Florida
Kim, K. H., Ph.D. ........................... NC State
Krieg, R. D., Ph.D. .......................... New Mexico
Lawrence, J. D., PE, Ph.D. ............... Leigh
Lee, C. W. (Emeritus), Ph.D. ............. Illinois IT
Lyday, W. A., M.S. ....................... Tennessee
MCCay, T. D. (UTSI), Ph.D. .............. Auburn
Pih, H., PE, Ph.D. ........................... Illinois IT
Reimenyik, C. J., Ph.D. .................... Johns Hopkins
Richardson, R. M. (UTSI), Ph.D. ........ AIFIT
Scott, W. E., Ph.D. ........................ Johns Hopkins
Shahriki, F. (UTSI), Ph.D. ............... Oklahoma
Shobe, L. R. (Emeritus), PE, M.S. ....... Kansas State

Associate Professors:

Boulet, J. A. M., Ph.D. .................... Stanford
Caruthers, J. E. (UTSI), Ph.D. ......... Georgia Tech
Engles, R. C. (UTSI), Ph.D. .............. VPI
Mathews, A., PE, Ph.D. ................... Illinois
McCay, M. H. (UTSI), Ph.D. ............. Florida
Steinhoff, J. S. (UTSI), Ph.D. ........... Chicago

Assistant Professor:

Brooks, G. N., Ph.D. ........................ Stanford

Instructor:

Foster, S., M.S. ............................. Tennessee

Graduate programs leading to the degrees of Master of Science and Doctor of Philosophy with a major in Engineering Science are available to graduates of recognized curricula in engineering, mathematics, or one of the physical or biological sciences. Program concentrations include solid mechanics, fluid mechanics, computational mechanics, biomedical engineering, and optical engineering (UTSI only.) In each of these concentrations, interdisciplinary programs are arranged to meet individual needs or interests. Each applicant is advised as to any prerequisite courses before entering a program; the student's program of study must be approved by his/her advisory committee, and must comply with the requirements of The Graduate School. The student's major professor may be selected from a department other than the Department of Engineering Science and Mechanics; however, at least one member of the student's graduate advisory committee must be on the faculty of the Department of Engineering Science and Mechanics.

A departmental application is required in addition to 1. Graduate School application. The names and addresses of four references must be included with the departmental application.

The flexibility and interdisciplinary aspect of the program concentrations are intended to be of particular interest to prospective students currently employed in research, development, or design activities and whose interests in continuing education (either full-time or part-time) lie at one of the interfaces between science and engineering or can best be met by interdisciplinary study in engineering. The department's course offerings and research activities are also intended to meet the needs of students who seek preparation for employment in engineering areas requiring specialization in mechanics or in related interdisciplinary studies such as biomechanics.

**THE MASTER'S PROGRAM**

Two M.S. options are offered: option I requires a thesis, while option II does not. The second plan is restricted to those students who have had significant engineering professional work experience.

In option I, a minimum of 30 semester hours including the thesis is required. In option II, a minimum of 33 hours is required. The requirements include the following:

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<th>Hours</th>
<th>Credit</th>
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<tbody>
<tr>
<td>Thesis</td>
<td>6-9</td>
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Mathematics

1. Engineering courses" (Major concentration may include but is not restricted to courses offered by the Engineering Science and Mechanics Department.)

2. Related courses (May include additional courses in mathematics, computer science, or the physical and life sciences as well as engineering courses.)

A final examination is required under both options covering graduate coursework and the thesis.

**THE DOCTORAL PROGRAM**

Specific departmental requirements for the Ph.D. include:

1. A minimum of 72 semester hours beyond the Bachelor's degree, exclusive of credit for the Master's thesis. These shall include a minimum of 24 semester hours in Doctoral Research and Dissertation and a minimum of 48 semester hours in other courses.

2. A minimum of 24 semester hours in engineering graduate courses, exclusive of thesis and dissertation credit. These courses will normally be numbered 500 and above, with at least 9 semester hours of 600-level courses, which constitute one or two areas of concentration selected by the student. The number of courses in this group to be taken will depend on the program selected by the student and the approval of his/her advisory committee.

3. A minimum of 12 semester hours in mathematics or computer science courses numbered 400 and above, exclusive of a first course in ordinary differential equations.

4. Attendance and participation in graduate seminars and colloquia.

5. Two doctoral examinations must be passed to be admitted to candidacy for the Ph.D. in Engineering Science.

After being admitted as a potential candidate for the Ph.D., a qualifying examination must be taken at the first offering after the student has either completed a Master's degree or completed 24 semester hours of graduate credit. The purposes of qualifying examinations are:

a. To determine the qualifications of the student to continue the Ph.D. program, and
b. To identify the areas of strengths and weaknesses to guide the student's graduate coursework and research.

The qualifying examination will be administered by the department's Graduate Studies Committee. The examination will be written and will cover at least four graduate level subject areas. One subject area will be mathematics, and the others will be designated by the student.
subject to the approval of the department's Graduate Studies Committee.

The comprehensive examination is to be taken by students within 6 credit hours of completion of graduate coursework required for the Ph.D. degree. This examination is to be administered by the student's advisory committee and shall consist of both a written and an oral portion.

6. After successfully passing the qualifying and comprehensive examinations, the student must present the Ph.D. dissertation research proposal to the student’s advisory committee and receive committee approval of the proposal before being admitted to candidacy for the Ph.D.

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 allows legal resident students of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The Ph.D. program in Engineering Science and Mechanics is available to residents of the state of Florida. Additional information may be obtained from the Resident Advisory in the Office of Graduate Admissions and Records.

GRADUATE CREDIT FOR 400-LEVEL COURSES

Four-hundred-level courses in engineering may be used for graduate credit at the discretion of the appropriate department. However, at least two-thirds of minimum required credit hours in a Master's degree program must be at or above the 500 level.

GRADUATE COURSES

421 Materials of Engineering (3) Mechanical properties of engineering materials; data collection and processing; time dependent and cyclic dependent properties. Prereq: 321, Materials Science and Engineering 201, 3 hrs or 2 hrs and 1 lab.

423 Fracture-Safe Design (3) Critical review of variables controlling fracture toughness: part and flaw geometry, temperature, loading rate, section size, material; characterization of fracture toughness by stress intensity factor, energy release rates, 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.

425 Principles of Nondestructive Testing (3) Principles and theory of nondestructive testing methods; liquid penetrant, magnetic particle, eddy current, ultrasonic, acoustic emission, and radiographic methods. Laboratory. Prereq: 321, Materials Science and Engineering 201. (Same as Physics 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: 321, Mathematics 231.

433 Dynamic Systems (3) Three dimensional dynamics of particles and rigid bodies; gyroscopes; variable mass systems; central force motion. Lagrange's equations; stability; transfer functions. Prereq. Dynamics.

450 Engineering Acoustics (3) Concepts of acoustics, measures of sound and their units; noise generation and transmission, noise control principles and application, materials and procedures for noise abatement. Prereq: Introductory course in vibrations or acoustics.

442 Fluid Mechanics II (3) Differential forms of basic laws; compressibility, isentropic flow, shocks, duct flows with heat transfer and friction; open channel flow, critical flow, energy methods; internal and external viscous flows, boundary layers, elementary turbulent closure models. Prereq: 431.

461 Experimental Stress Analysis (3) Theory, techniques, and instrumentation of resistance strain gauges; theory and techniques of brittle coating method; introduction to testing equipment and procedures. Prereq: 321, Electrical and Computer Engineering 301. 2 hrs and 1 lab.

463 Photomechanics (3) Introduction to photoelasticity, photoelastic method, Moiré methods, interferometry, and holography. Prereq: 321, Physics 232. 2 hrs and 1 lab.

465 Dynamic Data Acquisition (3) Use and calibration of instrumentation for measuring and recording dynamic events; Fourier analysis; transfer function analysis, digital signal processing, transduction, experimental parameter estimation with applications to modal vibration analysis. Prereq: 451. Electrical and Computer Engineering 301. 2 hrs and 1 lab.

471 Clinical Engineering and Bioinstrumentation (3) Function and characteristics of health care delivery systems; hospital organization and health care economics; development and management principles for hospital-based clinical engineering programs. Biomedical instrumentation characteristics; performance of transducers, signal conditioning, data readout and storage devices; evaluation of commercially available systems and procurement methods. Introduction to a custom-designed system, equipment maintenance and control programs for hospitals. Ethical issues and professionalism in the biomedical engineering profession. Introduction to Pattern Recognition.

473 Biomechanics (3) Mechanical properties of living tissues; biomechanics of injury; mechanics of prosthesis; material compatibility of prosthetic devices; biomechanical problems related to impact. Prereq: 321.

475 Design of Artificial Internal Organs (3) Design, development and evaluation of artificial internal organs; analysis of transport processes in therapeutic devices for design optimization; review of currently available devices; federal regulation and ethical considerations. Prereq: 341.


494-65 Special Engineering Science Topics (3) Problems related to recent developments and practice. Open to juniors or seniors. Prereq: 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 not be used toward degree requirements. May be repeated. S/N only. E


523 Theory of Elasticity (3) Equations of equilibrium; strain-displacement relations compatibility, and constitutive equations in three-dimensions. Beams, disks, thick-walled tubes, plates with holes; stress concentrations. Airy and complex potential stress function, plane stress, plane strain in rectangular and polar coordinates. Thermal stresses in beams, rings, plates, and shells; thermal buckling problems.

525 Theory of Plates (3) Classical bending theory of thin plates; thick plates; buckling and deflection problems. Prereq: 523 or 523.


536 Advanced Engineering Acoustics (3) Introduction to theory and application of acoustic analysis; vibration of continuous systems, plane and spherical waves, transmission, reflection and scattering. Resonators, filters, absorption mechanisms, microphones, ultrasonic systems, sonar transducers. Prereq: 431 or 435.

539 Continuum Mechanics (3) Cartesian tensors, transformation laws, basic continuum mechanics concepts; stress, strain, deformation, constitutive equations. Conservation laws for mass, momentum, energy. Applications in solid and fluid mechanics.

541 Fluid Dynamics I (3) Kinematic, kinetic and thermodynamic properties of fluids. Development of rate deformation laws, momentum, mass transfer models, constitutive relationships; non-dimensionalization. Applications of Euler and Navier-Stokes equations: exact solutions, potential flow, transonic, boundary layer, approximations; coupled heat/mass transfer models. Coreq: 539.

542 Fluid Dynamics II (3) Development of basic concepts and governing equations for turbulence and turbulent field motion. Formulation for correlation function, energy spectra, diffusion. Introduction to turbulent transport processes, free turbulence, wall turbulence; use of engineering turbulence closure models; examination of modern numerical and experimental methods. Prereq: 541.


563 Computational Solid Mechanics (3) Finite element analysis techniques in structural mechanics and elasticity, nonlinearties. Two and three-dimensional finite-element solutions for isoparametric elements; finite element shape functions; equation solving; substructuring; skyline solvers; matrix iteration techniques. Applications in beams,
plates and shells; use of representative computer programs in networked mini-computer/workstation environment; use of graphics, solid modeling, data base management. Prereq: 551.

557 Computational Mechanics Seminar (1) Current developments in computational fluid/thermal structural/mechanical mechanics. For departmental thesis students only. May be repeated.


561 Photoelasticity (3) Polarized light; basic principles of photoelasticity; experimental techniques and equipment; numerical methods in photoelastic stress analysis; three-dimensional photoelasticity; applications. Prereq: Mathematics 431. 2 hrs and 1 lab.

566 Optical Engineering I (4) Wave optics; scalar diffraction theory; introduction to Fourier optics; ray or geometric optics; lens, mirror, gratings; paraxial design methods; introduction to aberrations.

567 Optical Engineering Laboratory I (2) Laboratory in support of Optical Engineering I (566). Prereq or coreq: 566.

568 Optical Engineering II (4) Statistical optics; spontaneous and induced emission; black and gray body radiation; incoherent, partial and totally coherent radiation; mutual coherence function; detectors; radiometry. Prereq: 566.

569 Optical Engineering Laboratory II (2) Prereq: 567. Coreq: 568.


581 Special Topics in Engineering Mechanics (3) Mechanics problems related to recent developments. Prereq: Consent of instructor. May be repeated with consent of department.

588 Measurement Science I (3) (Same as Nuclear Engineering 588, Chemical Engineering 586, Civil Engineering 586, Electrical and Computer Engineering 586, Aerospace Engineering 586, and Mechanical Engineering 588.)

589 Measurement Science II (3) (Same as Nuclear Engineering 589, Chemical Engineering 589, Civil Engineering 589, Electrical and Computer Engineering 589, Aerospace Engineering 589, and Mechanical Engineering 589.)

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

621 Analysis and Design of Thin Shell Structures (3) Geometry of surfaces, derivation of thin shell theory for arbitrary shell geometry; selected applications of theory in structural engineering. Prereq: 525 or Civil Engineering 559.


624 Viscoelasticity (3) Viscoelastic constitutive relations, relaxation and retardation; boundary value problems; wave propagation in viscoelastic materials; stability problems; determination of viscoelastic properties. Prereq: 523 and 539 of Physics. Prereq: Consent of instructor. May be repeated with consent of department.

625 Theory of Plasticity (3) Yield conditions; strain hardening; general constitutive equations; plastic potential; uniqueness theorems; extremum and variational principles. Problems in perfectly plastic solids; finite plastic deformation; piecewise linear plasticity. Applications. Prereq: 523.


641 Advanced Topics in Fluid Mechanics and Convective Heat Transfer (3) Convective momentum, heat and mass transfer, boundary layer analysis, stability, transition, turbulence, closure models; Navier-Stokes equations, closure procedures, time and space averaging, large scale structures; high speed flow, reacting, nonreacting, excitation, ignition. Applications in propulsion. Prereq: Consent of instructor.

645 Theory of Turbulence (3) Mathematical descriptions of turbulence; isotropic turbulence, energy spectra, Kolmogorov's hypothesis, large and small eddy structure for turbulent flows; turbulent diffusion by continuous movement; applications to turbulent jets, wakes, pipe flow, and boundary layers. Prereq: 542, (Same as Aero/Erg Engineering 945.)

651-52 Advanced Topics in Computational Fluid Dynamics (3,3) Approximation theory; analysis of accuracy; convergence, and stability for smooth and non-smooth solutions; shocks, artificial dissipation; two- and three-dimensional, compressible viscous and inviscid flows; potential, Euler and complete Navier-Stokes equations, numerical methods for hyperbolic systems. Prereq: Consent of instructor. May be repeated with consent of department.

653-54 Advanced Topics in Computational Solid Mechanics (3,3) Fracture mechanics; singularity solutions; non-linear elasticity; problems, variable stiffness, initial strain and initial stress methods, plasticity, creep, unified creep-plasticity theory; geometrically non-linear problems, large deflection, stability; shell structures; analysis of accuracy, convergence, adaptive grids. Prereq: 553.

657 Computational Mechanics Seminar (1) Current developments in computational fluid/thermal/structural mechanics. For departmental thesis students only. May be repeated.

681 Advanced Topics in Engineering Mechanics (3) Advanced problems in mechanics, group or individually. Prereq: Consent of instructor. May be repeated with consent of department.

English

(College of Liberal Arts)

MAJOR

DEGREES

English ........................................ M.A., Ph.D.

Dorothy M. Scoura, Head

Professors:


Associate Professors:


Assistant Professors:


The Department of English offers the Master of Arts and the Doctor of Philosophy degrees with a major in English. Thesis and non-thesis options are available for the M.A. as well as a special concentration in writing. Detailed information about the Master's and doctoral programs, and about individual graduate courses, may be obtained by writing to the Director of Graduate Studies in English, 306 McClung Tower.

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 maintained at least a 3.0 GPA.
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: A candidate presenting a thesis or creative project must pass a ninety-minute oral examination, consisting of a short thesis defense, but chiefly of questions covering the general history of English and American literature, not merely the coursework taken. A reading list of primary works designed to help the student prepare for these questions is available in the office of the Director of Graduate Studies in English.

A non-thesis student must pass a written examination, followed by a one-hour oral examination, both consisting of the same sort of questions as the examination taken by the thesis student.

Residence Requirement: There is no residence requirement for the M.A., but students should attempt to pursue a full-time program whenever possible.

WRITING CONCENTRATION

The Master’s program with writing concentration is intended for those students who plan to do free-lance writing, specialize in teaching writing courses at the college level, or work as professional writers in business or industry. Students who go on to complete the Ph.D. may also find the Master’s with writing concentration helpful when they are seeking teaching positions.

Requirements:
The requirements for the writing concentration are the same as those for the thesis option above with the following exceptions:

Coursework: Writing students may substitute two 400-level writing courses for two 500-level courses. Students must take at least 9 hours in writing and 9 in literature, the remaining 6 to be selected from any English courses at the proper level. Of the courses in writing, at least 3 hours must be taken at the 500 level; additional 500-level courses are strongly recommended.

Writing Projects: One of the following writing projects for six hours of credit:
1. A thesis, using research to analyze some aspect of writing or rhetorical theory.
2. A creative project, such as a collection of poems or short stories, a short novel, a play, or a creative work of non-fiction prose.

The nature and length of each project will be determined by the Director of Graduate Studies after consultation 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.

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 57 semester hours beyond the B.A. to include at least 24 semester hours in the 500 level; at least 15 semester hours at the 500 level or above (Only 3 hours of 593 Independent Study may be applied toward the M.A. and 3 after the M.A.); a special course in teaching composition; and 15 additional hours at any level, including the 400 level. Up to 6 of these additional hours may be taken in some cognate field or fields such as history, philosophy, French. These courses may be drawn from those approved for graduate credit. All other coursework must be in the English department. In this course work, students must normally maintain a 3.5 GPA.

Dissertation: Twenty-four semester hours of dissertation. These represent the research for and writing of the dissertation. The research and dissertation will be directed by a faculty member of the department and approved by a doctoral committee of three or four other faculty members.

Language Requirement: A language examination may be taken in one of the following ways:
1. Two languages approved by the Director of Graduate Studies in English. The requirement for each language may be fulfilled by (a) completion of French 302 or German 332 with a grade of B or better; (b) completion of UT Knoxville of any two courses on the 300 level or above in the foreign language or literature with at least a grade of B in each course; or (c) passing of the regular Ph.D. foreign language examination as currently administered at UT Knoxville.
2. One modern language approved by the Director of Graduate Studies in English. This requirement must be fulfilled by passing a passing grade on the language examination given by UT Knoxville and completion of two courses given in the foreign language at the 400 level or above, at least one course to be at the 500 or 600 level. A minimum grade of B must be received in each course.
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. For the other 3 hours, the student may either complete the history of the language sequence or choose one other course in language taught in the Department of English at the 500 or 600 level and approved by the Director of Graduate Studies in English. These courses will not count toward the minimum number of courses for the Ph.D., and anyone electing this language option may not take the comprehensive examination in linguistics.

Examinations:
1. A 4-hour qualifying examination taken before the end of the first year of Ph.D. coursework; this examination is given three times a year, with the M.A. written examination.
2. A comprehensive written examination which must be approved by the candidate’s committee or the Director of Graduate Studies in English.

The comprehensive examination is given twice a year, normally in March and September. Before a student may take it, he must have completed all coursework required. A student must also have met all requirements for the foreign languages before beginning the first part of the examination.

Dissertation Defense: A one-hour examination on the dissertation and other related areas.

Residence Requirement: Two consecutive semesters as a full-time student. For students not on teaching assistantships, full-time consists of 9 or more hours of coursework and/or dissertation hours each semester. For students on assistantships, full-time consists of at least 6 hours of courses and/or dissertation hours and 3 hours of teaching each semester.

GRADUATE COURSES

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 Shakespeare’s dramatic achievement before 1601. Reading and discussion of selected plays from romantic comedies, including Twelfth Night, English histories, including Henry IV, and early tragedy, including Hamlet.

405 Shakespeare II: Later Plays Shakespeare’s dramatic achievement between 1601 and 1613. Reading and discussion of selected plays from great tragedies, including Othello; problem plays, including Measure for Measure; and dramatic romances, including The Tempest.

406 Renaissance Drama (3) English theatre between 1590 and 1640 through reading of representative plays by Shakespeare’s contemporaries: Marlowe, Webster, Jonson.

409 Spenser and his Contemporaries (3) Principal achievements in prose and poetry of sixteenth century authors; Spenser, Wyatt, Marlowe, More, Sidney, and Bacon.

410 Milton, Donne and their Contemporaries (3) Principal achievements in prose and poetry of seventeenth century authors: Milton, Donne, Marvell; and prose of Browne, Bacon, Walton.


412 British Drama from 1660 to 1800 (3) Playwrights from Dryden and Wycherley to Goldsmith and Sheridan; formal developments: heroic play, comic comedy, affective tragedy, and exemplary drama.

413 The Eighteenth-Century British Novel (3) Defoe to Austen.

414 Romantic Poetry and Prose (1) Wordsworth, Coleridge, and Blake; readings from Lamb, De Quincey, and other prose writers.

415 Romantic Poetry and Prose II (3) Keats, Shelley and Byron; readings from Hazlitt, Peacock, and other prose writers.

416 Victorian Poetry and Prose (3) Tennyson, Pre-Raphaelites, Carlyle, Newman, and Mill.

419 Victorian Poetry and Prose (3) Browning, Arnold, Hopkins, Hardy, Ruskins, 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 England (3) Literary consciousness and works of British women writers in nineteenth and twentieth centuries. (Same as Women's Studies 422.)
431 Colonial, Federal, and Early National American Literature (3) From Columbus to Washington Irving.
432 American Romanticism and Transcendentalism (3)
433 American Realism and Naturalism (3)
434 Modern American Literature (3) World War I to present.
435 American Novel before 1900 (3) From earliest sentimental novels through Brown and Cooper, and major figures to 1900: Hawthorne, Melville, Stowe, Clemens, and James.
441 Southern Literature (3) Southern writing from colonial period into twentieth century: frontier humorists, local color writers, and Southern literary renaissance.
442 American Humor (3) Early nineteenth century into twentieth century: Mark Twain.
443 Topics in Black Literature (3) Contents vary: particular genres, authors, or theories from 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.
451 Modern British and American Poetry (3) From Yeats and Frost to Auden, Stevens, and more recent poets.
452 Modern British and American Drama (3) O'Neill's works as precursors to modern dramatists: Williams, Miller, Albee, and representatives of Black theater, Bullins and Baraka.
453 Continental Drama (3) Selection of plays (in English translation) by major European writers from late Renaissance to present; twentieth-century a chevement.
454 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.
456 Professional Writing (3) Principles and practices of writing for publication. Dissertation, theses, articles, and reports in science and technology. Prereq: 459 or consent of instructor.
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 Technical Writing (3) Further development of skills acquired in basic writing course. Prereq: 460 or consent of instructor.
462 Advanced Technical Writing (3) For students planning careers in industry, education, and government who need technical writing skills. Writing of definitions, process descriptions, sets of instruction, descriptions of mechanisms, recommendation reports, abstracts, proposals, and major reports. Prereq: Junior standing in student's major or consent of instructor.
463 Advanced Poetry Writing (3) Further development of skills acquired in basic writing poetry course. Prereq: 363 or consent of instructor.
464 Advanced Fiction Writing (3) Further development of skills acquired in basic writing fiction course. Prereq: 368 or consent of instructor.
471 Sociolinguistics (3) Study of language in relation to society. Empirical and theoretical focus. Large-scale units: tribes, nations, social groups. Prereq: 371 or 372 or Linguistics 200 or consent of instructor. (Same as Linguistics 471 and Sociology 471.)
472 American English (3) Phonological, morphological, and syntactic characteristics of major social and regional varieties of American English: origins, functions, and implications for cultural pluralism. Prereq: 371 or 372 or Linguistics 200 or consent of instructor. (Same as Linguistics 472.)
474 Teaching English as a Second or Foreign Language (3) Grammatical structures of English; particular grammatical structures, rules of non-native speakers of English. Basic phonological structures of English. Teaching grammar and phonology to non-native speakers: contrasting analysis of English with other languages. Prereq: Second year of a foreign language. (Same as Linguistics 474.)
475 Teaching English as a Second or Foreign Language (3,3) Content varies: theoretical and practical approaches to teaching English. Prereq: English 474. (Same as Linguistics 475.)
481 Studies in Folklore (3) Topics vary. May be repeated with different topic. Maximum 6 hrs.
482 Major Authors (3) Content varies. Concentrated study of at least one of most influential writers in British or American literary history: e.g., Donne, Tennyson, 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. Prereq: Topics vary. 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. Particular directors, film genres, national cinema movements, or other topics. May be repeated with consent of department. Maximum 6 hrs. (Same as Cinema Studies 489.)
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. F
505 Teaching Freshman Composition (3) Introduction to teaching Freshman English through study of various techniques and philosophies of composition. Required of first-year faculty.
506 Introduction to Literary Research (3) Critical examination of aims of English studies, profession of English teacher, theory of literature, and methods of research: observation, 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) Historical, morphological, and syntactic development of English language: Anglo-Saxon and Middle English.
509 History of the English Language II (3) Historical, morphological, and syntactic development of the English language with concentration on developments after 1500, especially in American English.
513-14 Readings in Medieval Literature (3,3) Reading and analysis of selected masterpieces of Old and Middle English literature and their Continental sources in Modern English.
520-21 Readings and Analysis in Selected Areas of Sixteenth- and Seventeenth-Century Prose, Poetry, and Drama (3,3) Content varies: genre, theme, literary movement, or other coherent emphasis.
530-31 Readings in English Literature of the Restoration and Eighteenth Century (3,3) Topics vary. Genre, poetry, prose, fiction, drama, or other period. Restoration, earlier eighteenth century, later eighteenth century.
540-41 Readings in English Literature of the Nineteenth Century I and II (3,3) Content varies: genre, theme, literary movement, or other coherent emphasis.
Entomology and Plant Pathology

(College of Agriculture)

MAJOR	DEGREE
Entomology and Plant Pathology	M.S.

Carroll J. Southards, Head

Professors:
Bernard, Ernest C., Ph.D. 	Georgia
Gerhardt, Reid R., Ph.D. 	NC State
Hilty, James W., Ph.D. 	Ohio State
Johnson, Leander F. (Emeritus), Ph.D. 	Louisiana State

Assistant Professors:
Grant, Jerome F., Ph.D. 	Clemson
Gwin, Kimberly D., Ph.D. 	NC State
Windham, Mark T., Ph.D. 	NC State

The Department of Entomology and Plant Pathology offers a graduate program leading to the Master of Science with a concentration in entomology or plant pathology. Students in entomology may specialize in crop entomology, medical and veterinary entomology, insect biology, insect pest management, or biological control. Students in plant pathology may specialize in foliar and stem fungus diseases, soil-borne diseases, plant nematology, or virology. For specific information, contact the department head.

THE MASTER’S PROGRAM

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

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

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 Plant Disease Fungi (4) Morphology, taxonomy, biology, and genetics of plant pathogenic fungi; isolation and identification of plant pathogenic fungi. Prereq: 313 or consent of instructor. 2 hrs and 2 labs. F,A

511 Plant Disease Diagnosis (3) Diagnosis of plant diseases, disease symptoms, causal agents and control measures. Prereq: 510 or consent of instructor. 1 hr and 2 labs. Su,A

512 Soil-Borne Plant Diseases (3) Causal agents, host-parasite-environment interactions, epidemiology, and control of soil-borne plant diseases. Prereq: 313. 2 hrs and 1 lab. F,A

515 Physiology of Plant Disease (3) Biochemical and physiological processes involved in host-pathogen interactions. Mechanisms of disease resistance. Prereq: Introductory plant physiology and pathology, or consent of instructor.

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

521 Plant Virology (3) Symptomatology, epidemiology, and management of virus infection; structure, morphol- ogy, replication, transmission, purification, characterization, and classification of plant viruses; virology; plant pathogenic viroids, mycoplasmas and spiroplasmas. Prereq: 313 or consent of instructor. 2 hrs and 1 lab. Sp,A

523 Field Crop and Vegetable Insects (2) Identification, biology and management of insects affecting commercial vegetable and home garden crops. Prereq: 321 or basic entomology course. 1 hr and 1 lab. F,A

525 Medical and Veterinary Entomology (3) Mor- phology, taxonomy, biology, and control of arthropod parasites and vectors of pathogens of humans and animals. Ecology and behavior of vectors in relation to pathogen transmission and control. Prereq: 321 or 325, or Zoology 380, or consent of instructor. 2 hrs and 1 lab. Sp,A

530 Integrated Pest Management (3) Principles and application of biological, cultural, genetic, behavioral, and chemical methods of control to maintain pest populations below economic threshold levels. Prereq: 321, or consent of Instructor. (Same as Plant and Soil Science 530) F,A

531 Special Problems in Entomology (1-3) Comprehensive individual study of current problems. May be repeated. Maximum 6 hrs. E

532 Special Problems in Plant Pathology (1-4) Comprehensive individual study of current problems. May be repeated. Maximum 6 hrs. E

533 Concentrated Study in Entomology (1-3) Selected subjects in entomology for advanced students, concentrated in time and subject matter. Prereq: 321 or basic entomology course. May be repeated. Maximum 6 hrs. F,Sp

541 Seminar (1) Review of literature and current re- search in entomology and plant pathology. May be repeated. Maximum 2 hrs. E

Environmental Practice

(College of Veterinary Medicine)

MAJOR	DEGREE
Veterinary Medicine 	D.V.M.

L. N. D. Potgieter, Head

Professors:
Farkas, W. R., Ph.D. 	Duke
Oliver, J. W., D.V.M., Ph.D. 	Purdue
Potgieter, L. N. D., Ph.D. 	Iowa State
Reed, C. F. (Emeritus), D.V.M. 	Ohio State

Associate Professors:
New, J. C., D.V.M. 	Texas A&M
Schroeder, E. C., D.V.M. 	Michigan State

Assistant Professors:
Frazier, D., D.V.M., Ph.D. 	NC State
Lothrop, C. D., D.V.M., Ph.D. 	Tennessee
Morris, P. J., D.V.M. 	California (Davis)
Scott, J. A., V.M.D. 	Pennsylvania

Clinical Associate:
Funk, R. S., D.V.M. 	Ohio State

Post-Doctoral Research Associate:
Mishu, L., D.V.M. 	Texas A&M

See Veterinary Medicine for program description.

GRADUATE COURSES

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

501 Special Topics in Environmental Medicine (1-3) Aberrant metabolism, pharmacokinetic studies, toxicologic studies, epidemiology and techniques in molecular biology; atomic absorption, gas chromatography, ultracentrifugation, extraction techniques and radioimmunoassay. 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 is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

503 In Vitro Evaluation of Toxicity (3) Principles and techniques of in vitro evaluation of toxicity: mutagenesis, carcinogenesis, and teratogenesis. Prereq: Biochemistry 561 and consent of instructor. Sp,A


581 Pharmacology (4) Principles of pharmacokinetics and pharmacodynamics properties of drugs: mode of action, pharmacologic effects, chemical and physical properties, metabolism, toxicities, important idiosyncrasies and clinical applications. Prereq: Consent of instructor. F

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

610 Advanced Topics in Environmental Medicine (1-3) Current and future research methodology, laboratory situation, recent advances in instrumentation in analytical techniques for environmental medicine. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E
Finance

(College of Business Administration)

MAJOR DEGREES
Business Administration MBA, Ph.D.

Harold A. Black, Head

Professors:
Black, Harold A., Ph.D. Ohio State
Dorferweil, William W. (Wm. Voight Prof.), Ph.D. Pennsylvania
Goosby, G. C., Ph.D. Wisconsin (Milwaukee)
Hillard, Jimmy E. (Clayton Prof. of Excellence), Ph.D. Tennessee
Philippatos, G. C. (Distinguished Prof.), Ph.D. New York
Shriever, Ronald E. (Faculty Scholar), Ph.D.

Associate Professors:
Auxier, A. L., Ph.D. Iowa
Boehm, T. P., Ph.D. Washington (St. Louis
Wachowicz, J. M., Jr., CPA, Ph.D. Illinois
Wansley, James, W., Ph.D. South Carolina

BUSINESS ADMINISTRATION CONCENTRATIONS

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

MBA Concentration: Finance.
The curriculum offers courses for those interested in careers in corporate financial management, security analysis and investments, banking and financial institutions, and real estate.

Minimum course requirements are three courses: Finance 521, plus two courses from the following: 511, 512, 502, 531, 502, 581, or 582. A fourth finance course of the student's choice is strongly advised. Courses selected must be approved by the Finance Department MBA advisor.

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.

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: 501.

512 Problems in Financial Management (3) Readings and cases that apply finance theory to real world investment, financing, and asset management problems. Prereq: 501.


599 Special Topics in Finance (1-3) Topics vary. Prereq: 501 or consent of instructor. May be repeated. Maximum 6 hrs.

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


642 Seminar in Finance II: Theory of the Firm (3) Financial theory of firm and financial decision making under conditions of uncertainty, equilibrium models of firm. Option pricing, agency theory, capital structure, economics of information, and dividend policy.

651 Advanced Seminar in Finance I (3) Recent theoretical and empirical developments in micro-finance literature. Topics vary. May be repeated. Maximum 6 hrs.

652 Advanced Seminar in Finance II (3) Recent theoretical and empirical developments in macro-finance literature. Topics vary. May be repeated. Maximum 6 hrs.

Food Technology and Science

(College of Agriculture)

MAJOR DEGREES
Food Technology and Science M.S., Ph.D.
Hugh O. Jaynes, Head

Professors:
Collins, J. L., Ph.D. Maryland
Davidson, P. M., Ph.D. Washington State
Druggin, F. A., Ph.D. Georgia
Jaynes, H. O., Ph.D. Illinois
Melton, S. L., Ph.D. Tennessee
Miles, J. T. (Emeritus), Ph.D. Wisconsin
Overcast, W. W. (Emeritus), Ph.D. Iowa
Penfield, M. P., Ph.D. Tennessee

Associate Professors:
Demott, B. J., Ph.D. Michigan State
Loveday, H. D., Ph.D. Kansas State
Mount, J. R., Ph.D. Ohio State
Riemann, M. J., Ph.D. Kansas State

Assistant Professors:
Biswal, R. N., Ph.D. Massachusetts
Christen, G. E., Ph.D. Missouri

The Department of Food Technology and Science offers the Master of Science and Doctor of Philosophy degrees. Students in the doctoral program may choose to research in the concentration area of food products, food chemistry, food microbiology, or sensory evaluation. Commodity interests (meats, dairy, fruits, vegetables, or baked 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 scholarly ability and professional potential.

THE MASTER'S PROGRAM

1. Applicants must have a B.S. in food technology, food science, or a related agricultural or scientific discipline.

2. A thesis is required for the Master's program. Prior to research for the thesis, the student must develop a detailed written research plan. Registration for 6 hours of 500 Thesis is required.

3. 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.

4. All students are required to include 2 hours of 501 Seminar in their program and are expected to attend this course and participate in discussions during their Master's program.

5. An oral examination covering the thesis and coursework is required.

THE DOCTORAL PROGRAM

1. Completion of a Master's degree in the field, or a closely related field, or passing a special qualifying examination is required for admission. Scores on the GRE aptitude test are also required.
second semester of residence. At least one member shall be from outside the department. In addition to the thesis requirement, a minimum of 24 hours of graduate coursework is required. This work must be approved by the student's committee and no more than 10 hours of the minimum 30 can be below the 500 level. The committee may require additional coursework if the student's progress or background indicates such.

3. All students are required to include Forestry 512 or Wildlife and Fisheries 512, Seminar, in their programs. This is required of each graduate student in residence fall semester.

4. An oral examination covering the thesis and coursework is required.

Non-Thesis Option (Forestry only)

1. Thirty-five hours of graduate coursework of which 23 must be at the 500 level or above is required.

2. A graduate committee of no fewer than 3 faculty members will be selected. At least one member shall be from outside the department. The committee will meet and schedule the student's program for 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.

Forestry

GRADUATE COURSES

421 Forest and Wildland Resource Economics (3) Production functions, supply-demand and market analysis; non-market programs and projects; economic analysis and decision models; investment and financial analysis; managerial economics; taxes; forest products market analysis. Prereq: consent of instructor. F

422 Forest and Wildland Resource Policy (3) Policy formulation; criteria for policy determination; forest and wildland law and regulation; theory of conflict resolution; formal and informal resolution. Prereq: Senior standing. F

423 Forest 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 fieldtrips. Prereq: 321, 323, Ornamental Horticulture and Landscape Design 280, or consent of instructor. 2 hrs and 1 lab. F

431 Solid Wood Processing (3) Production processes for solid wood products: sawmilling, secondary machining, drying and preservation. Prereq: 331 and 332, or consent of instructor. 2 hrs and 1 lab. Sp

433 Wood Composites and Gluing (3) Principles of adhesion; wood adhesives; fundamentals of plywood and composite panel manufacture. Evaluation resin properties, bonding bond strength and durability. Prereq: 331 and 332, or consent of instructor. 2 hrs and 1 lab. F

434 Measurement and Marketing of Wood Products (3) Measurement systems used for sale and transfer of wood products. Application of market principles and analysis to wood products markets and economic structure of wood products industry. Prereq: 431, 433 and Forestry, Wildlife and Fisheries 513, or consent of instructor. Sp

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

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

511 Problem Analysis in Forest Resources (3) Problem identification, analysis and solution in forest resource management. Identify, analyze and prepare written report. Topic and report must have approval of graduate committee. Available only to students in non-thesis option for M.S. in Forestry. E

512 Seminar (1) Current developments in forestry. Required of all graduate students in residence in fall. May be repeated. Maximum 2 hrs. S/NC only. F

520 Advanced Forest Tree Biology (3) Growth, reproduction, and physiology of trees; forest ecology; variability and taxonomy of forest trees. Prereq: Graduates standing in forestry or biological science, or consent of instructor. Sp, A

530 Advanced Forest Resource Management (3) Identification and analysis of forest management in public agencies and private firms. Forest organization and computerized regulation systems; financial and capital budgeting; investment of forest resources; forest management. Prereq: Senior-level forest management or consent of instructor. Sp, A

540 Genetics in Forestry (3) Genetic improvement of forest trees: selection of superior clones; field testing for genetic variability; tree breeding; development of seed orchards; hybridization; tree cytology and tissue culture; use in genetic variation; planning and executing 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 forest recreation or consent of instructor. F, A

555 Forest Recreation Research Methods (3) Evaluation of research methodologies through readings and case studies; techniques of recreation resource monitoring and assessment. Prereq: or consent of instructor. One weekend field trip required. F

560 Industrial Forestry I (3) Economic structure of forest products industry. Identification and analysis of industry structure and markets, domestic and foreign. Current trends in markets and industrial structure: impacts on short-term and long-term planning. Prereq: Senior-level forest management or consent of instructor. F, A

565 Industrial Forestry II (3) Evaluation of alternative strategies for forest products production and timberland in integrated firm from standpoint of financial and strategic evaluations for different levels of self-sufficiency for raw materials. Analysis of social aspects of fee and leasehold interests. Other financial and institutional arrangements affecting forest management and management strategies for private, industrial, and public firms. Prereq: Senior-level forest management or consent of instructor. Sp, A

570 Management & Policy of Forest Resource Organization (3) Theory and application of management as applied to natural resource organizations: institutional direction and culture, and strategic management. Development of policy planning tool and as results from conflict resolution, linkage between policy development and execution, and structure and management of organizations. Prereq: Forest administration and policy or consent of instructor. F, A

580 Advanced Silviculture (3) Silvicultural characteristics, silvicultural practices and systems applied to commercially important hardwoods and softwoods. In-depth analysis of silvicultural principles involved and tools used, prescribed fire, pesticides, in regeneration and management of stands, dynamics of stand dynamics and structure, growth/yield. Prereq: Undergraduate silviculture course or consent of instructor. 2 hrs and 1 lab. Sp

581 Cytogenetics (3) Chromosome structure and behavior during meiotic and mitotic divisions in relation to structural changes, genetic controls, hybridization, speciation, and polyploidy. Laboratory: normal and aberrant meiotic systems and cytogenetic techniques from plants and animals. Prereq: Biology, 220 and at least 6 additional hrs in biological sciences. (Same as Botany 581.) Sp, A

585 Advanced Forest Biometry (3) Application of sampling techniques to forest inventory; fixed and variable plot sampling; list sampling; Poisson sampling; regression estimators; multistage and multiphase sampling. Growth and yield predictions for even-aged and uneven-aged forests. Prereq: 325 or consent of instructor. F, A

590 Advanced Topics in Forestry (1-3) Recent advances and concepts; research techniques and analysis of current problems. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. F

593 Independent Study in Forestry (1-4) May be repeated. Maximum 6 hrs. E

Wildlife and Fisheries Science

GRADUATE COURSES

416 Planning and Management of Forest, Wildlife and Fisheries Resources (3) Integrated forest and wildland resource management: development of land management plans and analyzing case studies including conflict resolution. Applicable to majors in Forestry and in Wildlife and Fisheries Science. Prereq: Senior standing 1 hr and 2 labs. Sp

525 Management of Forestry, Wildlife and Fisheries Resources (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

Wildlife and Fisheries Science

GRADUATE COURSES

441 Wildlife and Fisheries Techniques (3) Capturing and handling fish and wildlife; population restoration; food habitat sampling; wildlife damage control; marking techniques; fish culture systems; track and sign identification. Prereq: Forestry, Wildlife and Fisheries 317, 1 hr and 2 tabs or field. One weekend field trip required. F

443 Fisheries Science (3) Quantification and management of freshwater fisheries resources; population estimation, age and growth, biological assessment, and fisheries management. Prereq: Forestry, Wildlife and Fisheries 317 or Biology 230, and 6 hrs of mathematics. 2 hrs and 1 lab. Sp

445 Ecology and Management of Wild Birds (3) Biological and ecological characteristics of game birds, endangered birds, and threatened species. Conservation and practices of wild bird management. Prereq: Forestry, Wildlife and Fisheries 317 or Biology 230, 2 hrs and 1 lab. One weekend field trip required. F

445 Ecology and Management of Wild Birds (3) Biological and ecological characteristics of game birds, endangered birds, and threatened species. Conservation and practices of wild bird management. Prereq: Forestry, Wildlife and Fisheries 317 or Biology 230, 2 hrs and 1 lab. One weekend field trip required. 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

512 Seminar in Wildlife and Fisheries Science (1) Current status of wildlife and fisheries science. Prereq: Graduate standing of all graduate students in residence in fall. May be repeated. Maximum 2 hrs. S/NC only. F

520 Planning and Administration of Fisheries and Wildlife Programs (2) Factors influencing policy and
program planning activities of fisheries and wildlife agencies. Decision-making policies, case histories. Sp.A

530 Wildlife Diseases (2) Necropsy of birds and mammals. Recognition of various diseases and methods of preparing pathological materials in field and lab. Investigative procedures concerning wildlife diseases. Prereq: 1 yr biology. Consent of instructor. F.A

540 Predator Ecology (2) Dynamics of terrestrial vertebrate predator populations in human-altered and relatively unaltered environments. Prereq: 444 or 445 or consent of instructor. F.A

550 Fish Physiology (3) Mechanisms of circulation, excretion, osmoregulation, and neural/neurohormonal control of these systems in fishes. Practical applications of fish physiology in water pollution assessment, fish culture and management. Prereq Senior or graduate standing in biological sciences. Sp.A

560 Advanced Topics in Wildlife and Fisheries Science (3) Recent advances and concepts, research techniques and analysis of current problems. Prereq: 443, 444, 445, or consent of instructor. May be repeated. Maximum 6 hrs. E

593 Independent Study in Wildlife and Fisheries Science (1-4) May be repeated. Maximum 6 hrs. E

French
See Romance Languages

Geography
(College of Liberal Arts)

MAJOR
Geography M.S., Ph.D.

Sidney R. Jumper, Head

Professors:

Aiken, Charles S., Ph.D. .................. Georgia
Bel, Thomas L., Ph.D. ..................... Iowa
Hammond, E. H. (Emeritus), Ph.D. .... California
Jumper, Sidney R., Ph.D. .............. Tennessee
Long, G. (Emeritus), Ph.D. .......... Northwestern
Minkel, C. W., Ph.D. .................. Syracuse
Paludan, C. T. (UTSI), Ph.D. ........ Denver
Rakston, B., Ph.D. ....................... Northwestern
Schmudder, T. H., Ph.D. ................. Wisconsin
Wilbanks, T. J. (Adjunct), Ph.D. ........ Syracuse

Associate Professors:

Blasing, T. J. (Adjunct), Ph.D. ........ Wisconsin
Brinkman, L. W., Jr., Ph.D. .............. Wisconsin
Brown, Marilyn (Adjunct), Ph.D. ........ Ohio State
Carter, James R., Ph.D. ................. Georgia
Forestal, R., Ph.D. ...................... Rutgers
Pulipher, L., Ph.D. ....................... Southern Illinois
Rehder, J. B., Ph.D. ..................... Louisiana State

Assistant Professors:

Harden, Carol P., Ph.D. .................. Colorado
Horn, Sally P., Ph.D. .................... California

The department offers the Master of Science and Doctor of Philosophy degrees. The Master's degree emphasizes development of professional competence as a geographer and offers opportunities to gain substantial depth in a concentration or a major technique. An emphasis in geographic information systems is available for students who have appropriate backgrounds in mathematics and computer science. The doctoral program is for those who have demonstrated proficiency in conducting independent research. The department is particularly well-qualified to direct research in geography of the natural environment (biogeography, biological conservation, geomorphology), spatial analysis (especially transportation and location analysis), Latin America, and the American South. Graduate concentrations include nonmetropolitan areas, land use, urban geography, transportation geography, geography of resources, geography of development, and regional and historical geography of the United States.

THE MASTER'S PROGRAM

The department offers the thesis and non-thesis options for the Master of Science. Both options require a minimum of 30 semester hours beyond the completion of a sound undergraduate major program. At least two-thirds of the total hours in the degree program must be at or above the 500 level and must include 501 (at each offering during residency). 504 and 3 semester hours at the 600 level. In the thesis option, 6 hours must be Thesis 500. A final examination is required in both programs.

THE DOCTORAL PROGRAM

The doctorate is a research degree and is granted only to those who demonstrate proficiency in conducting independent research. Students must have achieved the equivalent of a comprehensive Master's program before they will be admitted to the doctoral program. Course requirements for the degree shall be determined by the student's faculty committee in accordance with specific interests and needs. The program of study must include sufficient coursework within the department, but outside the area of specialization, to provide a broad foundation and understanding of the discipline. The program must include 504, 515, 599, and (at each offering during residency) 501. A minimum of 12 hours must be earned in related fields outside the department. Completion of a comprehensive written examination and qualitative techniques is required. Additional tools, including languages, will be required as appropriate to the student's areas of research specialization. Examinations required for admission to candidacy include a written comprehensive; written examinations on two special fields; and an oral examination on the student's program, the special fields, and the dissertation proposal. Also required is a final oral examination on the dissertation and on other aspects of the program as determined by the student's doctoral committee.

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, South Carolina, Virginia, or West Virginia. The Master's program is also available to residents of Virginia. Additional information may be obtained from the Residency Assistant 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 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. 2hrs 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) Geographical application of statistical techniques, point pattern analysis, and analysis of areal units. Prereq: Mathem. 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 United States during four centuries of settlement and development. Changing population patterns, development of agricultural regions, and patterns of urban-industrial development. Prereq: 361 or consent of instructor.

433 The Land-Surface System (3) Characteristics of surface form, water, vegetation, and surface materials, and their regional interrelationships. People as evaluators and agents of change. Prereq: Geography of the Natural Environment or consent of instructor.

434 Climatology (3) General circulation system leading to world pattern of climates. Climatic change and modification, and interrelationships of climate and human activity. Prereq: Geography of the Natural Environment or Meteorology or consent of instructor.

435 Biogeography (3) Changing distribution patterns of plants and animals on variety of spatial and temporal scales. Effects of continental drift, Pleistocene climatic change, and human activity on world biota. Prereq: Geography of natural environment or consent of instructor.

436 Water Resources (3) Global water resources and hydrologic processes: water availability, flooding, and water quality issues from physical and economic geographic perspectives. Prereq: Geography of the Natural Environment or consent of instructor.

441 Urban Geography (3) Concepts and theories concerning development and significance of systems of cities and urban morphology. Prereq: 101-02 or 141 or 340 or consent of instructor. (Same as Urban Studies 441.)

443 Rural Geography (3) Geographical appraisal of rural areas of United States: small towns and urban fringes. Problems and potentials of rural America. Prereq: 101-02 or 141 or 340 or consent of instructor.

445 Geography of Resources (3) Study of factors relating to variations in resource availability from time to time and place to place; energy and metallic resources. Prereq: 101-02 or 141 or 340 or consent of instructor.

449 Geography of Transportation (3) Examination of transportation systems, their effects on trade patterns, land use, location problems, and development. Prereq: 141 or 340 or consent of instructor.

450 Process Geomorphology (3) Same as Geology 450.

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

501 Colloquium in Geography (1) Discussion of departmental research, current research literature, and general topics. Registration required of resident graduate students whenever offered. May be repeated. Maximum 4 hrs. May be applied toward graduate degree. S. NC only.
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.

504 Research Design (3) Geographical research from selection of topic and development of research design through field work and final report.

505 Directed Research (2-6) Research on problems as defined by individual students. Prereq: Written consent of instructor and department prior to registration. May be repeated with consent of instructor. Maximum 9 hrs. S/NC only.

506 Directed Readings (2-6) Readings on topics of interest as defined by individual students. Prereq: Written consent of instructor and department prior to registration. May be repeated with consent of instructor. Maximum 5 hrs. S/NC only.

600 Topics in Geography (2-3) Topics vary. Prereq: Consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

512 Topics in Cartography (3) Trends, concepts, problems and methods in cartography. Prereq: 411 and 412 or other consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

513 Topics in Remote Sensing (3) Applied research using imagery for interpretation and mapping of geographic data. Prereq: 415 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

515 Topics in Quantitative Geography (3) Multivariate analysis applied to problems in geography; research problems utilizing appropriate computer programs; usefulness to geographic research of techniques developed by other disciplines. Prereq: 415 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

517 Geographic Information Management and Processing (3) Concepts and management of geographic information. Database design, manipulation, sampling and analysis. Prereq: Consent of instructor.

519 Graduate Practicum in Cartography/Remote Sensing (2-6) Prereq: Written consent of department prior to registration. May be repeated with consent of instructor. Maximum 6 hrs.

521 Topics in Cultural Geography (3) Examination of trends, problems, and methods in cultural geography. Prereq: 421 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

524 Topics in Political Geography (3) Geographical consequences of public decisions; understanding how administrative and political processes affect public land management, spatial distribution of public goods, and urban morphology. Prereq: Consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

525 Topics in Historical Geography (3) Examination of trends, concepts, and methods in historical geography. Prereq: 425 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: 435 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

535 Topics in Biogeography (3) Examination of trends, problems, and methods in biogeography. Prereq: 435 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

536 Plant Communities and Plant Geography (4) (Same as Botany 536)

541 Topics in Urban Geography (3) Analysis of research on urban systems, internal morphology, urban problems and urban spatial behavior. Prereq. 441 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

549 Topics in the Geography of Transportation (3) Examination of trends, problems, and methods in transportation geography and transportation network. Prereq: 449 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

550 Regional Geomorphology (3) (Same as Geology 550)

577 Biological Conservation (3) Analytical treatment of politics, policies, and forms of biological conservation as practiced in U.S. and abroad. Prereq: Consent of instructor.

591 Foreign Study (1-15) See page 31. Prereq: Written consent of department prior to registration.

592 Off-Campus Study (1-15) See page 31. Prereq: Written consent of department prior to registration.

593 Independent Study (1-15) See page 31. Prereq: Written consent of department prior to registration.

599 Geographic Concept and Method (3) Traditional and modern geographic thought: readings on nature, scope, problems, and methods of geography. Prereq: Consent of instructor.

600 Doctoral Research and Dissertation (3-15) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

609 Seminar in Geography (2-3) Topics vary. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

625 Seminar in Historical Geography (3) Prereq: 525 or 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: 543 or consent of instructor. May be repeated. Maximum 6 hrs.

649 Seminar in Geography of Transportation (3) Prereq: 549 or consent of instructor. May be repeated. Maximum 6 hrs.

663 Seminar in Geography of the American South (3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

673 Seminar in Geography of Latin America (3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

Geological Sciences

(College of Liberal Arts)

MAJOR DEGREES

Geology M.S., Ph.D.

Harry Y. McSween, Head

Professors:

Hatcher, Robert D., Jr. (Distinguished Scientist), Ph.D. .............. Tennessee
Kiepser, Harry J. (Emeritus), Ph.D. .. Ohio State
Kopp, Otto C., Ph.D. ............... Columbia
McLaughlin, Robert E. (Emeritus), Ph.D. ............... Tennessee
McSween, Harry Y., Ph.D. .............. Harvard
Misra, Kula C., Ph.D. .............. Western Ontario
Taylor, Lawrence A., Ph.D. .............. Lehigh
Walker, Kenneth R. (Carden Prof.), Ph.D. .............. Yale
Wallis, James G. (Emeritus), Ph.D. .............. North Carolina

Associate Professors:

Broadhead, Thomas W., Ph.D. .............. Iowa
Byerly, Don W., Ph.D. .............. Tennessee
Clark, G. Michael, Ph.D. .............. Penn State
Delcourt, Paul A., Ph.D. .............. Minnesota

Driese, Steven G., Ph.D. .............. Wisconsin
Dunne, William M., Ph.D. .............. Bristol
Labotka, Theodore C., Ph.D. .............. Caltech
Williams, Richard T. II., Ph.D. .............. Yale
Mora, Claudia I., Ph.D. .............. Wisconsin

The Department of Geological Sciences offers both the M.S. and Ph.D. degrees in Geology. Persons interested in these programs should contact the Director of Graduate Admissions in the department.

For admission, an applicant must provide transcripts of previous university-level coursework, two rating forms or letters of recommendation, and GRE scores, including the subject exam in geography (or in another area if geography was not the area of previous university-level concentration). Students are not admitted under provisional or non-degree status.

Prerequisite for both degrees is a Bachelor's degree, including coursework in mineralogy, optical mineralogy, petrology, stratigraphy, paleontology, structural geology, and field geology. One year each of coursework in calculus and chemistry and one year of coursework in biology, physics, or statistics is also required. Applicants lacking any of these may be admitted, but the deficiencies must be removed within the first year without graduate credit.

THE MASTER'S PROGRAM

The department offers the thesis option in the Master's program. Graduation requires successful oral defense of a written thesis and a minimum 3.0 GPA in graduate coursework.

Course requirements are a minimum of 30 semester hours, including:

1. Six hours of Thesis 500.
2. Registration in 595 during the first two years in residence. Two hours may be counted toward the 30-hour minimum. This requirement may be waived in unusual circumstances.
3. Sixteen hours of geography courses, with at least 14 hours at the 500 or 600 level, including at least one course from each of the following groups:
   Group I: 510, 530, 560, 580.
   Group II: 521, 525, 545, 546, 550, 557, 561.
   Group III: 570, 571, 576, 577.
4. Eight hours of additional graduate coursework.

THE DOCTORAL PROGRAM

The prerequisite for the Ph.D. program, in addition to that for the M.S. program, is either a Master's degree in Geology, or a Bachelor's degree plus completion of 9 hours of coursework from the list in #3, above, including one course from each group. These courses may be taken while completing other course requirements.

Graduation requires passing a comprehensive examination, taken no later than the end of the second year, completion of all course requirements with a minimum 3.0 GPA, completion of the language requirement, and successful oral defense of the dissertation.

The comprehensive examination includes both written and oral parts in which the can-
didate will be tested on his/her knowledge of the area concerning the proposed dissertation and of related fields. The candidate is expected to be conversant in a wide field of geological sciences.

A minimum of 24 hours of graded coursework is required in addition to the 24 hours of Dissertation. The coursework includes the sum of 6 hours of 600-level geology courses, 12 hours of 500-level or higher geology courses, and 6 hours of additional graduate courses. Extra-departmental coursework is encouraged. Registration in 595 is required during the first four years in residence. 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


420 Paleogeology (4) Principles of ecological analysis as applied to ancient marine environments. Stratigraphy, basin analysis, biostratigraphy, tectonic setting. May be repeated for credit. E

421 Invertebrate Paleontology I (3) Survey of preservational processes and geologically important representatives of Protista, Porifera, Cnidaria, Bryozoa, and Brachiopoda. Functional analysis of morphology, skeletal structures, ecology, and stratigraphic distribution. Prereq: 320 or consent of instructor. 2 hrs and 1 1/2 lab.

422 Invertebrate Paleontology II (3) Survey of "higher invertebrates": Annelida and other worms, Mollusca, Arthropoda, Echinodermata, Graptoloidea, Conodonta, Chordata. Functional morphology, skeletal structures, ecology, and stratigraphic distribution. Prereq: 320 or consent of instructor. 2 hrs and 1 1/2 lab.


426 Paleobotany and Palynology (3) Evolutionary history of terrestrial plant and animal ecosystems; data collection and interpretation. Laboratory designed around preparation of scientific reports based on field and laboratory analysis. Writing emphasis course. 3 hrs and 1 lab.

455 Basic Environmental Geology (3) Application of several types of geologic data. Prereq: 310 and 330 or equivalents. Recommended prereq: 450. 1 hr and 1 1/2 lab.

485 Principles of Geohydrology (3) Principles governing flow of water through rock systems. Applications to groundwater contamination, ore-forming hydrothermal fluids, and paleohydrology. Geophysical geology, general chemistry, and calculus. (Same as Civil Engineering 485.)

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

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

505 Structure of the Southern and Central Appalachian (2) Structural development of Southern and Central Appalachians from extensional Late Proterozoic to Early Paleoic 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; application of mineralogical techniques in the study of clays. Prereq: 310 and 568 or equivalent. 2 hrs and 1 lab.

520 Advanced Paleontology (3) Detailed analysis of selected groups of fossil organisms; functional morphology, evolutionary development.

521 Data Analysis in Geology and Paleobiology (3) Application of statistical and other quantitative techniques to geologic and paleontological data. 2 hrs and 1 seminar.

525 Biostratigraphy (3) Examination of principles of stratigraphy and biostratigraphy through selected case histories. 1 hr and 1 1/2 seminar.

530 Petrogenesis of Crystalline Rocks (4) Origin and properties of igneous and metamorphic rocks, magmatic and subsolidus processes and physical conditions. Laboratory involves petrographic study of crystalline rocks in thin section. Prereq: 410. 3 hrs and 1 lab.

540 Seminar in Local Geology (1) Introduction of geology of Southern Appalachians. 1 hr plus fieldtrips.

545 Sandstone Petrology/Physical Sedimentology (4) Field and mineralogy of various clastic rock types; physical processes of sedimentation. Analysis of sediment and formation of sedimentary strutures. Prereq: 340 or equivalent. 3 hrs and 1 lab.

546 Carbonate Sedimentology (4) Environments of deposition of modern and ancient carbonate sediments and diagenesis of resultant rocks; field and laboratory analysis of sample material and preparation of scientific reports. 3 hrs and 1 lab.

550 Regional Geomorphology (3) Integrative approach to study of natural geomorphological regions stressing links and similarities across boundaries, unique characteristics of major divisions, provinces, sections, and districts. May be repeated with consent of instructor. Maximum 6 hrs. (Same as Botany 555 and Zoology 555.)

555 Seminar in Quaternary Studies (3) Interdisciplinary examination of contemporary issues in the dynamics of pattern and process in Quaternary landscapes; responses of plant, animal and human populations to environmental changes during glacial/interglacial cycles. Prereq: Consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs. (Same as Botany 555 and Zoology 555.)

556 Quaternary Geology of North America (3) Interpretation of geomorphologic, stratigraphic, and sedimentologic data. Prereq: Consent of instructor. Interpretation of 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 Paleogeology (3) Perturbation, process, and patterns within Quaternary systems; climatic change and vegetational responses during last 2.5 million years. Prereq: Consent of instructor.


561 Aqueous Geochemistry (3) Introduction to and applications of geochemical theory to modern and ancient environments; geochemistry of natural water, weathering reactions, and early sediment diagenesis. Prereq: Chemistry 120-30. 3 hrs and 1 lab or seminar.


568 Geochemical Analysis (3) Collection and treatment of geochemical data using electron microprobe, x-ray fluorescence, and atomic absorption spectrophotometric techniques. Prereq: 310 or consent of instructor. 2 hrs and 1 lab.

569 Experimental Geochemistry Laboratory (1-3) Independent lab study of problems in geochemistry using experimental and analytical techniques. Prereq: Consent of instructor.

570 Advanced Structural Geology (4) Current topics in structural geology and tectonics of mountain belts; recent literature. Prereq: Consent of instructor 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 form them. Comparison of internal structure of mountain chains and how they function in increasing continental crust. Examples from different parts of world. Prereq: Structural geology or consent of instructor.

575 Plate Tectonics and Orogeny (4) Tectonic development of orogenic belts in context of newest aspects of plate tectonic theory; 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) Interpretation of global structure and stratigraphy using seismic data, effects of velocity anomalies, multiples and complex reflector structure. Applications of reflection for exploration. Prereq: Stratigraphy and sedimentation, structural geology, and 470 or consent of instructor.


580 Ore Petrology (3) Detailed study of selected ore deposits: petrology of ore-gangue assemblages. Prereq: 480 or consent of instructor. 2 hrs and 1 1/2 lab.

581 Special Problems in Geology (1-3) Directed study or special topics. Prereq: Consent of instructor. May be repeated. Maximum 10 hours.

591 Foreign Study (1-15) See page 31.

592 Off-Campus Study (1-15) See page 31.

593 Independent Study (1-15) See page 31.

594 Field Problems in Geology (1-2) Literature study and seminars on specific research problems. Must be supplemented by extended field trip. Prereq: Consent of instructor. May be repeated. Maximum 6 hours.

595 Selected Topics in Geology (1) Presentation of graduate, faculty, and visiting scholar research. Registration required each semester except summer for resident full-time graduate students. S/NC only.

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

610 Seminar in Mineralogy (2) May be repeated with consent of department. Maximum 6 hrs.
Germanic and Slavic Languages

(Majors: German, Modern Foreign Languages, Ph.D.

Degrees: M.A., Ph.D.

The Department of Germanic and Slavic Languages offers two advanced degrees: the Master of Arts in German and the Doctor of Philosophy in Modern Foreign Languages. Inquiries should be addressed to the head of the department.

The Master's Program

The department requires a minimum of 30 semester hours including 15 hours of coursework numbered 500 and above and 6 hours of Thesis 500.

The Doctoral Program

The Ph.D. in Modern Foreign Languages is offered jointly by the Department of Germanic and Slavic Languages and the Department of Romance 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.

Degree Requirements

Candidates must complete a minimum of 63 semester hours of coursework beyond the Bachelor's degree in addition to 24 hours of doctoral research and dissertation. The program consists of a first concentration, a second concentration, and 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:

A minimum of 21 hours at the 500 level (exclusive of thesis hours) including French 584 (3), German 560 (3), or Spanish 550 (3); French 512 (3), German 512 (3), or Spanish 512 (3); French 515-16 (25) or German 520 (3).

2. Second Concentration: French, German, Italian, Russian, or Spanish (different from the first concentration). It consists of at least 18 hours 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 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.

4. Additional Requirements: A student must demonstrate competence in languages of both his/her 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 measures 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 placed 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 Romance Languages.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The Ph.D. program in Modern Foreign Languages is available to residents of the state of Alabama. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.

German

Graduate Courses

331-32 Elements of German for Upper-Division and Graduate Students (3 credits) Study 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.

410 Selected Topics in German Literature from 1750 to the Present (3) Prereq: 6 hrs of 300-level courses (excluding 331-32) and courses in English translation) or equivalent.

421 German Lyric Poetry (3) Prereq: 6 hrs of 300-level courses (excluding 331-32) and courses in English translation) or equivalent.

422 German Drama (3) Prereq: 6 hrs of 300-level courses (excluding 331-32) and courses in English translation) or equivalent.

423 German Narrative Prose (3) Prereq: 6 hrs of 300-level courses (excluding 331-32) and courses in English translation) or equivalent.

426 German Literary Movements (3) Survey of major periods in development of German literature since 1750: problems and pitfalls of periodization.

427 Introduction to Descriptive Linguistics (3) (Same as French 426, Spanish 426, Linguistics 425, and Russian 425.)

428 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. Prereq: 3 hrs of upper division foreign language courses (excluding courses in translation or graduate reading courses). (Same as Russian 426, French 426, Spanish 426, and Linguistics 426.)

435 Structure of the German Language (3) Comparative Germanic and suprasegmental phonemes, phonological features, English-German lexical structures, selected topics in advanced German grammar and syntactic analysis. Prereq: 6 hrs of upper-division foreign language courses (excluding courses in translation and graduate reading courses). (Same as Linguistics 435.)

436 History of the German Language (3) Development of German language from Indo-European through Proto-Germanic, Old High German, Middle High
German to New High German. Internal and external linguistic history of German speech. Prereq: 6 hrs of upper division German language courses (excluding courses in translation or graduate reading courses). (Same as Linguistics 436.)

405 Business German (3) Survey of German used in fields of business, government, administration, and economics. Prereq: 6 hrs of upper-division German. German, excluding courses in translation and 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

510 German Phonetics and Advanced Grammar (3) Advanced work in phonetics, pronunciation, and selected topics in German grammar. For teachers and prospective teachers. Prereq: Consent of instructor.

512 Teaching a Foreign Language (3) Practical application of methods for teaching and evaluating basic language skills and foreign language skills, and cultural knowledge through seminars, demonstrations, peer teaching, and observation of foreign language classes. Required of all M.A. and Ph.D. students holding GTA; except those whose previous training or experience warrants an excursion by department.

520 Proseminar (3) Bibliography; methods; illustrative problems; preparation of papers.

521 Works of Dostoevsky in English Translation (3) Crime and Punishment, Brothers Karamazov, and other works. No foreign language credit.

522 Works of Tolstoy in English Translation (3) War and Peace, Anna Karenina, and other works. No foreign language credit.

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 Language 1890-1945 (3) Content varies. May be repeated. Maximum 6 hrs.

556 Modern German Literature 1945-Present (3) Content varies. May be repeated. Maximum 6 hrs.

560 German Literary Theory and Criticism (3)

561-62 Directed Readings in German Language and Literature (3,3)

571-72 Old Norse Language and Literature (3,3)

591 Foreign Study (1-15) See page 31.

592 Off-Campus Study (1-15) See page 31.

593 Independent Study (1-15) See page 31.

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.

612 Old Saxon (3) Phonology, morphology, and syntax of Old Saxon. Representative readings.

621-22 Seminar in German Language (3,3) May be repeated. Maximum 18 hrs.

631-32 Seminar in German and Germanic Philology (3,3)
Public Health

Graduate study with a major in Public Health leads to the Master of Public Health (M.P.H.). Three professional preparation concentrations are available: Community health education, health planning/administration, and occupational/environmental health and safety. 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. Appropriate forms are available from the department’s program in Public Health. Preferential consideration for admission to degree status shall be given to those with a minimum undergraduate grade-point average of 2.8 and with at least one year of professional experience in a health-related occupation.

THE MASTER’S PROGRAM

The M.P.H. is a non-thesis program requiring completion of 38 semester hours of coursework including 9 weeks of field practice. Field practice provides a full-time experience with an affiliated health agency or organization offering one or more health programs. Of importance, field practice allows the student to apply academic theories, concepts, and skills in a realistic setting. Students must complete all assigned prerequisite courses and 21 semester hours of the curriculum with a minimum overall GPA of 3.0 prior to placement in the field.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs. The program of study must be approved by the M.P.H. program in Virginia. Additional information may be obtained from the Office of Graduate Admissions and Records.

GRADUATE COURSES

400 Consumer Health (3) (Same as Health 400.)
410 Health in the Work Environment (3) Fundamental activities in field of industrial health aimed at reducing health problems for employees. Workplace health hazards and problems, medical staff, management, engineers and others in industrial health and safety fields. Prereq: Consent of instructor. May not be taken for credit by occupational health concentration majors.
460 Special Topics (3) Prereq: Consent of instructor. May be repeated under different topic. Maximum 6 hrs.
493 Directed Independent Study (1-3) Individual study directed under the supervision of an instructor. May be repeated. Maximum 12 hrs.
505 Continuing Education in Public Health (1-3) Selected learning activities and experiences in specialized areas of public health utilizing workshop format. May be repeated. Maximum 9 hrs.
509 Graduate Seminar in Public Health (1) In-depth discussion of timely topics reflecting scope of public health as discipline and its interrelation with many other academic and professional disciplines. Speakers both internal and external. May be repeated. Maximum 4 hrs. (Same as Nursing 509, Nutrition and Food Science 509, Physical Education 509, and Social Work 509.) SN/C only. F, Sp, E.
511 Fundamentals of Industrial Hygiene (3) Occupational hazards, identification and regulations; recognition, evaluation and control of workplace health hazards. Pertinent workplace problems and situations.
513 Industrial Hygiene Instrumentation and Sampling (3) Instruments and methods for evaluating industrial environment for personal exposure to chemical and physical stressors associated with design, demonstration, and lab. Prereq: 511 or consent of instructor. Sp.
514 Industrial Toxicology and Occupational Exposures (3) Principles of toxicologic mechanisms, portals of entry, physiologic and biochemical responses. Occupational exposure assessment, physiologic factors and environmental hazards, exposure characterization, statistical aspects of sampling, and transport of contaminants into general environment.
525 Financial Management of Health Programs (3) Financial management concepts and practices applied to health services programs. Fundamentals of budgeting, costing, financing, risk-taking, financial planning and control. Opportunities to apply techniques. Prereq: 520 or consent of instructor. Sp.
530 Biostatistics (3) Application of descriptive and inferential statistics to health sciences, epidemiology, and health programs. Microcomputer applications, use and interpretation of vital statistics and introductory research methodology preparation for first course in epidemiology.
542 Advanced Epidemiologic Methods (3) Both cohort and case-comparison study designs; conduct and interpretation of study, and general attention to calculations and formulas. Professional literature, contemporary perspective of epidemiologic approaches to problem-solving and problem formulation in public health. Prereq: 540 or consent of instructor. Sp.
550 Principles and Practices of Community Health Education (3) Theoretical foundations for community health education; opportunities for skill development in variety of educational processes; and introduction to community health analysis.
552 Community Health Problem Solving (4) Dynamics of community organization, community needs assessment, community planning, community education, methods 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 in health systems and interrelated planning processes. 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 personnel management, evaluation, legal authority, introduction to budgeting and fiscal procedures. 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 facility, and shall be completed. May not be applied 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) Philosophy 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 Leisure Counseling and Facilitation Techniques (3) Investigation of concepts and techniques of leisure counseling, introduction to and practice of various leisure facilitation techniques, use of increased personal leisure awareness as desired but concomitant goal. Prereq: 520 or consent of instructor. Sp

522 Clinical Aspects in Therapeutic Recreation (3) Concepts and techniques utilized by experienced and advanced therapeutic recreation specialist: clinical issues, comprehensive program concerns, administrative funding and the delivery of therapeutic recreation services. Prereq: 520. 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

590 Graduate Practicum (1-6) Required of all graduate students. 100 clock hours during semester with agency for 2 hrs credit. Two major phases: work experience and written paper. E

591 Directed Study in Leisure & Recreation (1-6) Detailed study of thesis, 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.

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, Florida, or South Carolina. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.
History

(College of Liberal Arts)

MAJOR

DEGREES

History .................................. M.A., Ph.D.

Professor:

John Muldowny, Head

Graduate Awards and Review Committee monitors the progress of all graduate students each semester.

Thesis Option

Twenty-four hours of coursework and 6 hours of Thesis 500 for a total of 30 hours are required. The student must complete 510, 3 hours of reading courses (521) and 3 hours of a 600-level seminar. A two-hour oral examination covering both the thesis and the general field in which the thesis is written is given at the end of the program.

Non-Thesis Option

A total of 30 hours of coursework is required. A student must complete 510, 6 hours of reading courses (521) and 6 hours of 600-level seminars. A two-hour written examination on one field and a one-hour oral examination on the second field are given at the end of the program. As many as 9 related hours may be taken in courses outside the department for either option.

Concentration in Historic Preservation

This option is a non-thesis program requiring 33 total hours: 18 hours outside the history department and 15 hours within. Required courses are 6 hours of 521, 3 in historic preservation and 3 in either early American or recent American history.

Students will be examined in two fields: historic preservation and either early American or recent American history.

THE DOCTORAL PROGRAM

Admission Requirements

1. Acceptable scores on the Graduate Record Examination (general and subject history).
2. Successful completion of the M.A.

Residence and Coursework

Students are required to complete a minimum of 50 hours in coursework beyond the Bachelor's degree. Students must take 510 or its equivalent. Students transferring from another institution may count up to 24 hours of coursework toward the required 50 hours. All students pursuing the Ph.D. must take a minimum of 521 and 15 hours outside the department. No fewer than 3 semesters of the 6 semesters of residence work (2 of which must be consecutive semesters) shall be under the supervision of the staff of UT Knoxville.

Language Requirements

Candidates must possess a reading knowledge of one foreign language and such additional languages as may be determined by the student's committee. Under normal circumstances, these concentrations in European history will need two languages. The committee may also specify any other research tools, such as statistics, essential for the student's preparation. Upon student petition, the committee may accept in place of a language a B or better performance in an appropriate statistical course and History 526.

Thesis Option

The foreign language requirements may be satisfied in one of two ways:

1. By examination. When the student is ready to take a language examination, he/she should consult with an advisor. The appropriate forms and the time of the examination may be obtained from The Graduate School.
2. By coursework. Upon consultation with the advisor, a student may elect to complete an appropriate sequence in a language department (or an intermediate sequence in a language in which no appropriate sequence is available). Satisfactory completion requires that a student must have at least a B in the final semester.

Comprehensive Examination

The comprehensive examination which will be both written and oral must be taken after all coursework is completed, language requirements fulfilled, and at least nine months before the degree is expected. This exam should normally be taken before beginning the sixth semester of work toward the doctorate. The candidate must present two fields, one from group I and one from group II.

Group I

Premodern Europe
Modern Europe
Early American
Recent United States

Group II

Socio-economic
Military/Foreign Relation
Regional/Local (U.S.)
National/Regional (U.S.)

Dissertation and Defense

Original research forms the basis for the dissertation. After the dissertation has been completed, a final oral examination will be given on the dissertation in its historical context.

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 academic 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
532 Topics in Modern Europe (3) Reading seminar: secondary sources on modern movements and trends that are multinational in focus. Focus varies. May be repeated. Maximum 15 hrs.
533 Topics in European National History (3) Reading seminar: secondary sources on intra-national topics, usually British, Russian, German or French. Focus varies. May be repeated. Maximum 15 hrs.
541 Topics in Early American History (3) Reading seminar: secondary sources on early North American history. Focus varies. May be repeated. Maximum 15 hrs.
542 Topics in 19th- and 20th-Century United States (3) Reading seminar: secondary sources on 19th- and 20th-century United States. Focus varies. May be repeated. Maximum 15 hrs.

The Department of History offers graduate study leading to the Master of Arts and Doctor of Philosophy. The M.A. program includes a thesis and non-thesis option and also offers a non-thesis concentration in historic preservation.

The doctoral program has concentrations in American or European history with specializations in regional/local American, military/foreign relations, and socioeconomic history. Detailed information may be obtained from the Director of Graduate Studies.

THE MASTER'S PROGRAM

Admission Requirements

1. Successful completion of a baccalaureate degree, preferably with a major in History.
2. Acceptable scores on the Graduate Record Examination (general and subject history).

Academic Standards

A 3.0 overall GPA is required of graduate students to remain in good standing. The
551 Topics in the History of Foreign Relations (3)
Reading seminar: secondary sources on foreign relations. Focus varies. May be repeated. Maximum 15 hrs.

552 Topics in Military History (3) Reading seminar; secondary sources on military history, military operations, social impact of war and naval strategy in foreign policy. May be repeated. Maximum 15 hrs.

554 Topics in Comparative Social and Economic History (3) Reading seminar; secondary sources on multi-national topics in contemporary history. Focus varies. May be repeated. Maximum 15 hrs.

555 Topics in United States Social and Economic History (3) Reading seminar; secondary sources on U.S. social and economic history. Focus varies. May be repeated. Maximum 15 hrs.

556 Topics in European Social and Economic History (3) Reading seminar; secondary sources on social or economic history of European nations. Focus varies. May be repeated. Maximum 15 hrs.

557 Topics in Cultural and Intellectual History (3) Reading seminar; secondary sources on cultural and intellectual history. Focus varies. May be repeated. Maximum 15 hrs.

558 Topics in United States Regional and Local History (3) Reading seminar; secondary sources on regions, states and cities of the South. Focus varies. May be repeated. Maximum 15 hrs.

561 Topics in Latin American History (3) Reading seminar; secondary sources in Latin America. Focus varies. May be repeated. Maximum 15 hrs.

562 Topics in Asian History (3) Reading seminar; secondary sources on Asian history; East Asia and Middle East. Focus varies. May be repeated. Maximum 15 hrs.

566 Topics in U.S. Religious History (3) (Same as Religious Studies 566.)

567 Topics in Applied History (3) Seminar to develop practical skills applicable to museology, historical preservation, material culture, historical agencies, historical editing, and other areas of applied history. Focus varies. May be repeated. Maximum 15 hrs.

580 Topics in History (3) Reading seminar; secondary sources for new topics. Focus varies. May be repeated. Maximum 15 hrs.

591 Foreign Study (1-15) See page 31.

592 Off-Campus Study (1-15) See page 31.

593 Independent Study (1-15) See page 31.

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

621 Directed Readings (3) Directed readings to prepare candidate for doctoral comprehensive examination. May be repeated. Maximum 1 per doctoral field. S/N only.


632 Seminar in Modern European History (3) Research seminar in primary sources culminating in scholarly paper in modern European history. Focus varies. May be repeated. Maximum 15 hrs.

641 Seminar in Early American History (3) Research seminar in primary sources culminating in scholarly paper in American history. Focus varies. May be repeated. Maximum 15 hrs.


658 Seminar in United States Regional and Local History (3) Research seminar in primary sources culminating in scholarly paper in regional and local history. Focus varies. May be repeated. Maximum 15 hrs.


680 Seminar in History (3) Research seminar in primary sources culminating in scholarly paper in aspect of history not covered in another 600-level research seminar. Focus varies. May be repeated. Maximum 15 hrs.

Home Economics
(College of Human Ecology)

MAJOR DEGREE
Home Economics ........................................... M.S.

The Master of Science with a major in Home Economics is a college-wide, multidisciplinary program. This degree provides a flexible graduate program for students wishing to pursue in-depth study across subject areas of home economics/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.

ADMISSION REQUIREMENTS
A completed file for review includes a
College of Home 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
Dean's Office, College of Human Ecology. The M.S. in Home Economics requires an undergraduate degree in Home Economics.

THE MASTER'S PROGRAM
The M.S. in Home Economics is designed to meet graduate study needs of professionals who work in programs encompassing all areas of home economics. Thesis (33 hours) and non-thesis (36 hours) options are offered. The program includes 3-6 hours in research methodology, 6-9 hours in thesis program planning and implementation (agricultural extension, home economics education, other areas of education), 3 hours in the integrative nature of home economics, and 12-15 (thesis) to 15-18 (non-thesis) hours in the College of Human Ecology. At least one course is to be from each department in the college. The non-thesis option requires a practical component, and an extensive comprehensive examination will be administered at the end of 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 offered at UT Knoxville on an in-state tuition basis. The M.S. program in Home Economics is available to residents of the state of South Carolina. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.

Home Economics Education
(College of Human Ecology)

Students pursuing graduate study in home economics education or extension are encouraged to enroll in the multidisciplinary Master's degree in Home Economics. Home Economics Education courses may be selected to meet requirements of that program. Home economics teachers may choose courses within this area for updating and certification renewal. Graduate coursework in Home Economics Education may also be selected for development of a concentration or minor within other areas of specialization.

GRADUATE COURSES
510 Curriculum in Home Economics (3) Development of home economics educational materials and instruction. Prereq: 420 or equivalent or consent of instructor. F.A.

515 Evaluation in Home Economics Education (3) Assessment of programs and pupil progress: techniques, methods and purposes. Prereq: 420 or equivalent. F.Sp.A.

520 Supervision of Home Economics in the Public Schools (3) Program planning, organization and administration of vocational home economics education. Supervision of pre-service and in-service home economics professionals. Prereq: Classroom teaching experience. Su.A.


530 College Teaching in Home Economics (3) Instructional effectiveness, techniques, organization, and evaluation. Prereq: Consent of instructor. F.A.

563 Family Life Education Programs (3) (Same as Child & Family Studies 563.)

580 Special Topics in Home Economics Education (1-3) Current issues and trends in home economics. Prereq: Consent of instructor. May be repeated. Su.A.

581 Directed Study in Home Economics Education (1-3) Prereq: Consent of instructor. May be repeated. E

Human Ecology
(College of Human Ecology)

MAJOR DEGREE
Human Ecology ............................................ Ph.D.

Graduate study leading to the Doctor of Philosophy with a major in Human Ecology is available in the Departments of Child and Family Studies, Nutrition and Food Sciences, and Textiles, Merchandising and Design. Concentrations areas are child development, family studies, food science, nutrition science, and textiles and apparel. 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 improvement of
individual and family well being. For example, the physiological chemist may study metabolic-dietary interrelationships and psychologists may study child behavior. But, it is within human ecology that the nutrient needs of the growing child are considered along with the factors that affect the child's acceptance of different foods. Within the College of Human Ecology, research from one discipline is enhanced by encompassing and utilizing the findings of research from other disciplines.

ADMISSION REQUIREMENTS

A completed file for review includes a College of Human Ecology application, Graduate Factual Information, and selected 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 Dean’s Office, College of Human Ecology.

THE DOCTORAL PROGRAM

The doctoral 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);
3. College Professional Seminar in Human Ecology 610;
4. Minimum of 9 semester hours of 600-level coursework (not including dissertation);
5. Successful completion of written/oral comprehensive examinations as provided by each department’s procedures and the student’s doctoral committee;
6. Original research project, which culminates in a dissertation; 24 semester hours of credit are required for dissertation;
7. Defense of the dissertation. The doctoral committee shall determine whether a reading knowledge of a foreign language is required.

More specific information about the course of study is given under the individual academic units that administer the Ph.D. concentrations.

ACADEMIC COMMON MARKET

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

GRADUATE COURSES

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

Human Performance and Sport Studies

(College of Education)

MAJORS

DEGREES

Physical Education M.S., Ed.D. Ph.D.
Education M.S., Ed.D. Ph.D.

Joan Paul, Head

Professors:


Associate Professors:


Mead, B. J., Ph.D. .......... Purdue Morgan, W. J., Ph.D. .......... Minnesota

Assistant Professors:


Adjunct Faculty:


THE MASTER’S PROGRAM

The Department of Human Performance and Sport Studies offers the Master of Science with a major in Physical Education with the following concentrations:

Adapted Physical Education Exercise Physiology and Fitness Motor Behavior Pedagogy in Physical Education Philosophical and Sociological Foundations of Sport Sport Administration/Management (an interdisciplinary concentration with Health, Leisure, and Safety)

The Master of Science program permits the student to select a thesis or non-thesis option. The thesis option requires a minimum of 30 hours. The non-thesis option requires 32 hours, including a project. All M.S. students must complete a course in research design or statistics and register for two credits of Physical Education 601.

THE DOCTORAL PROGRAM

The Doctor of Education with a major in Physical Education is available with concentrations in the following areas:

Adapted Physical Education Exercise Physiology and Fitness Motor Behavior Philosophical and Sociological Foundations of Sport

The Doctor of Philosophy with a major in Education includes the concentrations and specializations listed under Education.

ADMISSION REQUIREMENTS

Applicants are required to complete the departmental application which will be sent to all persons upon their initial inquiry about the program. Specific questions about these programs should be directed to the head of the Department of Human Performance and Sport Studies.

The following retention policy applies to all graduate students seeking degree in the Department of Human Performance and Sport Studies:

1. Graduate students are required to maintain an overall 3.0 GPA.

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 ASSISTANTSHIPS

A limited number of graduate assistantships are available for qualified women and men who are graduates of accredited colleges or universities. These assistantships are open to students in the Master's and doctoral programs. Students interested in these opportunities should file their applications before February. Letters should be addressed to Graduate Assistantships Coordinator, Department of Human Performance and Sport Studies, The University of Tennessee, Knoxville, TN 37996-2700.

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 Physical Education is available to residents of the state of Texas. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.

Physical Education

GRADUATE COURSES

405 Sociology of Sport (3) (Same as Sociology 405.)
411 Adapted Physical Education (3) Developmental disabilities, motor performance and varied/invariant characteristics of specific syndromes germane to motor development/programming for those with special education needs.
414 Physical Activity and Fitness (2) Relationship of exercise to cardiorespiratory function, body composition, healthy low back, and stress. Prereq: Human physiology. Recommended coreq: 415. (Same as Health 414.)
423 Readings in Physical Education (2) Review of current and classic literature in physical education.
480 Physiology of Exercise (3) Functions of body in muscular work: physiological aspects of fatigue, training and adaptation to environment. Prereq: Human Physiology or general physiology. 2 hrs and 1 lab. (Same as Zoology 480.)
500 Thesis (1-15) P/NP only. E
501 Special Project (3) Culuminating experience for nonthesis major. Research study suitable for publication, or practicum requiring special written work. Prereq: 532.
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or sport. May not be repeated. Maximum 16 hrs.
509 Graduate Seminar in Public Health (1) (Same as Public Health 509, Nursing 509, Nutrition and Food Science 509 and Social Work 509.)
511 Administrative/Supervisory Processes in Physical Education (3) Organizational concepts, management strategies, and supervisory techniques related to physical education programs at all levels.
512 Application of Theory to Curricular/Methodological Decision in Physical Education (3) Application of curricular principles and theories to educational situations for development of curricula and lessons in physical education. Various methodological approaches.
514 Advanced Philosophy of Sport (3) Major philosophical theories of sport: Varies conceptual, moral, aesthetic, and social-political issues.
515 Social Theories of Sport (3) Liberal, democratic and Marxist social theories of sport. (Same as Sociology 594.)
528 Motor Behavior: A Theoretical Perspective (3) Motor behavior from information processing perspектив overview of current research that supports theoretical bases. Prereq: Undergraduate course in general psychology or consent of instructor.
531 Biomechanics of Human Performance (3) Human movement: teaching, coaching, and sports medicine. Prereq: 422 or equivalent.
532 Seminar in Research Techniques in Physical Education (3) Evaluate, compare, and contrast research techniques in physical education with consideration for and experiences in appropriate review, design, and analysis procedures, and proposal development.
533 Psychology of Sport (3) Social psychological factors influencing sport and physical education. Parttern issues and research applications. Prereq: Consent of instructor. (Same as Sociology 542.)
543 Human Motor Development (3) Changes in selected motor performance and related attribute areas during critical developmental periods within context of perceptual-motor development theories and explanations of factors affecting motor behavior.
544 Theories of Physical/Movement Education (3) Integration of various theoretical approaches to physical education/movement education within cultural context; research and applied work.
553 Advanced Adapted Physical Education (2) Curriculum development and teaching methodologies in programming for child with special education needs. Prereq: 411 or consent of instructor. Coreq: 554.
554 Advanced Adapted Physical Education Practicum (1) Curricula and methodologies implemented in lab in school for handicapped. Coreq: 553.
555 Motor Assessment and Programming for the Child with Special Education Needs (3) Criterion and norm-referenced tests used in development of individuated education programs for child with special physical education/motor development needs. Testing protocols which purport to get at basis of dysfunction; those which just measure symptoms of dysfunction; efficacy of remediation theories based or related to testing protocols; evaluation of motor skill in exceptional children and development of remedial programs for children assessed appropriate for school/plant implementation.
563 Laboratory Techniques in Exercise Physiology (2) Laboratory course in experimental methodology and instrumentation: respiratory and metabolic measurements, blood chemistry, and gas analysis. Prereq: Zoology 480. S/N only.
565 Advanced Physiology of Exercise (3) Quantitative approach to current and classical questions in exercise physiology. Prereq: Zoology 480 and 583.
569 Fitness Testing, Programming, and Leadership for Diverse Populations (2) Clinical experience in selecting, administering, and evaluating exercise tolerance tests on cycle ergometer and treadmill. Individual fitness programs for diverse populations. Practice in leading variety of activities aimed at improved fitness. Prereq: Zoology 480 and 414/415. Coreq: 568. (Same as Public Health 569.)
585 Seminar in Gerontology (1) (Same as Human Ecology 585, Educational and Counseling Psychology 585, Nursing 585, Psychology 585, Public Health 585, Social Work 585, and Sociology 585.)
593 Directed Independent Studies (1-3) May be repeated. Prereq: 532 or consent of instructor. S/N or letter grade.
600 Doctoral Research and Dissertation (3-15) P/NP only. E
601 Research Seminar in Physical Education (1) Research topics in different aspects of physical education, sport, and human movement. May be repeated. S/N or letter grade.
622 Directed Independent Research (3-6) Prereq: Doctoral student or consent of instructor. May be repeated. S/N or letter grade.
633 Advanced Motor Behavior (1-3) In-depth analysis, synthesis, and discussion of contemporary theory and topics; research development and production: motor control learning, sport psychology, motor development.
651 Seminar in Exercise and Applied Physiology (1) Selected topics in exercise and environmental physiology. Prereq: 563 and 565. May be repeated with consent of instructor.
664 Research Participation in Applied Physiology (1-6) Participation in research with faculty member whose interests coincide with those of student. S/N or letter grade.
681 Practicum (1-3) Intern experience in areas of major interest. May be repeated.

Dance

GRADUATE COURSES

410 Ballet: Level III (2) Instruction and practice in advanced classical ballet techniques. Prereq: Dance majors and minors or consent of instructor. May be repeated. Maximum 16 hrs.
415 Teaching Creative Dance for Children (2) Theory, methods and materials for developing and implementing integration of creative dance in grades K-6. Mini-teaching experience.
420 Jazz: Level III (2) Instruction and practice in advanced jazz and musical theater dance styles and techniques. Prereq: Dance majors and minors and consent of instructor. May be repeated. Maximum 16 hrs.
430 Modern: Level III (2) Instruction and practice in advanced modern dance techniques. Prereq: Dance majors and minors or consent of instructor. May be repeated. Maximum 16 hrs.
450 Composition III (3) Application of choreographic and production skills culminating in presentation of two works. Prereq: 350.
460 Rhythmic Analysis (3) Basic nature and principles of music, rhythm, and rhythmic notation; correlation with dance movement and composition. Prereq: Consent of instructor.
465 Dance Notation (3) Fundamentals of movement notation; notation and reading of elementary movement studies.
466 Dance Through the 19th Century (3) Dance of various societies and culture from pre-history through 19th century.
481 History of Dance II (2) Development of dance in theatre, recreation and education during 20th century.
Industrial and Organizational Psychology

(College of Business Administration and College of Liberal Arts)

MAJOR DEGREES

Industrial and Organizational Psychology M.S., Ph.D.

Michael Rush, Director

Committee:

Dewhirst, H. Dudley, Management
Dobbins, Gregory H., Management
Fowler, Oscar S., Management
James, Lawrence R., Management
Jenkins, Roger L., Business Administration
Ladd, R. T., Management
Larsen, John M., Jr. (Emeritus), Management
Lounsbury, John W., Psychology
Pollio, Howard R., Psychology
Russell, J. E. A., Management
Schumann, David W., Marketing
Sundstrom, Eric, Psychology

(For complete Faculty Listing, see Departments of Management and Psychology.)

The Master's and doctoral programs are offered in conjunction with the Department of Psychology and the Department of Management. They are designed to prepare students for personnel, managerial, and organizational research; for university teaching; and for consulting relationships with industry. The program emphasizes a scientific/practitioner model in applying and conducting research based on accepted theory, organizational behavior, psychology, management, and statistics. The programs are administered by a joint committee of the two departments, appointed by the Vice Provost and Dean of The Graduate School on recommendations from the two department heads.

It is intended that students entering the I/O Program will represent widely different undergraduate and graduate backgrounds including psychology, business administration, engineering, science, and liberal arts. The first-year program provides the opportunity to take courses that will assist the students in attaining a reasonable level of sophistication in areas of deficiency.

ADMISSION REQUIREMENTS

Applicants for admission should request information and application forms from both the Graduate School and the Director, Industrial and Organizational Psychology Program, 408 Stokely Management Center, The University of Tennessee, Knoxville, TN 37996-0545.

Two separate applications must be completed:

- one application for admission to The Graduate School (apply for major in "Industrial and Organizational Psychology") and one application for admission to the Industrial and Organizational Psychology program.
- Deadline: New students are admitted in Fall semester only, and applications must be received by the Graduate Admissions and Records Office by March 1.

General Requirements

At least one year of college mathematics and one course in statistics are required. Ordinarily, an undergraduate grade point average of 3.0 or above is required with no evidence of special weakness in mathematics and physical sciences.

Test scores on each section of the general portion (verbal and quantitative) of the Graduate Record Examination (GRE) and the Subject GRE (Psychology-81) are required. Customarily, those students admitted to the program have performed at or above the 69-79th percentile on the general tests. (This corresponds to a raw score of approximately 600 on each of the tests.) The Subject GRE (Psychology-81) score will be used in making admission decisions, although special consideration will be given in the case of non-psychology majors.

THE MASTER'S PROGRAM

Note: Curriculum under review and subject to change effective Fall 1991.

A thesis is required with 6 semester hours of Management or Psychology 500. The Master's degree can be completed with a minimum of 33 semester hours in the major as follows:

- Management 587, 588 or Psychology 517-18; Psychology 557, Statistics 537, 538.

Twelve hours of additional coursework to be selected primarily from the following with the approval of the student's advisor:

- Management 511, 522, 610; Management/psychology 625, 626, 627, 638; Psychology 505, 550, 610, 620, 624.

Electives, as approved for an individual's plan of study, may be selected from graduate courses in psychology, social work, sociology, management, education, planning, etc. Students who wish to pursue special research interests aside from their 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).

A dissertation is required with 6 semester hours of Management 567-68 or Psychology 517-18. 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 670 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).

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 670 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-61) 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. and Ph.D. programs in Industrial and Organizational Psychology are available to residents of the states of South Carolina or Virginia. The Ph.D. program is also available to residents of Arkansas or Kentucky. Additional information may be obtained from the Admissions and Records Office.
Industrial Engineering

(College of Engineering)

MAJOR DEGREE
Industrial Engineering M.S.

John N. Snider, Head

Professors:
Bentadeili, J. A., Ph.D. Ohio State
Claycombe, W. W., Ph.D., PE. VPI
DePorter, Elden L., Ph.D. VPI
Doulet, Dan C., PE, M.S. Tennessee
Emerson, H. P. (Emeritus), PE, S.B. MIT
Garrison, G. (UTSI), Ph.D. NC State
LaForge, R. M. (Emeritus), PE, M.S. Georgia Tech
Loveless, Howard L. (Emeritus), PE, M.S. NC State
Mitchell, James T. (UTSI), Ph.D. Vanderbilt
Snider, John N., PE, Ph.D. Ohio State
Westbrook, Jerry D., PE, Ph.D. VPI

Associate Professors:
Aikens, Charles H., PE, Ph.D. Tennessee
Halley, M. L. (UTSI), PE, Ph.D. Texas Tech
Hungerford, J. C., Ph.D. Ohio State
Hutchinson, D. H., Ph.D. Georgia Tech
Kirby, K. E., Ph.D. Tennessee

Assistant Professors:
Goodman, Marvin K., PE, M.S. Tennessee
Jackson, D. F., M.S. Tennessee
Tippett, Donald T. (UTSI), Ph.D. Texas A&M

Lecturers:
Douglass, S. Ph.D. Tennessee
Forth, W. B., M.S. Purdue
Greenwood, T. G., M.S. Tennessee

THE MASTER'S PROGRAM

A graduate program leading to the degree of Master of Science is open to graduates of A.B.E.T.-accredited undergraduate curricula in industrial engineering or to graduates of other technical curricula who take prerequisite coursework depending on their academic background. These courses will be determined by the graduate committee. The thesis program requires 24 hours of coursework and 6 hours of Thesis. A non-thesis option with 30 hours of coursework plus a 3-hour design project is available.

Graduate work in Industrial Engineering provides for concentrations in operations research, engineering management, manufacturing systems, human factors engineering, information systems, reliability and quality control, and traditional industrial engineering. Either one or two minors can be elected in engineering, mathematics, psychology, business, computer science, statistics or economics.

Any 400-level course required in the Bachelor of Science in Industrial Engineering program at The University of Tennessee may not be used for graduate credit in the M.S. graduate program in Industrial Engineering.

GRADUATE COURSES


401 Integrated Manufacturing Systems (3) NC and CNC machine tools, robotics and related materials handling systems, hard automation, alternative integrated manufacturing systems, and manufacturing information/ control systems.


403 Production Facilities Design and Material Handling (3) Design of production facilities: plant layout, analysis and planning for overall moving, packaging and storage of materials. Office layout and service areas. Design of facilities for such diverse groups as hospitals, banking, insurance, etc. Design of buildings.

405 Engineering Economy (2) Methods and problems in selection or replacement of equipment. Decisions among engineering alternatives involving capital recovery, economic life of equipment, and rate of return on investment.


412 Quantitative Methods in Project Management (2) Project planning, scheduling, and control based on network and precedence diagramming methods. Resource allocation and time-cost trade off algorithms, multi-project control, computer applications, and PERT methods of handling uncertainty in activity time estimates.

413 Research Methods in Industrial Engineering (3) Methods to collect and analyze data. Process control, statistical modeling of processes, behavior sampling, single subject experimental designs, classical experimental design methods, and time series models of experiments. Validity and reliability concepts as related to measurement and collection of data. Strategies to control rival hypotheses: randomization, matching, yoking, fixed variables, and building extraneous variables into experiments. Design of experiments for research. Prereq: 300 and senior standing.


420 Human Factors Engineering II (3) Design of man-machine interfaces and environment. Specific application of human factors engineering to special problem areas. Prereq: 519.

421 Informational Systems (3) Systems engineering approach to design, development, implementation, and evaluation of systems of information. Informational aspects of systems, structures and data management systems. Prereq: 200 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. Prereq: 403, 404, and 405.


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

501 Design Project (1-3) Enrollment limited to industrial engineering students in non-thesis program. May be repeated. Maximum 6 hrs. S/NC only.

502 Registration for Use of Facilities (3-16) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.


511 Facilities Planning and Design (3) Modern materials handling techniques, computer-aided layout techniques, application of operation research models, and use of these to design manufacturing facility. Prereq: Production facilities planning or consent of instructor.

514 Information Systems (3) Systems analysis and control concepts applied to systems of information. Role of IE in office and factory of future. Management support systems, decision support systems, and integrated support systems.

515 Production and Inventory Systems (3) Application of OR techniques to production and inventory systems. Deterministic and stochastic inventory models. Use of mathematical programming for product mix, process selection, blending and aggregation planning problems. Application of simple and complex queueing models in manufacturing environment.


518 Advanced Engineering Economy (3) Financing and investment functions of firm, deterministic analysis of after-tax cash flow projections: separation theorem and basic horizon models; stochastic analysis of capital budgeting problems; Monte Carlo simulation techniques; multiple attribute decision analysis. Prereq: Statistics.


520 Human Factors Engineering II (3) Design of man-machine interfaces and environment. Specific application of human factors engineering to special problem areas. Prereq: 519.

521 Human Factors Engineering Methodology (3) Background in methodology used by human factors engineering designers and systems analyst. Observational methods, function/task analysis, design aiding techniques, and reliability assessment. Prereq: 300.
Interdisciplinary Programs

(Professor of Liberal Arts)

The College of Liberal Arts offers a series of interdisciplinary undergraduate majors and minors through its Interdisciplinary Programs. These programs include Afro-American Studies, American Studies, Ancient Mediterranean Civilizations, Asian Studies, Comparative Literature, Latin American Studies, Linguistics, 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.

Afro-American Studies

GRADUATE COURSES

421 Comparative Studies in African and Afro-American Societies (3) Education, religion, and social stratification. Views Afro-Americans and African Americans have of each other and concept of Pan-Africanism.

450 Issues and Topics in Afro-American Studies (3) Problems, 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.)


483 Afro-American Women in American Society (3) Historical and contemporary socio-political factors in American society as related to Black women. (Same as Women's Studies 483.)

Asian Studies

GRADUATE COURSES

421 Readings in Islamic Literature (3) Prereq: Mastery of intermediate-level Arabic or consent of instructor. May be repeated. Maximum 9 hrs.

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.

Cinema Studies

GRADUATE COURSES

420 French Cinema (3) (Same as French 420.)

489 Special Topics in Film (3) (Same as English 489.)

Comparative Literature

GRADUATE COURSES

401 Cultural Plurality and Institutional Changes in Latin America (3) Value systems, behavioral pattern, political parties, role of military, church, educational institutions, dictatorship and nationalism.

402 Latin American Studies Seminar (3) Selected topics. May be repeated. Maximum 6 hrs.

Latin American Studies

GRADUATE COURSES

401 Cultural Plurality and Institutional Changes in Latin America (3) Value systems, behavioral pattern, political parties, role of military, church, educational institutions, dictatorship and nationalism.

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 Anthropology 411.)

420 The Development of Historical Linguistics as a Science (3) Scientific understanding of language change. Emergence of Neogrammarian paradigm from 19th-century intellectual trends. Impact of synchronic, descriptive, structural and transformational-generative linguistics on contemporary diachronic theory. Prereq: 6 hrs of courses required for linguistics concentration or consent of instructor.

425 Introduction to Descriptive Linguistics (3) (Same as French 425, German 425, Russian 425, and Spanish 425.)

426 Methods of Historical Linguistics (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-gen-
485 Special Topics in Language (3) (Same as English Language II (3) (Same as English 475.)
475 Teaching English as a Second or Foreign Language I (3) (Same as English 474.)
475 Teaching English as a Second or Foreign Language II (3) (Same as English 475.)
485 Special Topics in Language (3) (Same as English 485.)
559 Problems in Linguistics: Romance Languages (3) (Same as French 559 and Spanish 559.)

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 England (3) (Same as English 422.)
425 Women's Health (3) (Same as Health 425.)
434 Psychology of Gender (3) (Same as Psychology 434.)
465 Rhetoric of the Women's Rights Movement (3) (Same as Speech 465.)
483 Afro-American Women in American Society (3) (Same as Afro-American Studies 483.)

Journalism

(College of Communications)

MAJOR

Communications

DEGREES

M.S., Ph.D.

James A. Crook, Director

Professors:

Adamson, June N., M.S. ................. Tennessee
Ashdown, Paul G., Ph.D. ............... Bowling Green
Crook, James A., Ph.D. ............... Iowa State
Everett, George A., Ph.D. .............. Iowa
Leiter, B. Kelly, Ph.D. ................. Southern Illinois
Singletary, Michael W., Ph.D. ........ Southern Illinois
Wilford, John N., M.A. ................. Syracuse

Associate Professors:

Bowles, Dorothy, Ph.D. ................. Wisconsin
Miller, M. Mark, Ph.D. ................. Michigan State
Morrow, Jerry L., Ph.D. ............... Toledo
Puetz, Sammie Lynn, M.S. ............ Tennessee

Assistant Professors:

Caudill, C. Edward, Ph.D. .......... North Carolina
Caudill, Susan M., Ph.D. ............ Tennessee
Heller, Robert B., M.A. ............. Syracuse

Adjunct Professor:

Haley, Alex

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, pages, 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.
432 Advanced Editing (3) Sensitivity to language and editing skills. Headline writing, layout, and production. Prereq: 203.
430 Mass Communications History (3) Development of press and role of mass communications in American history. Newspapers, radio, television, and magazines. F.
516 Seminar in Journalism Issues (3) Topics vary. May be repeated. Maximum 6 hrs.
520 Press-Government Relations (3) Development of adversary relationship between journalists and government officials. Philosophical and legal basis for open reporting of government. Use of press by candidates and incumbents. F.
525 Public Opinion (3) Role of press in developing and influencing public consensus. Social theories of public opinion and analysis of media mass media's response. F.
535 Publications Management (3) Problems in management, production, market analysis, and design. Techniques of writing, editing, and presenting comprehensive articles and other material; regional and specialized magazines. Individual editorial projects. Prereq: 420 or consent of instructor.
540 Seminar in Newspaper Operations (3) On-site study of newspaper management operations. Positioning medium for its target audience and how this affects profitability. Prereq: 550 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.
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. Sp.
580 Seminar in Visual Communication (3) Behavioral aspects of communication with images. Theories of psychological effect in color, shape, texture, and other design elements. Prereq. 203 or Advertising 350 or Broadcasting 430 or equivalent.
590 Communications and International Development (3) Relationship between mass communications and development of nations. Role of communications media of developed nations in "Third World" regions of globe. Communications as facilitator of international cooperation.
597 Independent Study (3) Prereq. Consent of instructor. May be repeated. Maximum 6 hrs.
598 Internship (3) Professional work in journalism supervised by editor or manager with faculty approval. No retroactive credit for previous work experience. Prereq: Completion of core curriculum.

Law

(College of Law)

MAJOR DEGREES

J.D., J.D.-MBA, J.D.-M.P.A.

Martin Yarbrough, Dean

Professors:

Cohen, Neil P., LL.M. ................. Harvard
Cook, Joseph G., LL.M. .............. Yale
Gray, R. Macdonald (Emeritus), LL.M. ................. George Washington
Hardin, Patrick, J.D. ................. Chicago
Hess, Amy M., J.D. ................. Virginia
Jones, Durward S., J.D. ............. North Carolina
King, Joseph H. (Distinguished Prof.), J.D. ........ Pennsylvania
Lacey, Forrest W. (Emeritus), S.J.D.
Le Clerq, Frederick S., LL.B. .... Duke
Lloyd, Robert M., J.D. ............. Michigan
Miller, Charles H. (Emeritus), J.D. ................. Duke
Overton, Elvin E. (Emeritus), S.J.D. ................. Harvard
Phillips, Jerry J., J.D. .............. Yale
Picquet, Cheryl, M.S.L.S............. Vanderbilt
Rivkin, Dean H., J.D. .............. Michigan
Sebert, John A., J.D. .............. Michigan
Sewell, Toxey H. (Emeritus), LL.M.

George Washington
DUAL J.D.-MBA DEGREE PROGRAM

The College of Business Administration and the College of Law offer a coordinated dual degree program leading to the conferral of both the Doctor of Jurisprudence and the Master of Business Administration degrees. A student pursuing the dual program is required to take fewer hours of coursework than would be required if the two degrees were to be earned separately.

Admissions

Application for the J.D.-MBA program must make separate application to, and be competitively and independently accepted by, the College of Law for the J.D. degree and The Graduate School and College of Business Administration for the MBA degree, and by the Dual Degree Committee. Students who have been accepted by both colleges may commence studies in the dual program at the beginning of any term subsequent to matriculation in both colleges provided, however, that dual program studies must be started prior to entry into the last 28 hours required for the J.D. degree and the last 16 hours required for the MBA degree.

Curriculum

A dual degree candidate must satisfy the graduation requirements of each college. Dual degree students withdrawing from the dual 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 may be transferred. Students continuing in the dual degree program, the J.D. and MBA degrees will be awarded upon completion of requirements of the dual degree program.

The College of Law will award a maximum of nine (9) semester hours of credit toward graduation from the College of Business Administration. Three of the nine semester hours must be earned in Accounting 501, 503, or a more advanced accounting course. If College of Law credit is given for such accounting courses, the dual degree student may not receive College of Law credit for Accounting for Lawyers (Law College Course 837). The College of Business Administration will award credit toward the MBA for acceptable performance in a maximum of 12 semester hours of approved courses offered by the College of Business Administration. 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 grade of B or higher and a No Credit for any lower grade. The College of Business Administration will award a grade of Satisfactory for a College of Law course in which the student has earned a grade of C or higher and a No Credit for any lower grade. Grades earned in courses of either college may be transferred to either college for course work or an internship for one summer term in addition to taking normal course loads for four academic years.

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 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 Liberal Arts offer a coordinated dual degree program leading to the conferral of both the Doctor of Jurisprudence and Masters 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 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 and a complete application to the dual program. Applicants must also meet M.P.A. admission requirements of each college. Candidates accepted to the dual program must be enrolled in course work or an internship for one summer term in addition to taking normal course loads for four academic years.
agged 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. coordinator in both academic units. In the third and fourth years, students are strongly encouraged to take both law and political science courses each semester.

Dual degree students who withdraw from the program before completion of the requirements for both degrees will not receive credit toward either the J.D. or the M.P.A. degree for courses taken in the other program except as such courses qualify for credit without regard to the dual program.

Awarding of Grades
For grade recording purposes in the College of Law and the Department of Political Science, grades awarded in courses in the other unit will be converted to either Satisfactory or No Credit and will not be computed in determining a student's GPA or class standing. The College of Law will award a grade of Satisfactory for an approved M.P.A. course in which the student earns a grade of B or higher and a grade of No Credit for any lower grade. The Political Science Department will award a grade of Satisfactory for law courses only in the M.P.A. program in which the student earns a grade of 2.3 or higher and a grade of No Credit for any lower grade. The official academic record of the student maintained by the Registrar of the University shall show the actual grade assigned by the instructor without conversion.

Policy for Graduate Students Taking Law Courses
Law courses are not available for graduate credit; however, a graduate student may be allowed to take up to 6 semester hours of law courses and receive credit toward a degree upon approval of the College of Law and the major chairperson. The graduate student must register for the law course during regular registration at the College of Law requesting an S/N credit 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.

Different rules apply to the student enrolled in the Dual J.D.-M.B.A. or J.D.-M.P.A. Programs. Graduates must complete the requirements 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 I (3) Binding effect of judgments, selecting proper court (jurisdiction and venue), ascertaining applicable law, and federal and state practice.


803 Contracts (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, assignment and delegation. Considerable coverage of Articles 2 and 4 of the Uniform Commercial Code with respect to remedies, anticipatory repudiation, impracticability and good faith.

805 Legal Process I (2) Lawyer-like use of cases and statutes in prediction and persuasion. Analysis and synthesis of common law decisions; statutory interpretation; fundamentals of expository legal writing and legal research.

806 Legal Process II (3) Continuation of Legal Process I. Formal legal writing, appellate procedure, and oral advocacy.

807 Torts I (3) Intentional torts, including battery, assault, false arrest, false imprisonment, false imprisonment, conversion and trespass; privileges and defenses to intentional torts; negligence, including standard of care and proof of negligence; limitations on strict liability defenses; 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 public proceedings; misrepresentation, injurious falsehood, misappropriation of commercial values, and interference with contract; constitutional 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 titles in the areas of landlord-tenant relations; estates in land and future interests; co-ownership and tenancies in common; sales agreements and conveyances; title assurance and recording statutes; servitudes; and selected aspects of nuisance law, eminent domain, and zoning.


813 Evidence (4) Rules regulating introduction and use of evidence in 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 (4) Introduction to major legal databases and retrieval systems. Legal databases as tools for research and practice, and as a means of disseminating legal information.

816 Income Tax I (4) What is income; whose income is it; when is it income; how is it taxed (capital gains and losses, minimum and maximum tax); deductions and credits; rates (both state and federal).

821 Administrative Law (3) Administrative agency decision-making processes and judicial review of administrative decisions; procedural standards for informal and formal administrative adjudication and rule-making (attention to federal Administrative Procedure Act; constitutional due process standards in administrative settings; and availability, scope and timing of judicial review of agency actions).

822 Legislation (3) Interpretation and drafting of statutes, legislative process, and legislative power; comparison of judicial views on legislative process with both realities of legislative process and applicable constitutional principles.

824 Local Government (3) Distribution of power between state and local governmental units; sources of authority for local government; creation of local government units; home rule; problems created by fragmentation of local government units; financing of local services; influence of federal programs on local government finance and decision-making.

827 Business Associations (4) Legal problems associated with formation, operation, and dissolution of unincorporated and incorporated business firms; legal rights and duties of firm members (partners and agents); partners and limited partners; and corporate shareholders, directors and officers, and others with whom these members interact in connection with firm's business.

828 Advanced Business Associations (2) Selected topics from law of business associations. Prereq: 827. May be repeated.

830 Securities Regulation (3) Basic structure of federal securities laws. Legal analysis of underwriting of capital by new and growing enterprises; securities transactions by promoters, officers, directors and other insiders; and their regulation under Rule 506. Emphasis on federal regulation under Rule 10b-5 and other antifraud provisions; and provision of legal and other professional services in connection with securities transactions.

832 Business Planning Seminar (2) Selected problems on corporate and tax aspects of business planning and transactions. Prereq: 818, 827, and 970.

834 Antitrust (3) Federal antitrust laws: monopolization, price-fixing, group boycotts, and anticompetitive practices generally; government enforcement techniques and private treble damage suits.

835 Trade Regulation Seminar (2) Selected problems arising under laws regulating competition and conduct of business enterprises.

837 Accounting for Lawyers (2) Basic accounting documents, problems, and techniques to enable law students to understand and interpret their financial statements properly.

840 Commercial Law (4) Basic coverage of most significant provisions of Uniform Commercial Code; security interests in personal property (Art. 9 of U.C.C. and relevant Bankruptcy Code provisions); commercial paper, including checks, notes and other negotiable instruments (Arts. 3 and 4 of U.C.C.); sales of goods, including coverage of portions of Art. 2 of U.C.C. not covered in Contracts.


843 Debtor-Creditor Law (3) Enforcement of judgments; bankruptcy and its alternatives for business and consumer debtor; emphasis on Federal Bankruptcy Code.

846 Constitutional Law I (3) First Amendment rights to freedom of religion, expression, association and press; Fourteenth Amendment rights against discrimination as to race, religion, sex, etc.; substantive and procedural due process; protection of state and local governmental entities against federal court intervention; and limitations on federal courts in civil rights actions; and remedies for violations of constitutional and other civil rights.

Law 109
Library and Information Science

(Office of the Provost)

MAJOR

Library Science .................................................. M.S.L.S.

Gary R. Purcell, Director

Glen E. Estes, Assistant Director

Library and Information Science

Professors:

Estes, Glenn E., M.L.S. ................................... Kent State
Griffiths, Jose-Marie, Ph.D. ......................... London (UK)
Purcell, Gary R., Ph.D. ............................... Case Western
Wilson, P. (Emeritus), Ph.D. ................. Michigan

Associate Professors:

Karrenbrock, Marilyn H., Ed.D. .......... Georgia
Pemberton, J. Michael, Ph.D. .............. Tennessee
Robinson, William C., Ph.D. ................. Illinois
Sinkakas, George M., Ph.D. ................. Pittsburgh

The Graduate School of Library and Information Science 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 in Library Science. The program is accredited by the American Library Association.

The mission of the school is to provide excellence in teaching, research, and public service in library and information science. The goals and objectives of the school are:

A. To prepare students to understand the nature of information and the role of the library and other information agencies in the management of information resources, and the facilitation of information transfer. Students will demonstrate:

1. Knowledge of the historical role of libraries and other information agencies in society.

2. A knowledge of how information flows through contemporary society.

3. An understanding of the role of the librarian and/or information specialist as a mediator between information and the user with an emphasis on the improvement of the quality of information services in response to the needs of society.

4. An understanding of and competence in the selection, acquisition, organization, storage, retrieval, and dissemination of information.

5. An understanding of bibliographic control and knowledge of information sources in various formats and subjects.

6. An understanding of management theory and practice, particularly as these are related to library and information services.

7. A knowledge of research methods sufficient to enable them to engage in effective problem solving.

8. To provide services to the state, region, and nation in association, consulting, and continuing education activities which will promote the development and improvement of information systems and services such that the school's contributions reach beyond its immediate academic programs.

The school will provide:

1. Continuing education for information professionals and, on a selective basis, to persons outside the information field.

2. Advisory services to libraries and other types of organizations.

3. Leadership for professional associations.

C. To conduct basic and applied research which promotes the generation of new knowledge, services, and technology. The school will encourage:

1. Research which strengthens its instructional and public service programs.

2. The use of a variety of research methods.

3. Sharing the results of its research.

4. Increased research quality and productivity.

ADMISSION REQUIREMENTS

Candidates who have at least a 3.0 average in the junior and senior years will receive first consideration. Applicants are required to take the general test of the Graduate Record Examination. The test should be taken at least one semester in advance of application for admission to The Graduate School.

Foreign applicants are required to take the Test of English as a Foreign Language. A personal data sheet and three recommendations (obtained from the Graduate School of Library and Information Science) should be returned to the assistant director of the school.

MASTER OF SCIENCE IN LIBRARY SCIENCE

The program leading to the Master of Science in Library Science involves a total of 39 semester hours of graduate courses, 18 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 30 hours must be taken in the Graduate School of Library and Information Science, allowing up to 9 hours of work in another 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.

FINANCIAL ASSISTANCE OPPORTUNITIES

Employment with The University of Tennessee Libraries may provide a work-study opportunity for selected students who wish to gain experience in academic librarianship while pursuing the degree. Such students usually work at least 20 hours each week and thus may extend the period required for the degree. Similar opportunities exist with some other libraries and information agencies in the Knoxville area.

Work opportunities in a scientific-technical environment are available through subcontracts with Oak Ridge National Laboratory and the Department of Energy.

A limited number of graduate assistantships are available through the school. Assistantships of this type carry a waiver of tuition and fees as well as a stipend and require that recipients work 10 hours per week in the school.

For application forms and information about financial aid and other information about the M.S.L.S. in Library and Information Science, write to Admissions, Graduate School of Library and Information Science, University of Tennessee, 804 Volunteer Blvd., Knoxville, TN 37996-4330.

Corporations and shareholders, and related topics. Pre-req: 818. Recommended prereq or coreq: 870.

973 Wealth Transfer Taxation (3) Transfers of wealth at death (estate tax) and during life (gift tax), and of generation skipping transfers; fiduciary income taxation. Recommended prereq or coreq: 818.
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. in Library Science is available to residents of the states of Arkansas, Georgia, West Virginia, or Virginia. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.

GRADUATE COURSES

430 History of the Book (3) History of writing and various methods of bookmaking from earliest times through 19th century. Sp

475 Utilization of Instructional Media (3) (Same as Curriculum and Instruction 475.)

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

522 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 Information Professionals and Their Organizations (3) Variety and prospects of information professions; achievements, responsibilities, goals, and issues. E, Su, A

520 Technical Services I (3) Technical services principles and techniques: acquisitions, bibliographic control, storage, maintenance, and public service. Prerequisite: 530 or consent of instructor. E, Su, A

521 Technical Services II (3) Library of Congress subject organization and description, automated cataloging and indexing. E, A

530 Information Sources and Services (3) Basic bibliographic and information sources, online databases, interview and search techniques, selection and evaluation of information collections and development and evaluation of services. E, Su, A

531 Sources and Services for the Social Sciences (3) Information sources in social sciences: political science, sociology, psychology, geography, history, anthropology, sources and services in business, education, and law. Prerequisite: 530. Sp

532 Sources and Services in Science and Technology (3) Information sources in the physical and life sciences. Prerequisite: 530. Sp

533 Sources and Services for the Humanities (3) Information sources in philosophy, religion, fine arts, performing arts, literature and language, and history. Organization of collections for optimum use. Prerequisite: 530. Su


540 Research Methods in Library and Information Science (3) Research methods applicable to librarianship and information management. Process and conduct of empirical research; analysis of published research. Prerequisite: admission to program or consent of instructor. E, Su, A

550 Library and Information Agency Management (3) Management and organizational concepts applicable to libraries and other information agencies. Prerequisite: admission to program or consent of instructor. E, Su, A

551 School Libraries and Media Centers (3) Planning, implementing and evaluating school library programs. Curriculum development, role of technology, relationships with district and state services. F, Su

552 Academic Libraries (3) Development and present status, mission and objectives within higher education institutions, trends, problems, recurring issues. F

553 Special Libraries and Information Agencies (3) Development and present status, scope and objectives, administrative and organizational problems and techniques. F

554 The Library in the Community (3) Application of library services in planning and policy formulation. Public library focus. Sp

560 Development and Management of Collections (3) Philosophy and process of building and managing collections in libraries and information agencies: environment; community analysis; policy statements; collection evaluation; and preparation of buying lists. Prerequisite: 530. E, Su, A

561 Contemporary Book Publishing (3) Creation, design, production, marketing, and distribution of materials acquired by libraries; various types of publishers. F

562 Serials (3) Serials collections; selection, acquisition, bibliographic control, storage, maintenance, and public service. Prerequisite: 560 or consent of instructor. Sp

563 Nonbook Materials (3) Selection, acquisition, mediographic representation, storage, utilization, and programming; microfilms, films, video, sound recordings, and as information media. F

564 Records Management and Archives (3) Objectives and functional elements of records management and archives programs within various types of organizations, management of creation, distribution, retention, storage, retrieval, protection, and disposition of organizational records regardless of information medium. Sp

569 Advanced Production of Audiovisual Software (3) (Same as Curriculum and Instruction 569.)

571 Resources for Children (3) Critical survey of books and related materials for children, development of genre, evaluation, selection, and utilization for school and public libraries. F

572 Resources for Young Adults (3) Critical survey of books and materials for young adults; personal, vocational and recreational needs and interests. Evaluation, selection, and utilization for school and public libraries. Sp

573 Services 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. Prerequisite: 571 or 572 or consent of instructor. Su

574 Adult Materials and Services (3) Fiction and subject categories, popular and standard; reading, listening, and viewing guidance to meet adult interests; development of specialized collections; services for adults. F

580 Foundations of Information Science (3) Conceptual framework for information science and other disciplines; bibliographic control, storage, maintenance, and public service of information retrieval system design. Related research findings and applications to library and information system practice. F, Sp

581 Information in Society (3) Characteristics of an information society, knowledge and information, effect of technological innovation, use and effect of media. F

582 Automation (3) Computer concepts and their applications to basic library and information center operations. E, Su, A

583 Information Systems Analysis and Design (3) Tools and methodologies in library/information agency systems planning and implementation. Role and training of systems analyst, systems study from planning through implementation and evaluation, and related topics. Sp

584 Bibliographic Database Design (3) Design and construction of bibliographic databases, record and database structure, document representation, indexing, abstracting, thesaurus construction and maintenance, and information retrieval. Sp

585 Information Technologies (3) Computer-based and non-computer related media and methods for information storage, retrieval, and transfer within and external to library/information center environment; existing and prototype systems and interfacing of technologies. Prerequisite: 582 or consent or instructor. Sp

590 Problems in Library and Information Science (3-6) Prerequisite: Consent of instructor. May be repeated. Maximum 6 hrs.

591 Supervised Readings in Library and Information Science (3-6) Prerequisite: Consent of instructor. May be repeated. Maximum 6 hrs.

592 Seminar in Library and Information Science (3) Prerequisite: Consent of instructor. May be repeated with consent of advisor. Maximum 6 hrs.

593 Independent Study (3) Prerequisite: Consent of advisor. Maximum 6 hrs.

599 Practicum (3) Opportunity to translate theory into practice under guidance of qualified information professionals. Prerequisite: Completion of core courses relevant to student's practicum design. Written consent of advisor and approval of practicum coordinator. May be repeated with consent of advisor and practicum coordinator.

Life Sciences

(Office of the Provost)

MAJOR

DEGREES

Life Sciences

M.S., Ph.D.

Howard I. Adler, Chair

Coordinating Council

Becker, Jeff M., Cellular, Molecular and Developmental Biology
Bright, Janice M., Veterinary Medicine
Burghardt, Gordon M., Ethology
Dougall, D. K., Biotechnology
Farkas, W. R., Environmental Toxicology
Hickox, L. G., Plant Physiology and Genetics
Vaughan, Gerald, Physiology

The programs leading to the M.S. and Ph.D. degrees in Life Sciences are interdisciplinary 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 or subcellular components, or the applications of recombinant DNA technology and risk assessment. The program is designed to foster research and opportunities in structural or functional aspects of the biology and biochemistry of cells and molecules.

M.S. in Biotechnology

Required courses are Life Sciences 510; Botany 511, 512; Biochemistry 511; Microbiology 410; Chemical Engineering 475; and Zoology 502. Students may also choose an area of specialization from: (1) Biotechnology concentration. Evaluation by supervisor. May be repeated. Maximum 9 hrs.

Ph.D. in Biotechnology

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.

Physiology

The inter-departmental program in physiology includes research in areas of cellular, comparative, developmental, exercise, muscle, neuro-physiology, regulatory, or reproductive biology and biochemistry of cells and molecules; by formal study of cells and of engineering aspects of biotechnology; and by the development of special expertise in areas such as animal embryo manipulation, automated chemical synthesis of macromolecules, bioprocess engineering, bioproducts and biotransformations, liposomes, microscopy and image processing, monoclonal antibodies and hybridoma technology, plant tissue culture, recombinant DNA technology and risk assessment, and modeling. The production of a research thesis or an industrial co-op experience plus an area of specialization will also be an important part of the training experience.

Required courses are Life Sciences 509, 511, 512, 531, 532; Biochemistry 511; Microbiology 410; Botany 451; Chemical Engineering 475; and Zoology 507.

Cellular, Molecular and Developmental Biology

The inter-departmental program in cellular, molecular, and developmental biology is designed to foster 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 510.

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 socio-biology.

Required courses for the Master’s are: Psychology/Zoology 450, 459; Zoology 524, 583; Statistics 531-32; and Zoology/Psychology 516.
one additional semester of approved doctoral seminar work. For strategic management - 513, 610, 611, 612.

GRADUATE COURSES

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

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

504 Management of Organizational Behavior (3) Integration of individual and group differences, organization theory and design, motivation, leadership, human resource planning, and career implications with strategy, planning, and decision making.

505 Operations and Logistics Management (3) Concepts and techniques for managing operations and distribution systems. (Same as Logistics and Transportation 505.)

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, organizational design: social influences on organization effectiveness; motivation, leadership, group behavior, intergroup relations, organization change and development.

513 Strategic Planning (3) Theoretical and applied literature, successful strategic positioning of business in variety of environments. Analysis of industry notes and literature, successful strategic positioning of business in variety of environments. Analysis of industry notes and literature. (Same as Business Administration 509.)

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 692.)

525-26 Industrial and Organizational Psychology (1-3, 1-3) Readings in industrial and organizational psychology. Available only by prearrangement with supervising faculty member. May be repeated. Maximum 6 hrs. S/NC or letter grade.

531 Management of Technology-Based Organizations (3) Role of technology and innovation in formulating and implementing 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 venture plan, case analysis.

567-68 Proseminar in Industrial/Organizational Psychology (3,3) Basic thought, concepts, and issues required for advanced graduate study in industrial and organizational psychology. Must be taken in sequence during student's first year of study in industrial and organizational psychology program. Consent of instructor required for all non-industrial/organizational psychology program students. (Same as Psychology 517-18.)

571 International Management (3) Analysis of environment of international business firms and impact of international and national factors on managerial decisions.

593 Directed Independent Study (1-3) Topic of mutual interest. Available only by prearrangement with supervising faculty member. May be repeated. Maximum 6 hrs. S/NC or letter grade.

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 proposal.

610 Seminar in Advanced Organization Theory (3) Analysis of functioning of complex organizations. Classical and open systems models, organization growth and change, organizational effectiveness and design of complex organizations.

611 Seminar in Strategic Management I (3) Analysis of concepts and research in strategic management.

612 Seminar in Strategic Management II (3) Analysis of concepts and research in strategic management.

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 626.)

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 627.)

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 628.)

638 Current Topics in Industrial/Organizational Psychology (3) In-depth analysis of various topics: organizational change and development, psychology and problems of interviewing, consumer behavior. Prereq: 567, 568, consent of instructor. May be repeated. (Same as Psychology 638.)

640 Seminar in Operations Management (3) Research and concepts. Application of quantitative methods to operations management problems. May be repeated.

690 Field Work in Industrial and Organizational Psychology (1-2) Supervised field practice in industrial and organizational psychology. 1 hr per 30 hrs of practice. Maximum 12 hrs. (Same as Psychology 690.)

Management Science

(College of Business Administration and Intercollegiate Program)

MAJORS

Management Science ......................... M.S., Ph.D. Business Administration ................... MBA

Kenneth C. Gilbert, Chair

Professor:

Ho, James K., Ph.D. .................... Stanford

Associate Professor:

Gilbert, Kenneth C., Ph.D. ................ Tennessee

Assistant Professors:

Bowers, Melissa R., Ph.D. .............. Clemson

Kaplan, Lori A., Ph.D. ................... Michigan

Noon, Charles E., Ph.D. ................. Michigan

Patel, Minnie H., Ph.D. ................. Georgia Tech

Additional Committee Members:

Fowler, Oscar S., Management Hilliard, Jimmy E., Finance

Leitnaker, Mary G., Statistics

Raistoon, Bruce A., Geography

Sullivan, William G., Industrial Engineering

THE MASTER'S PROGRAM

The M.S. program in Management Science is an intercollegiate program and 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 for individual 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 concentration 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 Graduate School Rating 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>Hours</th>
<th>Core Requirements</th>
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<tbody>
<tr>
<td>14</td>
<td>Management Science 531, 532, 533, 534</td>
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<tr>
<td>5</td>
<td>Statistics 567</td>
</tr>
<tr>
<td>9</td>
<td>Applied specialization area (approved by advisor) or Statistics elective—500 level or above (approved by advisor) or Mathematics—400 level or above (approved by advisor)</td>
</tr>
<tr>
<td>6</td>
<td>Electives selected from mathematics, statistics, computer science, and/or management science area</td>
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<tr>
<td>38</td>
<td>TOTAL</td>
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</table>

A thesis option is available to qualified students which substitutes 6 hours of thesis credit for the following 8 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 5-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 under the College of Business Administration is designed to prepare students for research related to the application of mathematical tools to complex decision making. Three primary objectives of the program are:

1. to provide, through management science coursework, a thorough knowledge of common Management Science/Operations Research mathematical models and their uses;
2. to provide sufficient advanced study in a supporting area to qualify the graduate for a joint faculty position in the supporting area and management science. The candidate may choose from the 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 Graduate School Rating 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 and/or statistics 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 the examination are determined on an individual basis. Students will be expected to demonstrate an integrative ability that goes beyond simple mastery of course content.

Research and Dissertation

The student must complete 24 semester hours of Management Science 600: Doctoral Research and Dissertation, through which he/she is expected to make a significant contribution to the science. A final oral examination is conducted over the dissertation and such other segments of the program that the faculty committee deems appropriate. This effort, which is beyond the minimum 46 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

The Management Science Program is interdisciplinary and students in other degree programs are encouraged to enroll in management science courses. Course prerequisites are designed to indicate the level at which courses are taught. Interested students whose prior coursework does not match the prerequisites are encouraged to seek the instructor's guidance and consent to enroll.

BUSINESS ADMINISTRATION CONCENTRATION

For complete listing of MBA program requirements, see Business Administration.

MBA Concentration: Management Science. Minimum course requirements are 531, 532 and 534.

GRADUATE COURSES

500 Thesis (1-15) P/NC only. E
502 Registration for Use of Facilities (3-15) Required
531 Mathematical Programming (3) Linear programming procedures, duality and sensitivity analysis.
Marketing

Professors:
- Barnaby, David J., Ph.D. - Purdue
- Cadotte, E. R., Ph.D. - Ohio State
- Jenkins, Roger L., Ph.D. - Ohio State
- Locander, W. B., Ph.D. - Illinois
- Woodruff, R. B., DBA - Indiana

Associate Professors:
- McMillan, J. R., Ph.D. - Ohio State
- Reizenstein, Richard C., Ph.D. - Cornell
- Rentz, J. O., Ph.D. - Georgia

Assistant Professors:
- Faulds, D. J., Ph.D. - Iowa
- Gardial, S. F., Ph.D. - Houston
- Schumann, D. W., Ph.D. - Missouri
- Speck, P. S., Ph.D. - Texas Tech

BUSINESS ADMINISTRATION CONCENTRATIONS

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

MBA Concentration: Marketing
- Minimum course requirements are three courses from the following: 503, 504, 505, 506, 550, 593, 599, Logistics and Transportation 507, Business Administration 510, 599.
- Prerequisite: Marketing Management (3)
- Minimum course requirements are 12 hours from among the following courses: 601, 602, 603, 604, 605, 606.

GRADUATE COURSES

501 Marketing Management (3) Marketing viewed as total system designed to plan, promote, and distribute goods and services to household consumers and industrial users. Demand analysis as basis for marketing decisions.
- Prerequisites: 501, 502, 503, 504, 505, 506, 550, 593, 599, Logistics and Transportation 507, Business Administration 510, 599.
- Prerequisite: Marketing Management (3)
- Minimum course requirements are 12 hours from among the following courses: 601, 602, 603, 604, 605, 606.

LOGISTICS AND TRANSPORTATION

593 Independent Study (3) Directed research and study. Prereq: MBA Core and consent of instructor. May be repeated. Maximum 9 hrs.
- Prerequisite: Consent of instructor. May be repeated. Maximum 9 hrs.
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Fellers, J. F., Ph.D ......................... Akron
Lin, J. S., Ph.D ......................... Kansas
Lowndes, Douglas H., Ph.D .................. Colorado
Lundin, Carl D., Ph.D ......................... Rensselaer
Machurauskas, G. J., Ph.D .................. Kentucky
Oliver, Ben F., Ph.D ......................... Penn State
Phillips, Paul J., Ph.D ......................... Liverpool (UK)
Spruill, Joseph E., 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
Liu, C. T., Ph.D ......................... Brown
Meek, Thomas T., Ph.D ......................... Ohio State
Pedraza, A. J., Ph.D ......................... National (Argentina)

Graduate programs are offered leading to the degrees of Master of Science and Doctor of Philosophy in Metallurgical Engineering or Polymer Engineering. Both the metallurgical and polymer programs are flexible and inter-disciplinary 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

Departmental requirements include the satisfactory completion of:

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 and 572. (Substitutions may be acceptable for students with significant experience in polymer chemistry, physics or engineering.)

2. One or two minors or cognate work, 6 to 12 hours total in engineering, chemistry, mathematics, physics, or 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.

Non-Thesis Option

Under certain conditions, a candidate may apply for a non-thesis option. To be eligible, the candidate must show evidence of significant professional experience after the baccalaureate degree; at least five years of industrial experience or research publications would be examples of such evidence. A departmental faculty meeting will consider each application individually. Upon acceptance, a supervisory committee of three will be appointed, at least two being from the Department of Materials Science and Engineering. The requirements for completion of the non-thesis option are as follows:

1. A total of at least 33 hours in graduate courses in metallurgical engineering, polymer engineering and related areas. The minimum requirements are 21 hours in the Department of Materials Science and Engineering and up to 12 hours in other engineering or science courses. The candidate's degree program must be approved by the faculty committee.

2. Satisfactory completion of a critical review of the literature in an area related to metallurgical, polymer or materials engineering.

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.

Departmental requirements consist of the satisfactory completion of:

1. Graduate courses in materials science and engineering amounting to approximately 24 semester hours, at least 8 of which must be in 600 series courses.

2. Supporting courses in related scientific and engineering fields amounting to approximately 24 semester hours, subject to approval by the student's faculty committee. These related fields will normally include chemistry, mathematics, physics, and engineering.

3. The comprehensive examination, usually given in two parts, and covering such topics as materials science and engineering, metallurgical or polymer engineering operations and processes, thermodynamics, technology, mathematics, physics, chemistry, and other related fields.

4. Active participation in graduate seminars conducted by the department. Resident students must register for the appropriate 503 or 504 every semester offered.

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, Texas, or Virginia. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.

GRADUATE COURSES

421 Mechanical Metallurgy (3) Brittle fracture due to metallurgical and environmental factors; stress-life and strain-life fatigue analysis; residual stresses; creep and stress rupture; finite plastic strain, ductile fracture, fabrication by forging, rolling, deep drawing, stretch forming; formability testing. Prereq: 302 or 201 and Mechanical Engineering 469 or equivalent.

422 Chemical Process Metallurgy (3) Application of chemical thermodynamics to metallurgical processing. Ferrous and nonferrous pyrometallurgical refining, slag-metal equilibria, solidification, gas-metal processing. Prereq: 303. S

423 Metallurgical Fabrication (3) Principles and processes of welding, casting and powder metallurgy; solidification, segregation, heat flow, microstructure, residual stresses; thermal treatments, sintering, non-destructive testing. Prereq: 301, 320. 3 hrs or 2 hrs and 1 lab. F

424 Metallurgical Process Design (3) Property control through composition, thermal and mechanical selection, material and property selection: steels and nonferrous alloys. Prereq: Materials Science and Engineering 201 or equivalent. F

425 Metallurgical Applications in Manufacturing and Processing (3) Fabrication methods, standards and specifications; principles of thermomechanical processing for finished and semi-finished products; casting, forming, joining, heat treatment, powder metallurgy, corrosion control. Prereq: 201.


443 Polymer Processing (3) Rheological measurements; flow through tubules and slits, and effects and extrudate swell; selected application, screw extrusion, injection molding, spinning, spinning methods, structure development, properties.

444 Plastics Fabrication and Design (3) Lectures, laboratories, and field trips; unit operations of plastics fabrication; plastic classification; design and selection criteria; processing techniques; characterization laboratory. Sp

470 Corrosion Science and Engineering (3) Mechanical and control of corrosion and degradation processes; thermodynamics and electrode kinetics of corrosion reactions; electrochemical measurement techniques; applications to design. Prereq: 201 or equivalent.

471 Semiconductor Materials (3) Theory, properties and processing of semiconductors; applications to solid-state devices; basic physics of semiconductor materials; crystal growth, films, doping, annealing, etching, properties and performance evaluation. Prereq: 310. F

472 Fundamental Principles of Composite Materials (3) Establishment of physical principles basic to design, manufacture and application of fiber reinforced polymers, metals and ceramics. Prereq: 350 or equivalent.

474 Biomaterials (3) Metals, polymers and ceramics used in orthopedic, cardiovascular, and dental surgical implant devices; corrosion and degradation problems; materials properties of primary importance: tissue response to synthetic materials. Prereq: 201. Recommended for engineering science and mechanics majors.

475 Fracture-Safe Design (3) Same as Engineering Science and Mechanics 475.

500 Thesis (1-15) Pr/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 repeated. S/NC only. E

503 Graduate Seminar in Metallurgical Engineering (1) Prereq: Admission to graduate program. May be repeated. S/NC only. E

504 Graduate Seminar in Polymer Engineering (1) Prereq: Admission to graduate program. May be repeated. S/NC only. E

505 Engineering Analysis (3) Same as Chemical Engineering 505.
522 Defects in Crystals (3) Analytical and experimental analysis of defect interactions in solids. Prereq: 421 or consent of instructor.

523 Plastic Deformation of Metals (3) Geometry and mechanisms of single crystal plastic deformation; slip, twinning, and cleavage, work hardening, effect of temperature on flow stress. Prereq: 421 or consent of instructor.

524 Metallurgical Thermodynamics (3) Applications of chemical thermodynamics to metallurgical problems: refining, oxidation, surface treatments, alloy systems. Prereq: 540 or equivalent.

525-26 Welding Metallurgy (3,3) Welding processes: physical metallurgy of welding, phase transformations; heat flow; residual stresses; theories of hot cracking, cold cracking and porosity formation, applications to process evaluation.

529 Diffusion in Solids (3) Phenomenological and atomic mechanisms of diffusion in solid state. Solution and applications of diffusion equations; random walk problem and mechanisms of diffusion; diffusion in dilute and concentrated alloys; Kirkendall effect; high diffusivity paths.

530 Phase Transformations in Metallic Materials (3) Thermodynamics of metallic systems, theory of nucleation and growth in solids; kinetics and morphology of diffusion controlled growth; kinetics of interface controlled phase transformations; crystallography and kinetics of martensitic transformations.

531 Advanced Corrosion (3) Analysis of corrosion processes in terms of polarization measurements and Potentiodynamic and potentiostatic techniques; introduction to crystal structure determination; application to inorganic, metallic and polymer structures.


540 Basic Polymer Chemistry (3) Synthesis, reactions and degradation of polymers. Molecular characterization; solution methods and spectroscopy. Prereq: Semester of organic chemistry and thermodynamics or equivalent.

541 Fluid Mechanics and Polymer Processing (3) Navier-Stokes equations and illustrative problems; applications in chemical engineering and polymer engineering; packed and fluidized beds, multiphase systems; effect of environmental and mechanical factors contributing to pitting, crevice, fretting, wear, fatigue and stress corrosion. Prereq: 540 or consent of instructor.

542 Further Topics in Polymer Processing (3) Description and analysis of selected polymer processing operations. Prereq: 541.


544 Polymer Solution Thermodynamics and Characterization (3) Theories of solutions, statistical thermodynamics. Characterization, treatment of chromatography, viscosity, light scattering and osmotic pressure. Prereq: Undergraduate physical chemistry.

545 Physical Characterization of Polymers (3) Birèger-Pitzer theorem, solid angle, x-ray and light scattering, spherulitic and fibrous structures; Introduction to electron microscopy.

546 Mechanical Properties of Solid Polymers (3) Types of mechanical behavior: Hookan and rubber elasticity, fracture: linear viscoelasticity; dynamic mechanical behavior and testing; loss tangent; experimental methods. Introduction to mechanical properties of polymeric materials.

549-50 Laboratory Methods in Polymer Engineering (1,1) Basic experimental techniques and instrumentation associated with characterization, x-ray and light scattering, calorimetry, rheology, mechanical properties of solid polymers, polymer processing operations. Coreq: 540 or consent of instructor.

550 Principles of Ceramic Processing (3) Treatment of ceramic processing: raw materials preparation and characterization, crystallization, sintering, glass formation, consolidation; drying, firing, sintering techniques, mechanisms and kinetics. Prereq: 540 or equivalent.

551 Inorganic Glass Forming Systems (3) Physical and chemical properties of inorganic glasses; structural theories of glass formation; major glass forming systems: silica, oxide glasses, nitrate glasses, water glasses, and chalcedony glasses. Prereq: 363, Chemisty 371.

570 Chemical Thermodynamics (3) Entropy and entropy of mixing; Gibbs function and chemical potential methods of measuring activity; solution theories; phase rule; heat capacity of gases, liquids and solids; calculation of phase diagrams. Prereq: 303 or equivalent.

571 Electron Microscopy (3) Operation of electron microscope, kinematical and dynamical diffraction theories; structure determination; analysis of lattice defects. Prereq: 304 or equivalent.

572 X-Ray Diffraction (3) Symmetry of crystals, space group theory, reciprocal lattice and application to definition of structures, powder and single crystal x-ray techniques; introduction to crystal structure determination; characterization of orientation; application to inorganic, metallic and polymer structures.

573 Biomaterials Analysis and Development (3) Physical-property limitations of current implant surgical materials and methods of improvement: resistance to corrosion, mechanical damage; detrimental effects of specific metal ions; development of new biomaterials and new materials processing techniques. Prereq: 470, 474 or consent of instructor.

574 Formability of Materials (3) Modeling and analysis of finite plastic strain with application to primary and secondary forming operations; crystalline and noncrystalline materials; flow localization, instability, predictive testing. Prereq: Consent of instructor.

576-77 Special Topics in Materials Science and Engineering (3,3) Topics of current significance and interest. Prereq: Consent of instructor. May be repeated.


600 Doctoral Research and Dissertation (2-15) P/NP only. E

621-22 Theoretical Metallurgy (3,3) Topics in solid state physics as applied to metallurgy; introduction to quantum theory, specific heats, electron theory of solids, electrical and thermal conductivity, magnetic properties, theories of alloy formation. Prereq: Consent of instructor.

623-24 Solidification and Crystal Growth (3,3) Theories of solidification, fluid flow effects, phase transitions of organic glasses; net metalhydromechanical properties, incompressible flow, stability theory, thermodynamic applications, rapid solidification theory, metastability. Prereq: Consent of instructor.

641 Advanced Rheology and Viscoelastic Theory (3) Continuum mechanics, formulation of viscoelastic theories for describing deformation and flow of polymeric materials. Application to polymer processing problems. Recommended for MS candidates working in rheological areas. Prereq: 541.

642 Advanced Topics in Polymer Processing (3) Application of theories of rheological behavior and of structure development to analysis of polymer processing operations. Prereq: 541.

643 Phase Transformations in Polymers (3) Glass transition and glass reconsolidation, melting, of polymeric glasses; crystallization of polymers; nucleation, growth and morphology; secondary nucleation theory; solidification of copolymers; crystallographic stress. Prereq: 543.

671 Quantitative Microscopy (3) Principal acoustic, optical, x-ray neutron, electron and field-ion techniques for examination of microstructures of materials. Prereq: 400.


676-77 Advanced Topics in Materials Science and Engineering (3,3) Latest developments and/or advanced special topics. Prereq: Consent of instructor. May be repeated.

679-79 Seminar in Recent Advances in Materials Science and Engineering (3,3) Directed and independent study of advanced topics. Prereq: Consent of instructor. May be repeated.
THE MASTER OF SCIENCE PROGRAM

The Mathematics Department has three graduate degrees: (1) the Master of Mathematics degree, intended primarily for teachers, (2) the Master of Science degree, designed to prepare students for industrial employment and for teaching, and (3) the Doctor of Philosophy degree, designed to prepare students for industrial employment and for college and university teaching and research. Contact the department office for additional information.

A student seeking mathematics as a minor for the Master's degree is required to obtain at least 6 hours of resident graduate credit in course work above 400 and approved by both the major department and the Department of Mathematics.

THE MASTER OF MATHEMATICS PROGRAM

Before admission to the Master of Mathematics program, the applicant must have either (a) certification for teaching secondary mathematics in at least one state, or (b) three years of elementary or secondary school teaching experience. Applicants must have successfully completed one year of calculus (141-42 or equivalent) and a course in matrix algebra (251 or equivalent).

The following requirements must be met:

1. Complete 30 hours of coursework of which 21 must be at the 500 level. The coursework must include 504, 505, 506, 507, and 6 hours in 509. At most, 6 hours may be taken outside the Department of Mathematics (selected in consultation with the advisor).
2. Pass a final examination upon completion of all coursework.
3. In exceptional circumstances, part of admission requirement (b) might be satisfied concurrently with coursework. Normally Master of Mathematics degree students will start the program by taking 504 during the summer.

THE MASTER OF SCIENCE PROGRAM

The department offers two options for the Master of Science degree. The first option requires a thesis for which 6 hours must be earned along with 24 additional hours of work in acceptable courses numbered above 400. Of the additional hours, 8 may be in an area outside the department and 15 must be in courses in mathematics numbered above 500.

After one semester of graduate study, a student whose advisory committee gives its approval may choose the nonthesis option, for which 30 hours in courses numbered above 400 are required. Of these, 21 hours (at least 15 of which must be in mathematics) must be in courses numbered above 500. Of the 30 hours, 9 in courses approved by the advisory committee may be taken in fields other than mathematics. For this option it is also required that a written final examination be passed and that credit be received for a reading course (598) in which a term paper or project is required.

THE DOCTORAL PROGRAM

For the Ph.D. in Mathematics, the student must meet the following four requirements in addition to those of The Graduate School:

1. Satisfy either of the following: the standard program or the mathematical ecology concentration. A student intending to work in mathematical ecology may complete either, but he/she is encouraged to complete the mathematical ecology concentration. A student may elect to switch from one to the other provided the constraints of the latter option have not been violated. A student's status after electing such a transfer is determined by the complete history of his/her earlier examinations from the standard program and part 1 of the mathematical ecology concentration. A description of both programs is below.
2. Demonstrate proficiency in one foreign language normally French, German or Russian. This requirement is to be met prior to the examination in the area of specialization. The student's doctoral committee may require that the student pass a second language exam.
3. Pass an examination in the field of specialization. This examination will be given by a committee appointed by the department head at some time after the requirements in 1. have been met. A student may take this specialty examination only twice.
4. Take a one-year, 600-level sequence in mathematics outside of his/her area of specialization. The use of the course 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 course).

Standard Program

Pass written examinations covering four subjects, at least three of which must be from the following list:

- a. Modern Algebra 551-52
- b. Complex Analysis 543-44
- c. Topology 561-62
- d. Real Analysis 541-42
- e. Applied Linear Analysis 547-48
- f. Partial Differential Equations 535-36
- g. Ordinary Differential Equations 531-32
- h. Numerical Mathematics 571-72
- i. Statistics 525-26
- j. Probability 523-24

Students may not count examinations in both c. and e., and i. and j. toward the required four passes. Those who choose four from this list must choose at least two from a. through e., and the students who choose only three from this list must choose one from a. through e.

Students selecting only three from the above list will also be required to pass a written exam on an area of applied mathematics (e.g., fluids, elasticity, mathematical ecology) approved as an examination in advance by the student's doctoral committee and the Applied Mathematics Committee. The Graduate Committee will appoint a section of faculty who will submit a list of topics and references to the Graduate Committee and the Applied Mathematics Committee for approval.

Students may take as many of the written examinations as desired at any time these exams are given, subject to the following conditions:

1. The exams to be taken must be approved in advance by the student's advisory committee.
2. At most, 4 minus n exams may be taken at any one time, where n denotes the number of exams previously passed by the student.
3. Students may take a collection of written examinations a maximum of four times, but no one failing five exams, counting possible repetitions, will be permitted to take another round of exams.

Mathematical Ecology Concentration

Students must pass examinations in two areas:

1. Three subjects in mathematics. One must be mathematical ecology and two must be from the list under the standard program. Students may not count passes on examinations in both d. and e., f. and g., i. and j.
2. At least three of these exams may be taken at any one time, where n denotes the number of exams previously passed by the student.
3. Students may take a collection of written examinations a maximum of three times, but no one failing four exams, counting possible repetitions, will be permitted to take another round of exams.
4. Ecology, covering material selected from nine hours of coursework outside of mathematics at the 500 level or above.

- a. The courses submitted for examination must be approved by the student's doctoral committee and the departmental Graduate Committee. The examination must be prepared, administered, and graded by instructors of the courses involved, along with at least one member of the mathematical ecology section.
- b. Students may take the written examination at most twice.

GRADUATE COURSES

400 History of Mathematics (3) Development of major ideas in mathematics from ancient to modern times and influence of ideas in science, technology, philosophy, art, and other areas. Writing emphasis course: at least one in-class essay examination and 3000 words of writing outside classroom. Prereq: Calculus.

401 Mathematics and Microcomputers (3) Primarily for students seeking certification as mathematics teachers at secondary level. Use of microcomputers to study concepts and problems in mathematics. Does not satisfy the major requirements for a B.S. or M.S. in mathematics. Prereq: 141 plus 1 semester of discrete mathematics, 221.

404 Applied Vector Calculus (3) Topics from multivari- able and vector calculus; line and surface integrals, divergence theorem and theorems of Gauss and Stokes. Prereq: 241.

405 Models in Biology (3) Difference and differential equations, models of biological systems. Prereq: 141-42 or 151-52.

421 Combinatorics (3) Introduction to problems of counting and development of methods and structures: sequences, partitions, graphs, finite fields and geometries, or experimental designs. Prereq: 323 or consent of instructor.

423 Probability II (3) Law of large numbers and central limit theorems for discrete and continuous random variables: Poisson processes; discrete and continuous parameters. Markov chains and their applications; Kolmogorov differential equations; Brownian motion process as limit of random walks. Prereq: 323.

425 Statistics (3) Derivation of standard statistical distributions. The F, t, and chi-squared distributions: independence of sample mean and variance; basic limit theorems; point and interval estimation, Bayesian estimates; statistical hypotheses, Neyman-Pearson theorem; likelihood ratio and other parametric and non-parametric tests; sufficient statistics. Prereq: 323.


444 Complex Variables II (3) Applications of complex variables to steady-state temperatures, electrostatics, and functional analysis. Prereq: 443.

445-46 Advanced Calculus I, II (3,3) Theory of sequences, series, differentiation, and Riemann integration of functions of one or more variables. Prereq: 341 or consent of instructor.


451 Topics in Algebra (3) Number theory and theory of polynomial equations such as quadratic reciprocity law and Sturm separation. Prereq: 351.

453 Matrix Algebra II (3) Matrix theory including Jordan canonical form. Prereq: 421 or consent of instructor.

455-56 Abstract Algebra I, II (3,3) Algebraic structures: groups, rings, fields, vector spaces and linear transformations. Prereq: 351 or consent of instructor.

457-58 Honors: Abstract Algebra I, II (3,3) Honors version of 455-56. Prereq: 351 or consent of instructor.

460 Geometry (3) Axomatic and historical development of non-Euclidean geometries: Euclidean geometry; proof technique and critical reasoning, Models of Non-Euclidean geometries. Prereq: Calculus and Discrete Mathematics, or consent of instructor.

461 Topology (3) Topology of line and plane, separation properties, compactness, connectedness, continuous functions, homeomorphisms, continua and topological invariants. Prereq: 341 or consent of instructor.

471 Numerical Analysis (3) Computation, instabilities, and rounding. Interpolation and approximation by polynomials and piecewise polynomials. Quadrature and numerical solution of initial and boundary value problems of ordinary differential equations, stiff systems. Prereq: 371 (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 individual work. Maximum 9 hrs.

499 Seminar in Mathematics (1-3) Topics vary. Requires out-of-class projects and m-class presentations by students. Credit hours announced for each seminar. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

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

502 Registration for Use of Facilities (1-15) Requires for the student to check in with the department office during the assigned day and time each semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N/C only. E

503 MBA Calculus (3) Review of derivatives and antidervatives; exponential functions, functions of two variables, introduction to integrals. Credit is available only to MBA core requirement. Prereq: 121.

504 Discrete Mathematics for Teachers (3) Mathematical logic and method of argument, sets, functions and relations, combinatorics. Normally first graduate course for students seeking M.M. degree. For students in Master of Mathematics program and for students in graduate programs in College of Education. May not apply toward M.S. degree in mathematics. Prereq: 1 yr calculus or equivalent.

505 Analysis for Teachers (3) Development of differential and integral calculus, proofs of basic theorems. For students in Master of Mathematics program and for students in graduate programs in College of Education. May not apply toward M.S. degree in mathematics. Prereq: 1 yr calculus or equivalent, and 504.

506 Algebra for Teachers (3) Algebraic structures, integral domains and fields and their applications to algebra of integers and polynomials. For students in Master of Mathematics program and for students in graduate programs in College of Education. May not apply toward M.S. degree in mathematics. Prereq: 1 yr calculus or equivalent, and 504.

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.


517-18 Mathematical Methods in Physics (3,3) (Same as Physics 571-72.)

519 Seminar in Applied Mathematics (1-3) May be repeated. Maximum 12 hrs.

521-22 Applied Combinatorics (3) Application of finite differences, generating functions, and permutation groups to enumeration problems. Coding theory, experimental design, graph theory, or decision theory.

523-34 Probability (3) Pertinent facts from measure theory, definition of abstract probability spaces, Kolmogorov's existence theorem; series of independent random variables and laws of large numbers; general theory of distributions, random vectors and their characteristics; weak convergence concept, weak compactness; Levy's continuity theorem in Euclidian spaces; strong and weak convergence of distributions and central limit problem; general concept and properties of conditional expectation, martingales, Doob's martingale and optional sampling theorems. Prereq: 445-46, Recommended prereq: 423.

526-27 Statistics (3,3) Pertinent facts from probability theory; formulation of statistical models; sufficiency, Fisher-Neyman efficiency, polynomial models, likelihood, Bayesian models; methods of estimation and optimality theory; likelihood, maximum likelihood 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 model, analysis and tests in linear models; non-parametric models, rank methods for comparison, linear regression and independence, robust tests; topics from decision theory. Prereq: 445-46. Recommended prereq: 425.

527 Stochastic Modeling (3) Models in probability applied to real world situations; queueing theory; branching processes; Monte Carlo simulation. Prereq: 445-46 or Consent of instructor. May be repeated. Maximum 12 hrs.


534 Calculus of Variations (3) Necessary conditions for extrema, Euler's equation, broken extremals, Weierstrass-Young conditions. Sufficient conditions for extrema-Lagrange'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.

539 Seminar in Differential Equations (1-3) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.


549 Seminar in Analysis (1-3) May be repeated. Maximum 12 hrs.

550 Matrix Algebra (3) Advanced topics in matrix theory: decomposition theorems and applications to matrices 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 453 and programming algorithms.


555-56 Number Theory (3,3) Introduction to algebraic number theory. Prereq: 455-56 or consent of instructor.

559 Seminar in Algebra (1-3) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

561-62 Topology (3,3) Topological spaces; metrizability; homeomorphic spaces; compactness and connectedness; and homotopies. Covering spaces and fundamental group.

569 Seminar in Topology (1-3) May be repeated. Maximum 12 hrs.

573 Finite Difference Methods for Partial Differential Equations
574 Finite Element Methods
575 Matrix Theory and Techniques
576 Mathematical Systems Theory
577 Seminar in Numerical Mathematics
582 Mathematical Ecology
583 Mathematical Evolutionary Theory
584 Mathematical Systems Theory
585 Optimal Control Theory
587 Seminar in Algebra
589 Seminar in Mathematical Ecology
592 Graduate Reading in Mathematics
593 Independent Study
598 Theses Options
600 Doctoral Research and Dissertation
617-18 Lie Algebras in Mechanics and Physics
619 Seminar in Applied Mathematics
623-24 Advanced Probability
631-32 Advanced Ordinary Differential Equations
635-36 Advanced Partial Differential Equations
641-42 Functional Analysis
643-44 Harmonic Analysis
645-46 Partial Differential Equations
649 Seminar in Analysis
651-52 Advanced Modern Algebra
659 Seminar in Algebra
665-66 Topological Algebra
669 Seminar in Topology
673 Advanced Topics in Numerical Partial Differential Equations
679 Seminar in Numerical Mathematics
685-86 Optimal Control Theory
699 Seminar in Analysis
703 Seminar in Topology
705 Theoretical Mechanics
707 Seminar in Algebra
712-13 Differential Topology
719 Seminar in Applied Mathematics
725-26 Mathematical Economics
730-31 Numerical Analysis
733 Computational Fluid Dynamics
739 Seminar in Numerical Mathematics
749 Seminar in Analysis
759 Seminar in Algebra
761-62 Modern Topology
771-72 Topological Groups
775 Seminar in Topology
776 Topological Algebra
781-82 Mathematical Ecology
785 Optimal Control Theory
789 Seminar in Algebra
792 Seminar in Analysis
795 Seminar in Algebra
799 Seminar in Topology
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and normally 6 semester hours of coursework (400-level or above) in mathematics.

2. Six semester hours of thesis.

3. Participation in the departmental seminar.

4. Submission and defense of a written thesis that demonstrates the ability to conduct and report on an independent investigation.

5. Passing a final examination on all work submitted for the degree.

Course Option
This option is restricted to those students who have had the equivalent of a thesis experience. 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 12 semester hours of coursework that includes at least 12 semester hours of graduate (500-level or above) courses in mechanical and/or aerospace engineering 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 mechanical and/or aerospace engineering and normally 6 semester hours of coursework (400-level or above) in mathematics.

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:

1. A minimum of 72 semester hours credit beyond the Bachelor's degree, exclusive of credit for the M.S. thesis or problems, including:

a. A minimum of 24 semester hours in coursework in doctoral dissertation.

b. A minimum of 12 semester hours of graduate credit in mathematics in courses numbered numbered 500 or above with a minimum of 6 semester hours numbered 500 or above.

2. A minimum of 24 semester hours in mechanical and/or aerospace engineering courses numbered 500 and above, with at least 9 semester hours of 600-level courses. These are exclusive of thesis, problems, or dissertation credit.

3. The student's advisory committee may approve a student's petition to replace one 600-level course(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 states of Arkansas, Kentucky, or South Carolina. The M.S. in Aerospace Engineering is also available to residents of Kentucky. Additional information may be obtained from the Residency Assistant 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

GRADUATE COURSES

416 Turbo-Machinery (3) Basic principles of turbomachinery; systematic methods of analysis, design, performance evaluation. Prereq: Aerospace Engineering 351.

422 Environmental Noise (3) Basic principles of acoustics: measurements and control in industrial and community environments. Prereq: Senior standing in engineering or consent of instructor.

445 Lubrication (3) Hydrodynamic theory of lubrication of sliding bearings; application of Navier-Stokes equations to infinite and finite bearings; analytical and numerical solutions; applications to design. Prereq: 344, Aerospace Engineering 351.

449 Mechanical Engineering Laboratory (3) Desgign, conducting and reporting results of experimental exercises that illustrate and emphasize fluid mechanics, analysis of data and formation of conclusions. Prereq: 332, 344, 345. Coreq: 475. 3 labs. Sp,Su


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: 363 and 465. F

456 Introduction to Thermal Design (2) Engineering economy, optimization; design for automation, reliability, patents and product liability; design of mechanical engineering thermal-fluid system. Participation in team design effort; design report. Prereq: 332, F,Sp


462 Tool Design (3) Principles underlying tool and die design; design for high volume production; work holding fixtures; comparison of material removal methods; selection of tool material; plastics production. Prereq: 366 or Industrial Engineering 404, Engineering Science and Mechanics 321.


459 Machine Design (4) Design of complete machine; documentation, complete specifications, design calculations, working drawings, cost analysis. Written and oral report. Prereq: 455, 466. Sp

471 Refrigeration and Air Conditioning (3) Vapor compression and absorption cycles; heat pump systems; psychrometric processes; air washers; cooling towers; solar radiation; building heat transmission. Prereq: 332, 344.

474 Solar Energy Utilization (3) Nature and availability of solar radiation; review of selected heat transfer topics pertinent to solar energy collection and use; design analysis of solar energy collectors and method of storing selected applications. Prereq: 332, 344, or consent of instructor.

475 Thermal Engineering (3) Thermal systems, turbomachinery, heat exchangers, combustion and system analysis and design, second law and economic analysis. Prereq: 332, 344, F,Sp.

479 Thermal Engineering Design (4) Design of complete thermal-fluid system, economic, technical and optimization aspects. Participation in team design effort, final presentations and design report. Prereq: 456, 475. Sp


494-95 Selected Topics in Mechanical Engineering (1-1) Problems and topics related to developments and practice in mechanical engineering. Prereq: Consent of instructor.

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

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

507 Application of Numerical Linear Algebra in Systems and Control Engineering (3) (Same as Chemical Engineering 587 and Electrical and Computer Engineering 587.)


Phase Change Heat Transfer (3) Mechanics and modeling of nucleation, transition and film boiling processes; critical heat flux; forced convection boiling and pool boiling; heating and temperature control of heterogeneous nucleation; dropwise and filmwise condensation; flow condensation; liquid-solid phase change processes; melting and freezing front analysis; mathematical modeling. Prereq: 344, 511.

252-27 Thermodynamics I and II (3,3) Macroscopic thermodynamics, including First and Second Law analysis, energy methods, heat transfer, entropy, exergy, phase change, combustion, gas mixtures, and property relations, determination of thermodynamic properties from molecular structure, spectroscopic data, kinetic theory, statistical mechanics, quantum physics, Schroedinger equation. Prereq: 332.

253 Special Topics in Thermodynamics (3) Application of thermodynamics to topics of current interest in mechanical engineering. Prereq: Consent of instructor.

258 Combustion and Chemically Reacting Flows I (3) Fundamentals: thermochemistry, chemical kinetics and conservation equations; phenomenological approach to laminar flames; diffusion and premixed flame theory; single droplet combustion; deflagration and detonation theory; stabilization of combustion waves in laminar streams; flammability limits of remixed laminar flames; introduction to turbulent flames. Prereq: 522, 531.

259 Combustion and Chemically Reacting Flows II (3) Advanced topics: phenomenological approaches to turbulent flames; fundamentals of turbulent flow; application of high-speed imaging to turbulent combustion; chemically reacting boundary layer flow; gas turbine and/or rocket motor combustors; turblence and transition to turbulence; flow path analysis; introduction to supersonic combustion and hypersonic flows. Prereq: 529.

351 Fluid Mechanics (3) Derivation of equations governing flow of viscous fluids (conservation of mass, momentum and energy) using vector and Cartesian tensor notation. Equations of state and constitutive relations. Specialization of governing equations to those for Newtonian fluid. Appropriate initial and boundary conditions. Exact solutions. Introduction to boundary layer flows, potential flows, low Reynold's number flows. Prereq: 441, Aerospace Engineering 351.


451-42 Research in Mechanical Engineering I and II (3,3) Design of experiments; data analysis; experimental invesigation. Prereq: Consent of instructor.

452 Mechanical Engineering Design (3,3) Design of mechanical engineering devices and systems. Prereq: Consent of instructor.

553 Development of Superior Products and Processes (3) Case studies of recent techniques of superior product and process development practiced in industry; Case study of product or process yielding superior results developed by student. Prereq: B.S. in Engineering or consent of instructor.


550 Computer Aided Mechanical Design (3) Application of matrices and computational techniques in static and dynamic analysis and re-design of complex, three-dimensional, statically indeterminate structures. Prereq: 569 and 464 or consent of instructor.

561 Experimental Stress Analysis (3) Experimental stress analysis, photoelasticity, strain gauges. Prereq: Consent of instructor.

567-68 Dynamics of Machinery (3,3) 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. Prereq: 583, 591.

569 Vibrations (3) Free and forced vibration of single and multiple degree of freedom systems linear and nonlinear. Prereq: Undergraduate vibrations course.

571 Metal Machining and Forming (3) Mechanics of cutting and forming of metallic and chemically reacting ideal gases, rocket nozzle design; ideal rocket performance parameters; rocket heat transfer, chemis- try of propellants and rocket engine systems; ground testing; introduction to solid propellant rockets. Prereq: Consent of instructor.

578 Rocket Propulsion I (3) Rocket propulsion fundamentals; thermodynamics of nonreacting and chemically reacting ideal gases, rocket nozzle design; ideal rocket performance parameters; rocket heat transfer, chemistry of propellants and rocket engine systems; ground testing; introduction to solid propellant rockets. Prereq: Consent of instructor.

593 Dynamic and Static Model (3) Modeling and simulation of non-linear mechanical systems, including mechatronics, robotics, and aerospace applications. Prereq: 451, Aerospace Engineering 422, or equivalent.

598 Measurement Science I (3) (Same as Nuclear Engineering 528, Civil Engineering 556, Electrical and Computer Engineering 588, Engineering Science and Mechanics 588, and Aerospace Engineering 585.)

599 Measurement Science II (3) (Same as Nuclear Engineering 529, Chemical Engineering 558, Civil Engineering 559, Electrical and Computer Engineering 589, Engineering Science and Mechanics 589, and Aerospace Engineering 586.)

590 Selected Engineering Problems (2-6) Enrollment limited to students in problems program. Prereq: Consent of advisor. May be repeated. SC only.

599 Seminar (1) All phases of mechanical engineering, reports on current research at UT. May be repeated. SC only.

591 Special Topics in Mechanical Engineering (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

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

610 Advanced Topics in Fluid Mechanics and Heat Transfer (3) Advanced theory and application of fluid mechanics and heat transfer; natural convection, multiple flows, high Reynolds number flows, advanced boundary layer techniques, combustion, pollution, and forced convection flow, advanced boundary layer techniques, combustion, perturbation and variational methods of analysis, heat exchanger theory and design. May be repeated. Maximum 9 hrs. Prereq: Consent of instructor.

611 Advanced Convection Heat Transfer, Fluid Mechanics and Mass Transfer (3) Stagnation point and high speed viscous boundary layer flows; problems in heat transfer at high supersonic and hypersonic speeds; laminar and turbulent boundary layer heat transfer with surface mechanical or electronic heating; effects of gas species recombination; stagnation point heat transfer, Lee's integral solution for high speed boundary layers; heat flux distribution along heated bodies; and radiative and convective cooling techniques. Prereq: 512 and consent of instructor.


613 Advanced Radiation Heat Transfer (3) Radiation heat transfer in absorbing, emitting and scattering media; introduction to thermal radiation with conduction and convection heat transfer. Prereq: 511, 512.


642 Advanced Topics in Thermodynamics I (3) Comparison of macroscopic and microscopic approaches; equilibrium of pure substances, metastable states, nonequilibrium thermodynamics. Prereq: Consent of instructor.


Aerospace Engineering

GRADUATE COURSES

422 Aerodynamics (3) Theory and design of aerodynamic bodies for vehicle configuration. Potential flow theory, viscous effects, compressibility effects. Subsonic, transonic, and supersonic aerodynamics. Prereq: 570.

423 Viscous Flow (3) Boundary layer theory; laminar and turbulent flow, compressibility effects; numerical solution methods. Prereq: 511, Mechanical Engineering 391. Sp

424 Astronautics (3) Propulsion, trajectories, guidance, control, and atmospheric reentry of space vehicle systems. Prereq: 382, Mechanical Engineering 332. Sp

425 Propulsion (3) Principles of propulsion devices; turbo-jet, ram jet 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, 376, 363. Coreq: Mechanical Engineering 344. F

429 Aerospace System Design (4) Synthesis and design of complete aerospace systems, economics and technical aspects. Participation in team design effort, flight presentations and design report. Prereq: 425, 456, 351. Sp


449-65 Selected Topics in Aerospace Science (1-4,1- 4) Current problems and topics in aerospace science. Prereq: Consent of instructor.

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

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

511 Inviscid Flow (3) Kinematics and dynamics of inviscid fluids; potential flow about body, 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 theories; 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...
tics, and trajectory optimization. Prereq: 423 or Mechanical Engineering 531.

515-16 Air Vehicle Aerodynamics and Performance (3,3) Application of aerodynamics principles to air vehicles to provide estimation of performance, stability, and control characteristics for subsonic to hypersonic speeds. Relations among thrust, drag, lift and attitude, propulsion systems, vehicle performance characteristics, and trajectory optimization. Prereq: 422; 515 for 516.

521-22 Aerodynamics of Compressible Fluids (3,3) One-dimensional inviscid and internal flow; waves, small perturbation theory; slender body theory; similarity rules; method of characteristics. Prereq: 422 for 521; 522 for 522.

525 Hypersonic Flow (3) Slender body flow; similitude; 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 ballistic ranges; propulsion test facilities or air breathing and rocket engines; space environment and related vehicle test facilities. Prereq: 515 and 521, Mechanical Engineering 513 and 522.

529 Rarefied Gas Dynamics (3) Binary elastic collisions; kinetic theory; flow regimes; Boltzmann and model equations; introduction to hypersonic interactions; slip boundary conditions, free molecule, slip and transition flow. Monte Carlo simulation; experimental techniques; introduction to rarefied gas flows. Prereq: 522, Mechanical Engineering 522.

531 Magnetohydrodynamics (3) Electromagnetic field theory; chemical kinetics; thermodynamic and thermophysical properties of plasmas; governing equations and applications. Prereq: 422 and Mathematics 471.

532 Introduction to Turbulence (3) Macroscopic effects, analogies, statistical treatment, 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: 522.


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) Rotational attitude dynamics of space vehicles. Gyroscopic instruments, passive and active attitude control devices. Linear control theory and attitude stabilization. Prereq: 551, Mathematics 471.

574 Space Engineering: Satellite Technology (3) Satellites and rockets (orbit, launch vehicles and launchng), spacecraft structure, power systems, attitude control system, telemetry/tracking/command, and communication systems, spacecraft testing, reliability, and application of satellites (communications, weather, Earth observation, and future applications). Prereq: 425, Mathematics 471, 404.

588 Measurement Science I (3) (Same as Nuclear Engineering 588, Civil Engineering 596, Electrical and Computer Engineering 586, Engineering Science and Mechanics 588, and Mechanical Engineering 586.)

599 Measurement Science II (3) (Same as Nuclear Engineering 589, Chemical Engineering 589, Civil Engineering 596, Electrical and Computer Engineering 589, Engineering Science and Mechanics 589, and Mechanical Engineering 589.)

599 Selected Engineering Problems (2-6) Enrollment limited to students in problems program. Prereq: Consent of advisor.

595 Seminar (1) All phases of aerospace engineering. Reports on current research at UT. May be repeated. S/NC only.

599 Special Topics in Aerospace Engineering (1-3) May be repeated. Maximum 6 hrs.

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

631 Magnetohydrodynamics I (3) Electromagnetic field equations, motions of single charged particles, magnetic description of plasma, Boltzmann equation, conduction and diffusion in ionized gases, continuum magnetohydrodynamic equations. Prereq or coreq: 512. Prereq: Mathematics 561 or equivalent.

632 Magnetohydrodynamics II (3) Alhven 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 662.


645 Theory of Turbulence (3) (Same as Engineering Science and Mechanics 545) Prereq: 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 fluid flows. Fundamental assumptions, limitations of approximations and consequences. Foundations of gas dynamics. Applications to airplane, rocket, ground testing and jet propulsion. Discussion of special topics according to interest of students. Prereq: 511, 522.


690 Advanced Topics in Aerospace Engineering (3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

Medical Biology

(College of Medicine-Knoxville Unit)

Carmen B. Lozzio, Acting Chair
532 Special Topics in Hematology (1-3) Prereq: 531 and consent of instructor. May be repeated. Maximum 9 hrs. F,Sp


541 Molecular Basis for Metabolic Disease (4) Metabolic disorders of humans and animals. Molecular mechanisms in inborn errors of metabolism, toxic reactions and deficiency states. Clinical and pathological correlations. Prereq: Biochemistry 410-19 or equivalent. Sp,A

542 Special Topics in Metabolic Disease (1-3) Biochemical and physiological basis of selected diseases of humans and animals. Clinical-pathological correlations. Prereq: 541 and consent of instructor. May be repeated. Maximum 9 hrs. F,Sp

543 Metabolism of Drugs (1) Drug mechanisms of action: membrane transport, enzyme reactions, ionization, stereoisomerism, and metabolic pathways. For students interested in biochemical pharmacology. Prereq: Biochemistry 310. Sp

545 Clinical Genetics (3) Human genetic disorders: new developments in cytogentetics, 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

610 Medical Biology Seminar (1) Invited speakers. Topics posted in advance. May be repeated. S/NC only. F,Sp

611 Advanced Topics in Medical Biology (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. 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

Microbiology

The Department of Microbiology offers both the M.S. and Ph.D. Students have the option of selecting from a variety of graduate research programs. For a departmental brochure, contact the department head.

ADMISSION REQUIREMENTS

Students are expected to have completed an undergraduate program with a 3.0 or better GPA on a 4.0 system. Included in the undergraduate course credits should be (1) a full year of general biological science, (2) one year of calculus, (3) two years of chemistry, including one year of organic, (4) one year of physics, and (5) an introductory course in microbiology. In many cases, deficiencies in requirements may be removed by taking appropriate courses during the first year of graduate study. The department also requires the general portion of the Graduate Record Examination. A satisfactory score on each part is 550 or higher with rare exceptions. Three letters of recommendation should be submitted by current or former faculty members.

Each new graduate student meets with an advisory committee chaired by the departmental Director of Graduate Studies to plan a program of study for the first one or two semesters until a research advisor is selected. All first-year students participate in a laboratory rotation program during the first semester of study. This program allows the student to adjust smoothly to the research programs of the department, to develop a background of research procedures and concepts, and to facilitate the selection of a research professor. Usually the student selects a research professor toward the end of the laboratory rotation period. The major professor assists in the selection of and carrying out of the research program and in the naming of the thesis or dissertation committee.

THE MASTER'S PROGRAM

The program leading to the M.S. is designed to provide the student with broad basic knowledge, to permit the acquisition of technical competence in the fundamentals of research, and to encourage creativity 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; (5) coursework in at least five of the subdisciplines recognized by the department: microbial physiology, pathogenic bacteriology, virology, mycology, immunology, microbial genetics, microbial biochemistry, molecular biology, and applied microbiology; and (6) presentation of a research thesis and its oral defense.

THE DOCTORAL PROGRAM

The program leading to the Ph.D. is designed to develop the student's ability to pursue independent and original research in microbiology and allied fields, to teach both oral and written communication of the results of research to the scientific community, and to train effective teachers. Students may enter the program after receiving either a Bachelor's or Master's degree. Students who enter with a Bachelor's degree usually receive the Ph.D. after four or five years; those with the Master's degree usually take three or four years to complete the degree. Departmental requirements are: (1) 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 three semesters as a teaching assistant; (4) one semester of physical chemistry; (5) one course in statistics; (6) courses in at least five of the sub-disciplines listed in the Master's program; (7) satisfactory performance in a comprehensive examination that must be passed before admission to candidacy; and (8) the presentation of a research dissertation and its oral defense.

GRADUATE COURSES

410 Physiology and Genetics of Bacteria (3) Modern concepts of structure and function of bacterial cells: metabolism, energy flow, and transcription and expression of genetic information. Prereq: 310. F

419 Bacterial Physiology and Genetics Laboratory (1) Laboratory exercises designed to accompany 410. Coreq: 410. F

420 Pathogenic Bacteriology (2) Disease-producing microorganisms: bacteria, rickettsia, and chlamydia. Prereq: 310. Sp


430 Immunology (2) 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 (1) Laboratory exercises designed to accompany 430. Coreq: 430. Same as Zoology 439.) F


449 Virology Laboratory (1) Laboratory procedures for isolation, handling, and culturing of animal viruses. Prereq: 310. Coreq: 440. F

470 Microbial Ecology (3) Physiological diversity and taxonomy of microorganisms from natural environments. Functional role of microorganisms in natural and simulated ecosystems. Prereq: 310. Sp


480 Mycology (3) Morphology, physiology, genetics, and taxonomy of yeasts and molds; pathogenesis of disease-causing fungi. Prereq: 310. Sp
605 Journal Club in Microbial Genetics (1) Readings and discussions based on current literature. May be repeated. Maximum 18 hrs. S/NC only. E

606 Current Topics in Biological Membrane Research (1) (Same as Biochemistry 606.)

610 Advanced Topics in Microbial Physiology (3) Prereq: 410 or consent of instructor. May be repeated. Maximum 12 hrs.

529 Advanced Topics in Microbial Pathogenesis (3) Prereq: 520, 530 or consent of instructor. May be repeated. Maximum 12 hrs.

530 Advanced Topics in Immunology (3) Prereq: 530 or consent of instructor. May be repeated. Maximum 12 hrs.

640 Advanced Topics in Virology (3) Prereq: 440, 540, or consent of instructor. Maximum 12 hrs.

650 Advanced Topics in Microbial and Molecular Genetics (3) Prereq: 550 or consent of instructor. May be repeated. Maximum 12 hrs.

670 Advanced Topics in Environmental Microbiology (3) Prereq: 570 or consent of instructor. May be repeated. Maximum 12 hrs.

Microbiology - Veterinary Medicine

See Veterinary Medicine for program description.

Music

(College of Liberal Arts)

MAJOR

DEGREES

Music ........................................... M.M., M.A.

John J. Meacham, Head

Professors:

Bitzas, George C., M.M. .................... Converse
Brock, John P., M.M. ....................... Alabama
Carter, W. J. (Emeritus), D.M.A. ....... Eastern
Coker, J. M. A. ....................... Sam Houston
Combs, F. M., M.A. ....................... Missouri
DeVine, George F. (Emeritus), D.M.A. .... American

Diploma ........................................ Schurz
Dorn, W. M.A. ............................... Columbia
Fred, Herbert W., Ph.D. ................. North Carolina
Hafford, A. G. (Emeritus), M.M. .... Northwestern
Huber, Calvin R., Ph.D. ................. North Carolina
Lennon, J. A., D.M.A. ..................... Michigan
Maeham, John J., M.M. ................... Northwestern
Northington, D. B., D.M.A. ............. Yale
Pederson, D. M., Ph.D. ..................... Iowa
Starr, W. J. (Emeritus), M.M. ......... Eastern
Stutzenberger, D. R., D.A. .............. Maryland
VanVactor, D. (Emeritus), M.M. .... Northwestern

Associate Professors:

Adams, Fay, M.M. .......................... Tennessee
Bommelje, W., M.M. ....................... Tulsa
Carter, P. S., M.M. ....................... Colorado
Fraley, M., B.M. ............................ Oberlin
Horodysky, P., M.M. ..................... Manhattan
Hough, Don, M.M. ....................... Tennessee
Hough, Dolly C., M.M. ................... Tennessee
Jacobs, K. A., D.M.A. ..................... Texas
Johnson, A. E., D.M.A. ................... Stanford

MacMorran, W. S., M.M. ................ Wisconsin
McClelland, D. K., M.A. ................ Columbia
Michailopolus, L. W., M.A. ............. Columbia
Scarlett, William P., M.M. .............. Louisiana State
Searle, S. M., M.M. ....................... Tennessee
Teachey, J. C., D.M.A. .................... Florida State
Young, S. E., Ph.D. ....................... North Carolina

Assistant Professors:

Boling, M. E., M.M. ....................... Tennessee
Brown, Donald R. .......................... Yale
Duberry, T. S., M.M.A. .................... Southern Cal
Goolsby, D., M.M. ....................... Texas
Hawthorne, W., Ph.D. ..................... Cincinnati
Schrader, E., Ph.D. ....................... Stanford
Sper, G. R., M.M. ....................... Indiana
Leach, C. F., M.M. ....................... New Mexico

The Department of Music offers the Master of Music degree with concentrations in accompanying, choral conducting, composition, instrumental conducting, jazz, performance (organ, piano, string, voice, and percussion), piano pedagogy and literature, sacred music, string pedagogy, and theory, and the Master of Arts degree in Music with concentrations in musicology and theory.

Applicants for these degree programs 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 are required to audition before the appropriate area faculty committee. Applicants for admission to the program in composition must submit scores and tape recordings of representative works.

Applicants for the concentration in jazz must audition in jazz improvisation and jazz piano proficiency and interview with members of the faculty in this area. Other applicants are required to have an interview with members of the faculty of the prospective area of concentration.

All applicants are required to take the Diagnostic Examinations in music theory and music history/literature. These examinations are given by the Department of Music at the beginning of each semester.

All concentrations require a written and oral final examination.

THE MASTER OF MUSIC 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 student's concentration. All concentrations require coursework in music history/literature and music theory and allow for elective courses. Specific curricula are available from the Department of Music.

The graduate recital is given in lieu of thesis by Master of Music degree students with concentrations in performance, pedagogy, jazz, and accompanying. A performance project is given in lieu of thesis by students with concentrations in choral conducting, instrumental conducting, and sacred music. A thesis is required of students in composition and theory.
THE MASTER OF ARTS PROGRAM

A minimum of 33 semester hours, including 18 hours of coursework above the 500 level and 6 hours of thesis, is required for the Master of Arts. Specific curricula are available from the Department of Music. A reading knowledge of French or German must be demonstrated by applicants before being admitted to candidacy.

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/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NP only. E
511 Lecture Recital (2)
521 Special Topics in Performance (1-3) Prereq: Consent of department head.
561 Church Music Performance Project (1-2) May be repeated. Maximum 3 hrs.

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. Subjects vary.
460 Music Aesthetics (3) Nature of music and musical experience, sense perception and emotions, music, and role of artist in society. Aesthetic viewpoints of individuals 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-romantic.
580 Music in the Twentieth Century (3) From 1890, Debussy, to present, Stockhausen and others.

Music Instrumental

GRADUATE COURSES

410 Band Arranging (3) Study and application of techniques employed in scoring for marching and concert bands. Prereq: Music Theory 320.
490 Instrumental Conducting (3) Development of knowledge and skills in instrumental conducting; study of various periods and composers and relationship of different styles to conductor's art; musical analysis and practice in conducting. Prereq: Music Education 320 or equivalent.
570 Advanced Suzuki Pedagogy (2) Study of psychology, procedures, and literature utilized by Shin'ichiki Suzuki in Japan. Prereq: 495 or consent of instructor. May be repeated. Maximum 4 hrs.
580 Band Literature (3) Band literature and origins of band, its important expanded cultivation during past century in United States and Europe.
582 Instrumental Conducting Performance (1) Jury performance; conducting band or orchestra in public.
583 Practicum for Instrumental Conductors (1) Intern experience in choral music. S/N only.
584 Practicum for Instrumental Conductors (1) Intern experience in field other than area of major interest. S/N only.
595 Instrumental Conducting Seminar (3) Rehearsal and performance problems and techniques allied to score reading and preparation. Particular attention to individual problems. Prereq: 490 or equivalent.

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 instruction 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

410 Early Keyboard Literature (2) Keyboard music through baroque period, music for harpsichord. Prereq: Music History 210-20.
430-36 Piano Literature II (2,2) 430--From 1750 to middle 19th century; 430--Middle 19th century to present.
460-70 The Organ and Its Literature II (3,3) Development of organ and organ literature from Middle Ages to present; problems of style and interpretation; pedagogical literature and methods; organ design. Prereq or coreq: Music History 220 and consent of instructor.
485-90 Suzuki Piano Method II (2,2) Psychology, procedures, and literature of Suzuki piano method. Must be taken in sequence. Prereq: Consent of instructor.
520 Piano Literature Seminar (2) Topics vary. May be repeated. Maximum 6 hrs.

Music Theory

GRADUATE COURSES

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 non-tonal 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.
550 Music Theory Seminar (1-3) Topics vary.
593 Independent Study (1-15) See page 31. Prereq: Consent of department head.

Music Voice

GRADUATE COURSES

430 Styles in Opera Acting (2) Study and practice of styles in opera acting based on historical and national characteristics. Prereq: 230.
440 Projects in Opera Theatre (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.
510 Vocal Literature Seminar (3) Topics vary. May be repeated. Maximum 6 hrs.
530 Opera Performance (2) Prereq: Consent of instructor. May be repeated. Maximum 4 hrs.
540 Opera Production (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.
550-60 Advanced Vocal Pedagogy II (2,2) 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 (2,2) Choral music from medieval 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 documentation, 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.
Music Performance

GRADUATE COURSES

All performance courses require an audition and consent of instructor. May be repeated. Maximum 8 hrs toward M.M. degree.

403 Flute (1-4)
405 Oboe (1-4)
410 Bassoon (1-4)
415 Clarinet (1-4)
420 Saxophone (1-4)
425 Horn (1-4)
430 Trumpet (1-4)
435 Trombone (1-4)
440 Baritone (1-4)
445 Tuba (1-4)
448 Flute (1-4)
450 Percussion (1-4)
455 Voice (1-4)
460 Violin (1-4)
465 Viola (1-4)
470 Cello (1-4)
475 String Bass (1-4)
476 Electric Bass (1-4)
479 Guitar (1-4)
480 Piano (1-4)
485 Harpsichord (1-4)
490 Organ (1-4)
494 Composition (1-3)
495 Composition with Electronic Media (1-3)
496 Composition for Media (2)
498 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)
551 Accompanying (1-4)
555 Improvisation (1-4)
556 Viola (1-4)
557 Cello (1-4)
558 String Bass (1-4)
559 Bass (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 Ensemble

GRADUATE COURSES

501 Woodwind Choir (1) May be repeated.
503 Small Jazz Ensemble (1) May be repeated. Maximum 12 hrs.
504 Jazz Ensemble (1) May be repeated.
505 Studio Orchestra (1) May be repeated. Maximum 12 hrs.
506 Trombone Choir (1) May be repeated.
509 Tuba Ensemble (1) May be repeated.
510 Percussion Ensemble (1) May be repeated.
511 Marimba Choir (1) May be repeated.
512 Baroque Ensemble (1) May be repeated.
513 Synthesizer Ensemble (1) May be repeated.
514 Brass Choir (1) May be repeated.
515 Chamber Music Ensemble (1) May be repeated. Maximum 12 hrs.
520 UT Singers (1) May be repeated.
530 Chamber Singers (1) May be repeated.
532 Collegium (1) May be repeated.
534 Saxophone Choir (1) May be repeated.
540 Opera Theatre (1) May be repeated.
542 Opera Workshop (1) May be repeated.
550 Concert Band (1) May be repeated.
552 Campus Band (1) May be repeated.
554 Varsity Band (1) May be repeated.
556 Laboratory Band (1) May be repeated.
558 Marching Band (1) May be repeated.
570 Symphony Orchestra (1) May be repeated.
580 Concert Choir (1) May be repeated.
582 University Chorus (1) May be repeated.
583 Men's Chorale (1) May be repeated.
589 Women's Chorale (1) May be repeated.
599 Accompanying (1) May be repeated.

Nuclear Engineering

(College of Engineering)

MAJOR

Nuclear Engineering .................... M.S., Ph.D.

Thomas W. Kerlin, Head

Professors:
Dodds, H. L., PE, Ph.D. .................. Tennessee
Kerlin, T. W., Ph.D. .................... Tennessee
Keeshock, Edward G., PE, Ph.D. ........... Oklahoma State
Mihalcz, J. T., Ph.D. ..................... University of Tennessee
Pasqua, P. F. (Emeritus), PE, Ph.D. ...... Northwestern
Perez, R. B., Ph.D. ....................... Madrid
Roland, H. G. (Emeritus), Ph.D. ......... Tennessee
Stevens, P. N., PE, Ph.D. ............... Northwestern
Uckan, N. A., Ph.D. ...................... Michigan
Uhrig, R. E. (Distinguished Prof.), PE, Ph.D. ................................ Iowa

Associate Professors:
Katz, E. M., PE, Ph.D. .................... Tennessee
Miller, L. F., PE, Ph.D. ................... Texas A&M
Scott, T. H., PE, Ph.D. .................... Florida

The Department of Nuclear Engineering offers programs leading to the Master of Science and Doctor of Philosophy degrees. Students may elect a traditional nuclear engineering M.S. or Ph.D. program (focusing on fusion energy or fission energy) or a radiation protection engineering concentration at the Master's level. The radiation protection engineering concentration prepares students for careers in the radiation safety field (health physics). The program is designed for graduates of undergraduate programs in engineering, physics, biology and chemistry.

A joint fusion energy program has been developed between the Nuclear Engineering and the Electrical and Computer Engineering Departments. Cross-listed courses from each department are used to satisfy degree requirements. Students may have the opportunity to do their research at the Fusion Energy Division of 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.

Students in the Nuclear Engineering Department have an opportunity to affiliate with the Measurement and Control Engineering Center and the Waste Management Research and Education Institute. These organizations provide unique research opportunities.

THE MASTER'S PROGRAM

A graduate program leading to the Master of Science is available to graduates of recognized undergraduate curricula in engineering and physics. Each applicant will be advised as to the necessary prerequisite courses before he/she enters the program.

The student must complete 24 semester hours of coursework approved by the student's advisory committee that includes the following:

1. A major consisting of a minimum of 12 semester hours of graduate courses in nuclear engineering. This must include at least one of the following two-semester sequences: 511, 512; 551, 552; 563, 564; 571, 572.
2. A minor of 6 semester hours of elective courses in mathematics, statistics or computer science.
3. Six semester hours in either nuclear engineering or a related field.

The M.S. candidate must also demonstrate research or design capability. This requirement may be satisfied by preparing a thesis or participating in the nuclear engineering practice school, as described below.

Thesis - The student performs independent research on a topic approved by the graduate committee. He/she submits a thesis on this research. The student then must pass an oral examination on the thesis and all graduate coursework. The student must enroll for six semester hours of NE 509 (Thesis).
Practice School - The student addresses two to four separate research problems approved by his/her graduate committee. Each is similar to a thesis problem, but smaller in scope. The student must make an oral report and submit written reports on each project. He/she must pass an oral examination on practice school research and all graduate coursework. The student must enroll for sixteen semester hours of NE 598 (Nuclear Engineering Practice).

THE DOCTORAL PROGRAM

Students in the field of nuclear engineering desiring to study for the Doctor of Philosophy must have a Bachelor of Science or Master of Science from a regionally accredited university, with a major in engineering or physics. All candidates will be required to demonstrate general competence in a comprehensive examination in the areas of engineering science, mathematics, physics, and nuclear engineering.

Specific course requirements for the Ph.D. in Nuclear Engineering include:

1. A minimum of 48 semester hours beyond the Bachelor's degree, exclusive of credit for the M.S. thesis or Nuclear Engineering Practice.

2. A minimum of 24 semester hours in doctoral research.

3. A minimum of 30 semester hours in nuclear engineering courses numbered 500 and above (or the equivalent), with at least 9 semester hours of 600-level courses. These are exclusive of thesis or dissertation credit.

4. A minimum of 12 semester hours in mathematics, computer science, or statistics courses beyond nuclear engineering undergraduate requirements numbered 400 or above.

5. A minimum of 6 semester hours in courses numbered 500 or above from a department other than nuclear engineering. The choice depends on the student's overall program and should expand his/her knowledge in a given field.

6. A reading knowledge of one foreign language may be specified by the student's doctoral committee.

The comprehensive examination is prepared by the nuclear engineering faculty and consists of 12 hours of written examinations. All past examinations are filed in the library, and students are encouraged to review them. Students are invited to take the comprehensive examination after completing approximately 30 semester hours of coursework. A student who fails the written part of the examination must take and pass the examination the next time it is offered to remain in the Ph.D. program.

Registration for NE 600 is not permitted until the written examination is passed. The comprehensive examination is completed with a successful written examination is passed. The comprehensive examination after completing approximately 30 semester hours of written examinations. All past examinations are filed in the library, and students are encouraged to review them. Students are invited to take the comprehensive examination after completing approximately 30 semester hours of coursework. A student who fails the written part of the examination must take and pass the examination the next time it is offered to remain in the Ph.D. program.

Implementation for NE 600 is not permitted until the written examination is passed. The comprehensive examination is completed with a successful written examination is passed. The comprehensive examination after completing approximately 30 semester hours of written examinations. All past examinations are filed in the library, and students are encouraged to review them. Students are invited to take the comprehensive examination after completing approximately 30 semester hours of coursework. A student who fails the written part of the examination must take and pass the examination the next time it is offered to remain in the Ph.D. program.

The comprehensive examination is prepared by the nuclear engineering faculty and consists of 12 hours of written examinations. All past examinations are filed in the library, and students are encouraged to review them. Students are invited to take the comprehensive examination after completing approximately 30 semester hours of coursework. A student who fails the written part of the examination must take and pass the examination the next time it is offered to remain in the Ph.D. program.


550 Nuclear Instrumentation (3) Physics and electronics associated with radiation detection, methods of data analysis, applicability of particular instrument measurements and fundamentals of nuclear instrumentation operation.

551 Radiation Protection (3) Interactions of photons, neutrons, beta particles, and heavy charged particles with matter and mechanisms of energy loss; methods of radiation detection, internal and external radiation dosimetry; chemical and biological effects of radiation; regulations and standards. PreReq: Introduction to Nuclear Engineering or equivalent.

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 562.)

562 Plasma Diagnostics II (3) (Same as Electrical and Computer Engineering 562.)

563 Plasma Engineering (3) Integration of plasma physics models, fusion engineering design criteria, and fusion technology into design of future plasma experiments and reactors. Particle, momentum, and energy balance equations. Simulation of various fusion reactor plasma, PreReq: 401 or equivalent. (Same as Electrical and Computer Engineering 563.)

564 Fusion Technology (3) Engineering problems associated with fusion reactor design: vacuum and magnetic systems; materials and irradiation; plasma heating, fueling and impurity control; review of major design studies. PreReq: 563. (Same as Electrical and Computer Engineering 564.)


572 Reactor Theory and Design (3) Analytical and numerical techniques for neutronics modeling of nuclear systems. Multigroup cross section theory for homogeneous and heterogeneous systems. Selected topics from literature. Core analysis methods and codes. PreReq: Consents of instructor. (Same as Electrical and Computer Engineering 563.)

581 Reactor Shielding (3) Application of analytical and deterministic solutions to nuclear engineering problems. Shielding and transport applications; regulatory requirements; methods for enrichment, fabrication, storage, reprocessing, and transport applications of nuclear materials. PreReq: 401 or equivalent.

582 Monte Carlo (3) Analysis of radiation transport problems in radiation shielding by Monte Carlo method, description of MORMORE code. Random sampling, evaluation of integrals, analog particle transport, techniques of variance reduction, forward and adjoint modes of analysis, importance function, splitting, weight window, survival biasing and contribution theory. PreReq: 581.

585 Process System Reliability and Safety (3) Qualitative and quantitative techniques for assessing and improving process systems. Reliability and safety, fault tree analysis and associated dependent failure analysis. (Same as Chemical Engineering 585.)

586 Measurement Science I (3) Principles of measurement, introduction to uncertainty, error propagation, and associated dependent failure analysis. (Same as Chemical Engineering 586.)

685 Electrical and Computer Engineering 586.)

590 Environmental Science and Engineering 586.)
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, nurse anesthesia and nursing administration.

Admission Requirements

1. Meet requirements for admission to The Graduate School.
2. Hold a Bachelor's degree in Nursing 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 3.0 for courses in the undergraduate major.
4. Complete the General portion of the Graduate Record Examination. NOTE: A strong performance on this examination may compensate for a GPA lower than 3.0.
5. Complete Graduate Program Data Form.
6. Submit three Graduate School Rating Forms from 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. Have an undergraduate GPA of 3.0 or higher or a GPA of 3.0 for courses in the undergraduate major.
4. Each student must present evidence of current CPR certification.
5. Non-registered nurse students must have completed 30 semester hours of chemistry or biology, a nutrition and microbiology course, and 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. The non-thesis option must complete a research-oriented project, or successfully meet all M.S.N. degree requirements. In order to apply these credits toward the thesis option, each student must present proof of a GPA of 3.0 or higher or a GPA of 3.0 for courses in the undergraduate major. Students who are not nurses must complete the equivalent of an upper division undergraduate major in nursing in addition to meeting all M.S.N. degree requirements.

Program Requirements

All students must complete a minimum of 36 semester hours distributed as follows:

Core (12 credits)
- 503-04 Holistic Nursing
- 510 Theoretical Foundations of Nursing

Research (9-12 credits)
- 500 Thesis
- 580 Nursing Project

Concentration (12 credits)--choose one
- 530-31 Adult Health Nursing I,II
- 540-41 Family Nurse Practitioner I,II
- 550-51 Parent-Child Nursing I,II
- 560-61 Mental Health Nursing I,II

Elective (3 credits)--waived for those who choose thesis option

Students who are not nurses must complete the following undergraduate nursing courses in addition to meeting the requirements listed above:

- 311 Acute Care Nursing
- 313 Nursing Research
- 414 Community Mental Health Nursing
- 415 Family/Community Health Nursing

Registered nurses whose undergraduate degrees are not in nursing must complete 304, 305, 313, 315 Clinical Nursing Practicum, and 403. They must also complete or successfully challenge the following:

- 301 Pharmacology
- 312 Acute Care Nursing Theory
- 402 Family Health Nursing Theory
- 412 Psychosocial Long Term Nursing Theory

Students whose science backgrounds are deficient may also need to take 214 Integrated Biomedical and Health Sciences and/or 450 Physiological Principles.

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 a 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 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.

REQUIREMENTS FOR SECOND MASTER'S DEGREE

1. Those who already hold a Master's or doctoral degree may apply up to 6 semester hours from that degree to meeting MSN program requirements. In order to apply these hours to the MSN degree, the following criteria must be met:
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 cooperative 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, extend, and expand the theoretical basis of nursing practice.
2. Conduct nursing research that generates new knowledge and advanced 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.
3. Have a minimum cumulative graduate grade-point average of 3.3 on a 4.0 scale.
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.
6. Complete Graduate Program Data Form, College of Nursing.
7. Submit Graduate School Rating Forms from three college level instructors and/or nurses and administrators who have supervised applicant's professional work.
8. Have a personal interview with the College of Nursing Graduate Student Admissions Committee.
9. Submit entire application (Graduate Application for Admission, 3 Graduate School Rating Forms, Graduate Program Data form, academic transcripts, and GRE scores) and schedule personal interview by March 1st of the year preceding Fall admission.

Program Requirements

The following courses are required for all students:

- Core
- Concentration
- Research

The electives should constitute a cognate area. All 12 hours should be selected from a specific area of concentration. Appropriate cognate areas are anthropology, child and family studies, clinical psychology, educational administration, educational psychology, management, medical ethics, public health, and social work.

Doctoral Committee

The student and major professor identify a committee composed of at least five faculty members who hold the rank of assistant professor or above, four of whom, including the chair, must be graduate faculty approved by the Graduate Council to direct doctoral research. Two of the faculty members must be from an academic unit other than nursing. The committee should be formed during the student's first year of doctoral study.

GRADUATE COURSES

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

Nursing Research: Methods, Design, and Analysis (3) Methodology, design of 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,Su

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

503 Holistic Nursing: Wellness (3) Examination of philosophy of holistic nursing and new paradigms for nursing assessment, diagnosis, intervention, evaluation and application of principles of health promotion, education, and innovative strategies for achievement of wellness. Role, ethics, psychological factors, and culture in lifestyle diseases. F

504 Holistic Nursing: Illness (3) Exploration, analysis, and application of principles of holistic nursing to clients experiencing acute and chronic biopsychosocial phenomena: 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 utilized to treat common, recurrent health problems: indications, contraindications, side and interactive effects of commonly prescribed drugs. Prereq or coreq: 503. F

509 Graduate Seminar in Public Health (1) (Same as Public Health 509, Social Work 509, Physical Education 509, Nutrition and Food Sciences 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,Su

520 Nursing Resource Management (3) Selected organizational, conflict management, decision-making, leadership, professional, technological, and therapeutic theories, principles, and concepts applicable to advanced clinical nursing practice. Prereq or coreq: 503. F,Sp

530 Adult Health Nursing I (6) Exploration and application of advanced nursing, 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 helping clients and families achieve optimal wellness. Prereq: 504. Prereq or coreq: 501, 520, 2 hrs and 4 labs. F

531 Adult Health Nursing II (6) Further emphasis on role of clinical nurse specialist in providing and managing nursing care for acutely and chronically ill adults across life span; explorations of, and interventions for, selected advanced management, supervisory, organizational, and leadership theories, and concepts and health related research applications to implementation of the clinical nurse specialist role. Prereq: 530, 2 hrs and 4 labs. F

533 Directed Study in Technical Nursing Education (3) Philosophy, history and contemporary issues in technical nursing education; development of a program for adult learner in community college: investigation of selected topics. Prereq: Graduate student or consent of instructor. Su

540 Family Nurse Practitioner I (6) Exploration and application of selected advanced nursing, physiological, psychological, clinical, developmental, environmental, cultural, and other theories, principles, and concepts to childbearing or child-rearing families in acute care or community settings; family wellness promotion and interventions designed to recognize and respond to threats to wellness of mothers, neonates, children, and adolescents. Prereq: 504. Prereq or coreq: 501, 520, 2 hrs and 4 labs. Sp

551 Parent Child Nursing I (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 in nursing management of women and/or child-bearing or child-rearing families in community, hospital, or other health care settings. Prereq: 550. 2 hrs and 4 labs. F

552 Parent Child Nursing Fieldwork and Seminar (5) Seminar and intensive clinical practicum designed to facilitate further development of specialized knowledge and skills utilized for advanced practice. Prereq or coreq: 551. 1 hr and 4 labs. Sp

563 Teaching Strategies and Practice (5) Exploration, analysis, and application of selected educational, curricular, teaching-learning, measurement, and evaluation principles. Prereq or coreq: 503. Required of all graduate nursing students. Prereq or coreq: 541, 551, or 561. 3 hrs and 2 labs. Sp

570-71 Pharmaceutical Strategies and Nursing Anesthesia Practice I, II (3,3) Application of pharmaceutical principles to nurse anesthesia practice; pharmacokinetic and pharmacodynamic actions of anesthesia and adjuvant drugs including dosages, side effects, and interac- tive effects. Prereq or coreq: 503. F,Sp

572 Chemistry and Physics of Nurse Anesthesia (3) Chemical and physical principles and application to clinical nurse anesthesia practice; physical, organic, and biochemical concepts and relationships to administration and pharmacological action of anesthetics and ad- junct drugs. Prereq. 570. Coreq: 571. Sp
Nutrition and Food Sciences

(College of Human Ecology)

MAJORS

Nutrition  M.S.
Food Systems Administration  M.S.
Human Ecology  Ph.D.

James D. Moran III, Acting Head

Professors:

Beauchene, Roy E., Ph.D.  Kansas State
Carruth, Betty Ruth, Ph.D.  Missouri
Quinton, H. W., Ed.D.  Duke
Sachan, Dileep S., Ph.D.  Illinois
Smith, John T., Ph.D.  Missouri

Associate Professors:

Andrews, Frances E., Ph.D.  Ohio State
Brooks, M. D. (Memphis), M.S.  Alabama
Houghton, B., Ed.D.  Columbia
Skinner, Jean D., Ph.D.  Oregon State

Assistant Professors:

Bailey, James W., Ph.D.  Iowa State
Costello, Carol, Ph.D.  Tennessee
Powell, J. A. (Memphis), M.P.H.  North Carolina
Snedl, J., Ph.D.  Ohio State

Instructors:

Jones, K., MBA  East Texas State
McGrath, M., M.S.  Purdue

Nutrition and Food Sciences

(573 Physiological and Pathophysiological principles of respiratory, cardiovascular, renal, endocrine and neurological systems to anesthesia; physiological responses to anesthetics; and principles of anesthetic care. Prereq: 572. Su)


576 Advanced Clinical Concentration in Nurse Anesthesia (3) Intensive instruction and clinical management of administration of less routine and more complex anesthetics to clients with more complex pathophysiology. Prereq: 575. 1 hr and 4 labs. Sp.

577 Special Topics (3) Topic is determined by faculty and student interest. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. F,Sp.


580 Nursing Project (3) Research-oriented, student-initiated endeavor that culminates in a scholarly paper submitted for publication and/or presentation; project may take form of development of innovative nursing intervention program; comprehensive literature review that reflects synthesis or comprehensive analysis, or other formats approved by nursing faculty member. Required for all MSN candidates who select non-thesis option. Prereq: 501, 510. May be repeated. Maximum 6 hrs. F,Sp.

583 Directed Clinical Practice (1-9) Additional opportunities for advanced nursing practice. Objectives to be developed collaboratively by student and faculty. Prereq: Enrollment in or completion of graduate level courses in clinical nursing. Maximum 9 hrs. S/NC or letter grade.


591 Nursing Administration II (6) Continuation of 590. Utilization of human and financial resources, conflict resolution, and organizational development with application to mid-level and top-level nursing administration positions. Prereq: 550, 2 hrs and 4 labs. F.

593 Independent Study (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. F,Sp.

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

601-02 Theory Construction and Analysis I, II (3,3) Theory development; analysis of existing health and nursing theories; theory building from existing knowledge. Prereq: 503, 510, or consent of instructor. F,Sp.

603 Advanced Nursing Research I (3) Advanced clinical research in methodology and data analysis and interpretation. Quantitative nursing research. Prereq: 601, 6 hrs of graduate-level statistics. F.

604 Advanced Nursing Research II (3) Continuation of 603. Qualitative nursing research. Prereq: 603.


612 Health and Nursing Policy/Planning (3) Policies affecting nursing education and practice; health policies and political processes; interactions between health professionals, consumers, groups, and government in health policy development and health planning activities. Prereq: 611. F,Sp.

613 Nursing Management of Complex Systems (3) Contemporary organizational and management theories and techniques needed for effective administrative leadership in nursing education, practice, and research. Prereq: 612. F.

614 Nursing Preceptorship (3) Individually-designed practicum, field, or internship experiences in variety of administrative, educational, research, or clinical practice settings. Prereq: 612. Prereq or coreq: 913. Sp.

The Master's Program

Nutrition

In Nutrition, students may choose a thesis or non-thesis option. Students emphasizing public health nutrition must choose the non-thesis option. Nutrition students who choose the non-thesis option must take 515 or 541 and 2 hours from 542-544, which are designed as courses in which the student will integrate knowledge from coursework and write a major paper upon completion of an individual project.

Thesis Option: The program consists of a minimum of 33 hours with at least 16 hours of coursework in the department. NFS 503 or 504, 511, 512, and 540 are required. Six hours of Thesis 500 are required and may be applied toward the 33 hours. Six hours outside the department are recommended. A minimum of 22 hours at the 500 or 600 level is required.

An oral comprehensive examination is required upon completion of the thesis.

Non-Thesis Option: The program consists of a minimum of 36 hours with at least 20 hours of coursework in the department. NFS 500 or 504, 511, 512, 540, 541, and 2 hours from 542-544 are required. Students in public health nutrition must take 513, 514 and 515. Six hours in one area outside the department are required. A minimum of 24 hours at the 500 and 600 level is required.

A written comprehensive examination is given at the end of the program.

Food Systems Administration

In Food Systems Administration, students may choose a thesis or non-thesis option. Food Systems Administration students who choose the non-thesis option must take 541, 546 and 3 hours from 543, which are designed as courses in which the student will integrate knowledge from coursework and write a major paper upon completion of an individual project.

Thesis option: The program consists of a minimum of 33 hours with at least 16 hours of coursework in the department. NFS 537, 541, and 546 are required. Six hours of thesis 500 are required.
are required and may be applied toward the 33 hours. Six hours outside the department are recommended. A minimum of 22 hours at the 500 and 600 level is required.

An oral comprehensive examination is required upon completion of the thesis.

Non-Thesis Option: The program consists of a minimum of 36 hours with at least 20 hours of coursework in the department. NFS 537, 541, 546, and 3 hours from 548 (non-thesis research project) are required. Six hours in one area outside the department are required. A minimum of 24 hours at the 500 and 600 level is required.

A written comprehensive examination is given at the end of the program.

THE PH.D. CONCENTRATION

Students enrolled in the food science concentration specialize in either the physicochemical or socio-cultural aspects of food in relation to people and their environment. Students are encouraged to develop a strong foundation in nutrition and other fields by taking courses in a cognate area. Food systems administration, food technology, education, and the natural and behavioral sciences are among the potential cognate areas.

The nutrition science concentration enables students to study the science of nutrition from the cellular level to the application of nutritional principles by people in a changing environment.

In either concentration, students may specialize in nutrition education, using nutrition and food science as foundation areas, and incorporating the study of food science and factors that influence dietary change. Cognate areas could include sociology, education, communications, marketing, anthropology, and/or statistics. Students are expected to acquire advanced training in food science, chemistry, biology, and other natural and behavioral sciences. The doctoral program emphasizes human nutrition, experimental nutrition (small animals), and intermediary metabolism.

Requirements for Food Science Concentrations:
1. Sixteen hours with a concentration in food science or nutrition including 9 hours at the 600 level (exclusive of dissertation);
2. NFS 511, and 512, 503 or 504 (nutrition science concentration) or 503 and 504 (food science concentration);
3. Minimum 4 hours of NFS 540;
4. Minimum 9 hours of statistics, computer science, and research methods;
5. Minimum 8 hours in a cognate area;
6. Students without college teaching experience are required to take the fall semester seminar for GTAs and NFS 548 comprising a faculty-supervised problem in college teaching.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S. program in Food Systems Administration is available to residents of the states of Arkansas, Kentucky, South Carolina, or West Virginia. The M.S. program in nutrition is available to residents of Arkansas, Kentucky, South Carolina, or Virginia. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records. For the Ph.D., see Human Ecology.

GRADUATE COURSES

413 Experimental Food Science (3) Individual and group laboratory experimentation in food science; microcomputer applications. Prereq: 312, Plant and Soil Science 471, 1 hr and 2 labs. F

414 Nutrient-Drug Interactions (2) Nutrient effects on efficacy, toxicity and safety of drugs; drug effects on absorption and metabolism of nutrients. Prereq: 300 or equivalent. Sp, A

423 Foodservice Systems Design and Equipment (3) Physical facility design; production and delivery system analysis; equipment selection and purchase. Prereq: Quantity Food Procurement, Production and Service workshops, lab or consent of instructor. A

500 Thesis (1-15) S/NC only. E

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

503 Physicochemical Properties of Foods I (3) Proteins and lipids: physical and chemical characteristics; behavior in foods. Prereq: 201 or equivalent. 413. F, A

504 Physicochemical Properties of Foods II (3) Sugars, starches, non-starch polysaccharides, hydrocolloids, and pigments: physical and chemical characteristics; behavior in foods. Prereq: 201 or equivalent. 413. F, A

505 Food Texture (2) Classification of foods according to textural parameters; instrumental and sensory methods in evaluation of texture. Prereq: 413 or Food Technology and Science 411, statistics or consent of instructor. 1 hr and 1 lab. Su

506 Sensory Analysis (3) Principles and methodology for sensory evaluation of food; application to laboratory and consumer panels; interpretation of data. Prereq: 413 or consent of instructor. 2 hrs and 1 lab. F

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: 301 or 313 or consent of instructor. F, A

509 Graduate Seminar in Public Health (1) Same as Public Health 509, Nursing 509, Physical Education 509 and Social Work 509.

511 Advanced Physiological Chemistry (4) Bioenergetics, flux control and hormonal interrelationships. Prereq: 311 or equivalent. Sp


513 Community Nutrition (3) Orientation to community; assessment of nutrition problems, needs, and resources; functional roles of public health nutritionist. Concurrent field experiences. Prereq: 313 or consent of instructor. F

514 Community Nutrition (3) Planning, implementation, and evaluation of public health nutrition programs. Concurrent field experiences. Prereq: 513 or consent of instructor. Sp

515 Field Study in Community Nutrition (1-12) Personal participation in and analysis of state or regional community nutrition program. Location of in-depth study to be selected in consultation with instructor. Prereq: 514 and consent of instructor. 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: 313 or consent of instructor. Su

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: 313 or consent of instructor. Sp

518 Nutrition and Aging (3) Nutritional problems of adults; nutritional requirements, dietary intakes; affects of nutrition on biological aging. Prereq: 313 or consent of instructor. Sp

519 International Nutrition (3) World food supply, demographic, sociocultural, economic, and technological factors related to food and nutrition; international assessment and counseling for nutrition. Prereq: Consent of instructor. F, A

520 Nutritional Ecology (2) Examination of issues in nutrition, ecology, physical, and social environments that impact availability of food and nutrients in U.S. food supply. F

521 Physiological Basis for Diet and Disease (2) Case studies of nutrition problems of diseases related to nutrition. Prereq: 201 consent of department head.

522 Nutrition Counseling (2) Individual eating habits and disorders, evaluation strategies for effectiveness of helping process. Prereq: 313 or consent of instructor. Sp

523 Nutrition and Behavior (2) Influence of nutrition on intraindividual processes; physiological indicators of brain function and behavior of individuals; sensory, motor, intellectual, and personality aspects. Prereq: Consent of instructor. Su

524 Nutrition Education: Principles, Implementation, and Evaluation (3) Conceptual models, principles, application, and evaluation models in nutrition education research. Prereq: 508 or consent of instructor. Su, A

526 Mental Retardation or Other Developmental Disorders of Childhood (1-3) Special study course required of all full-time students in training at Child Development Center, UT, Memphis. Supervised project in related field. Prereq: 301 or 313 or consent of instructor. Su

527 Nutrition in Mental Retardation and Developmental Disorders (1-9) Interdisciplinary diagnosis and treatment of developmentally-handicapped child; role of the nutritionist; clinical evaluation. Prereq: 301 or 313 or consent of instructor. F

530 Computer-Assisted Foodservice Systems Management (3) Application of computer technology to foodservice industry; inventory control, cost accounting, nutrition education, and production, and nutrient analysis. Prereq: 320 or consent of instructor. Su, A

531 Financial and Marketing Administration in Foodservice (3) Marketing and financial techniques used in foodservice administration; developing foodservice marketing plan, budgeting, foodservice accounting, and information services. Prereq: 328 or consent of instructor. Sp

532 Human Resource Management in Foodservice (3) Identifying labor needs; development and maintenance of work force. Prereq: 422 or consent of instructor. F

533 Advanced Food Production and Delivery Systems Management (3) Analysis of food production and delivery systems; application of quantitative methods and models to optimize decisions. Prereq: 320 or consent of instructor. F

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

535 Directed Study in Foodservice Systems Administration (1-3) Final study selected for student with guidance of faculty. Prereq: 620 or consent of instructor. May be repeated. Maximum 6 hrs. E

537 Seminar in Foodservice Systems Administration (1) May be repeated. S/NC only. Sp

540 Seminar in Nutrition and Food Sciences (1) May be repeated. S/NC only. Sp

541 Research Methods (1) Basic principles of planning, conducting, and interpreting nutrition, food sciences, and foodservice systems administration research. Prereq: 6 graduate hrs in nutrition and food sciences and statistics.

542 Advanced Experimental Nutrition (2) Application of research principles to individual project using experimental animals. Prereq or coreq: 541. Sp
Ornamental Horticulture and Landscape Design

MAJOR

Ornamental Horticulture and Landscape Design

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
Gresshoff, Peter M. (Rachef Chair of Excellence), Ph.D. ………… Australian National
McDaniel, G. L., Ph.D. ………… Iowa State
Williams, Don B., Ph.D. ………… Penn State

Associate Professors:
Day, J. W., Ph.D. ………… Mississippi State
Witte, Willard T., Ph.D. ………… Maryland

Assistant Professors:
Augé, Robert M., Ph.D. ………… Washington State
Rogers, S. M., M.L.A. ………… Georgia
Trigiano, R., Ph.D. ………… NC State

The Department of Ornamental Horticulture and Landscape Design offers the Master of Science with concentrations in floricultural sciences, ornamental horticulture, and turfgrass management. The curriculum includes courses in plant production, physiology, soil fertility, pest management, and landscape design. The program is designed to prepare students for careers in research, teaching, and extension in ornamental horticulture and turfgrass management.

The program requires a minimum of 32 credits, including 28 credits of coursework and 4 credits of research. The coursework includes core courses in ornamental horticulture and turfgrass management, as well as electives in areas of specialty. Students also complete a research thesis or project under the guidance of a faculty advisor.

Graduate students admitted to the program are expected to attend this course and participate in discussions each semester enrolled. 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 university's Graduate Council. The program includes a thesis option and a non-thesis option. The thesis option requires the completion of a research project and a written thesis, while the non-thesis option requires the completion of a research project and a comprehensive examination.

The program is designed to prepare students for careers in research, teaching, and extension in ornamental horticulture and turfgrass management. The program is also designed to prepare students for careers in industry, government, and non-profit organizations.

Pathobiology

MAJOR

Veterinary Medicine

DEGREE

D.V.M.

David O. Slauson, Head
602 Veterinary Biopsy (1-2) Examination of biopsy specimens and interpretation of observations. Prereq: Consent of instructor. May be repeated. Maximum 4 hrs. Class meets once monthly. E

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

501 Special Topics in Pathobiology (1-2) Preprint. Maximum 6 hrs. E

502 Registration for Use of Facilities (3-15) Prereq: Consent of instr. May be repeated. S/NC only. E

503 Comparative Pathology (2) Pathogenic mechanisms. Comparative aspects. Study of gross, microscopic and ultrastructural lesions. Prereq: Histology. 2 hrs and 1 lab. Sp.A

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

601 Advanced Topics in Pathobiology (1-3) Neoplastic, histopathologic, clinical pathology, clinical parasitology, clinical immunology, clinical bacteriology and mycology, and clinical virology. May be repeated. Maximum 12 hrs. E

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

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

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

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

606 Ultrastructural Pathology (1) Ultrastructural changes in diseased cells, interpretation of observations. Prereq: Professional medical degree or consent of instructor. F.A


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

501 Special Topics in Pathobiology (1-2) 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 is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

503 Comparative Pathology (2) Pathogenic mechanisms. Comparative aspects. Study of gross, microscopic and ultrastructural lesions. Prereq: Histology. 2 hrs and 1 lab. Sp.A

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

601 Advanced Topics in Pathobiology (1-3) Neoplastic, histopathologic, clinical pathology, clinical parasitology, clinical immunology, clinical bacteriology and mycology, and clinical virology. May be repeated. Maximum 12 hrs. E

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

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

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

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

606 Ultrastructural Pathology (1) Ultrastructural changes in diseased cells, interpretation of observations. Prereq: Professional medical degree or consent of instructor. F.A

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: Cellular and Comparative Biochemistry, and Advanced Topics in Biochemistry. Virology and Virology Lab. Prereq: Consent of instructor. F.A

608 Techniques in Pathology (2) Fixation, processing and staining of tissue specimens; specialized gross dissec tion techniques; photography of gross specimens and photomicrography. Prereq: Consent of instructor. Sp.

609 Principles of Pathology (1) Advanced topics in pathobiology and mechanisms of disease: pathophysiology, cellular degeneration, inflammation, immunopathology, hemostasis. Principal biochemical and morphologic responses of various cells, tissues, and organs to injury and other metabolic derangements. Participants present seminars on selected topics from current literature and textbooks. Prereq: Consent of instructor. F.A

601 Advanced Topics in Pathobiology (1-3) Neoplastic, histopathologic, clinical pathology, clinical parasitology, clinical immunology, clinical bacteriology and mycology, and clinical virology. May be repeated. Maximum 12 hrs. E

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

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

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

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

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

501 Special Topics in Pathobiology (1-2) 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 is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

503 Comparative Pathology (2) Pathogenic mechanisms. Comparative aspects. Study of gross, microscopic and ultrastructural lesions. Prereq: Histology. 2 hrs and 1 lab. Sp.A

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

601 Advanced Topics in Pathobiology (1-3) Neoplastic, histopathologic, clinical pathology, clinical parasitology, clinical immunology, clinical bacteriology and mycology, and clinical virology. May be repeated. Maximum 12 hrs. E

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605 Pathobiology Seminar (1) Subjects of current interest in biomedical science. Students present one
440 Contemporary Ethical Theory (3) Topics in meta-
452 Topics in History of Philosophy (3) Figures or movements from antiquity through mid-twentieth cen-
455 American Philosophy (3) Colonial to early 20th Century. Prereq: 6 hrs of philosophy or consent of instructor.
457 Philosophy of Mind (3) Relation of mental to physical and of role of words in discourse for mental activities, thinking and feeling. May be repeated. Maximum 9 hrs.
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 history. Prereq: 6 hrs of philosophy or consent of instructor.
473 Philosophy of Mind (3) Problems of mind and body in relation to consciousness and personal identity. Prereq: 6 hrs of philosophy or consent of instructor. (Same as Religious Studies 446.)
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.
476 Philosophy of Language (3) Survey of issues such as meaning, reference, and truth. 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.
480 Social and Political Philosophy (3) Philosophical problems concerning social and political life: family, state, freedom, justice; major theoretical responses: anarchism, social contract, Marxism. May be repeated. Maximum 9 hrs.
481 Foreign Study (1-15) See page 31.
483 Off-Campus Study (1-15) See page 31.
600 Doctoral Research and Dissertation (3-15) P/NP only. E
620 Topics in the History of Ancient and Medieval European Philosophy (3) May be repeated. Maximum 9 hrs.
622 Topics in the History of Modern Philosophy (3) May be repeated. Maximum 9 hrs.
624 Topics in the History of 20th-Century Philosophy (3) May be repeated. Maximum 9 hrs.
640 Topics in Value Theory (3) May be repeated. Maximum 9 hrs.
646 Topics in Medical Ethics (3) Prereq: Consent of Medical Ethics Committee. May be repeated. Maximum 9 hrs.
657 Topics in Metaphysics and Epistemology (3) May be repeated. Maximum 9 hrs.
During the fall semester registration period.

Qualifying examination in undergraduate physics is required, for advising purposes only, to take a undergraduate minor in Physics or its equivalent. As a graduate minor will have completed an undergraduate major in Physics or its equivalent.

Physics 311-12, 321, 431-32, and 461-62-63 constitute the minimum core curriculum. At least 20 hours must be taken at the 500 level or above. In addition, the candidate must pass a written examination administered by his/her committee.

The DOCTORAL PROGRAM

All students are expected to take Physics 511-12, 531, 541-42, 551, 571-72, and 611. Physics 601-62 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, 571-2, 521-2, 541-2, 561 constitute the core curriculum. They are the usual basis for the departmental comprehensive examination which is normally taken by a well-prepared student after two years of graduate study.

A reading knowledge of one foreign language in which there exists a significant body of literature is required. German 332 or French 302 is normally required.

ATOMIC PHYSICS

Atomic structure of matter; quantum mechanics; quantum electrodynamics; solid state physics; and basic quantum mechanics. Recommended for graduate students who plan to teach. Prereq: Senior standing in physics or consent of instructor.

Non-Thesis Option

This program is designed primarily for students intending to teach in colleges or universities on the elementary or intermediate level, or for students specifically intending to work toward a Ph.D. Students seeking the non-thesis option must apply to the department's graduate committee for permission to enroll under this program. The requirements are the satisfactory completion of 30 hours of coursework composed of 18 semester hours from Physics 511-12, 521-22, 531-32, 541-42, and 571-72; 6 semester hours in a minor field; and 6 semester hours from other courses numbered above 400 (preferably advanced laboratory nature). At least 20 hours must be taken at the 500 level or above. In addition, the candidate must pass a written examination administered by his/her committee.

THE MASTER'S PROGRAM

Thesis Option

This program is designed primarily for students intending to go into industrial or governmental laboratories as physicists. The course requirements include 24 semester hours of physics courses, of which at least 12 semester hours are taken from Physics 511-12, 521-22, 531-32, 541-42, or 571-72. Each candidate must present an acceptable thesis, 6 hours of 500, and pass an oral examination on course material and thesis.

Non-Thesis Option

This program is designed primarily for students intending to teach in colleges or universities on the elementary or intermediate level, or for students specifically intending to work toward a Ph.D. Students seeking the non-thesis option must apply to the department's graduate committee for permission to enroll under this program. The requirements are the satisfactory completion of 30 hours of coursework composed of 18 semester hours from Physics 511-12, 521-22, 531-32, 541-42, and 571-72; 6 semester hours in a minor field; and 6 semester hours from other courses numbered above 400 (preferably advanced laboratory nature). At least 20 hours must be taken at the 500 level or above. In addition, the candidate must pass a written examination administered by his/her committee.

Admission Requirements

A student who enrolls in The Graduate School with the intention of attaining an advanced degree in Physics will have completed an undergraduate major in Physics or its equivalent. Physics 311-12, 321, 431-32, and 461-62-63 or 411-12 constitute the minimum courses prerequisite to graduate study.

A student who intends to present Physics as a graduate minor will have completed an undergraduate minor in Physics or its equivalent, Physics 311 and 431-32 constitute the minimum coursework prerequisite to a minor in Physics.

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.

Research Assistants:

- Daunt, S. J., Ph.D. Queens
- Davis, L. (UTSI), Ph.D. Auckland
- DelSerio, R. Ph.D. Chicago
- Harmatz, R., Ph.D. Ohio State
- Menzel, R. (UTSI), Ph.D. Tennessee
- Sanders, A. J., Ph.D. Tufts

Research Professors:

- Bottcher, C., Ph.D. Belfast
- Strayer, M. R., Ph.D. MIT

Graduate programs leading to the Master of Science and the Doctor of Philosophy are offered in a number of concentration areas: atomic and low temperature physics, biophysics, chemical physics, elementary particle physics, health physics, heavy ion atomic physics, molecular spectroscopy, nuclear physics, plasma physics, condensed matter physics, theoretical physics, and ultrasonics.

Departmental graduate programs leading to the M.S. and Ph.D. are also available at The University of Tennessee Space Institute, Tullahoma, where opportunities for study and research are available in quantum optics and laser physics, atomic and molecular spectroscopy, fluid physics, and theoretical physics. For additional information, contact the department head.

Admission Requirements

A student who enrolls in The Graduate School with the intention of attaining an advanced degree in Physics will have completed an undergraduate major in Physics or its equivalent. Physics 311-12, 321, 431-32, and 461-62-63 or 411-12 constitute the minimum courses prerequisite to graduate study.

A student who intends to present Physics as a graduate minor will have completed an undergraduate minor in Physics or its equivalent, Physics 311 and 431-32 constitute the minimum coursework prerequisite to a minor in Physics.

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.

Research Assistants:

- Faidas, H., Ph.D. Tennessee
- Warmack, R. J., Ph.D. Tennessee

Lecturers:

- 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.

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Admission Requirements

A student who enrolls in The Graduate School with the intention of attaining an advanced degree in Physics will have completed an undergraduate major in Physics or its equivalent. Physics 311-12, 321, 431-32, and 461-62-63 or 411-12 constitute the minimum courses prerequisite to graduate study.

A student who intends to present Physics as a graduate minor will have completed an undergraduate minor in Physics or its equivalent, Physics 311 and 431-32 constitute the minimum coursework prerequisite to a minor in Physics.

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.
490 Senior Seminar (1-3) Topic of current interest. May be repeated with consent of department. Maximum 6 hrs.

500 Thesis (1-15) P/NP only. E
501 Graduate Research Participation (3) Advanced research and research experience under supervision of staff research director whose research area coincides with interests of student. Open to all graduate students in good standing. Prereq: 500 or consent of instructor. 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 student uses University facilities and/or for faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

505 Physics of Fluids (3) Fluid physics, overview of fluid mechanics and associated computational techniques; general description of laminar and turbulent flows; subsonic, supersonic and hypersonic flows; con- tinuum, transitional and free-molecular flows; pipe flow, nozzle flow and sonic orifice expansion flows; reacting and nonequilibrium flows; shock-tube physics; and an introduction to the method of characteristics and Monte Carlo computational techniques.

506 Experimental Methods (3) Principles, real opera- tional techniques, selection of laser types, detectors, photomultiplier tubes, image intensifiers, image converters, image dissectors, streak cameras, and other devices; basic characteristics of laboratory sys- tems including cryogenic-based devices, data acquisition tech- niques 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 technology. Extensive use of computer calculations and design of practical and sophisticated optical systems.

508 Laser Physics (3) Mode analysis, stable and un- stable resonators; rate equations and population inver- sion, 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.

511-12 Theoretical Physics (3,3) Classical theoretical physics, with limited use of mathematics. Prereq. 312, 432, advanced calculus, differential equations, and vector analysis.

521-22 Quantum Mechanics (3,3) Fundamental prin- ciples of quantum mechanics, free particle, harmonic oscillator, hydrogen atom, angular momentum, electron spin, particles in electric and magnetic fields, perturba- tion theory, variational methods, scattering theory. Applic- ations to atomic and nuclear physics.


532 Advanced Classical Mechanics (3) Variational principles, canonical transformations, Hamilton-Jacobi theory, nonlinear mechanics, elasticity, fluid mechanics. Prereq: 531.


561 The Theory of Relativity (3) Geometry of space- time, relativistic electrodynamics, particle mechanics and continuous mechanics. Einstein's field equations, Schwarzschild solutions, the classical test of general relativity. Prereq or coreq: 531 and 542.


574-75 Group Theory for Physicists (3,3) Introduction to abstract group theory, discrete and continuous groups, representation theory, Noether's theorem, symmetries and degeneracies, application of group- theoretical methods to atomic physics, solid-state phys- ics, and particle physics. Prereq: 571-72.

591 Foreign Study (1-15) See page 31.

592 Off-Campus Study (1-15) See page 31.

593 Independent Study (1-15) See page 31.

594 Special Problems (3-15) P/NP only.

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


606-07 Nonlinear Optics (3,3) Nonlinear optical sus- ceptibilities, wave propagation in nonlinear media, sum- frequency and difference frequency generation, har- monic generation, parametric amplification and oscilla- tion, stimulated Raman processes, two- and multi-pho- ton processes, four-wave mixing and phase conjugation, transient coherent optical effects and free induction decay, optical breakdown and nonlinear effects in plas- mas. Prereq: 508.

609-09 Quantum Electronics and Electrodynamics (3,3) Electromagnetic propagation in anisotropic and periodic media, linear and quadratic electro-optic effects and devices, acousto-optical effects and devices, guided waves, phase conjugate optics, pico- and femto- second optical switching and electronics, and optical computers and processors. Prereq: 509.

610 Quantum Optics (3) Quantum theory of emission and absorption of radiation, frequency-dependent sus- ceptibility, coherence theory, field quantization and coherent emission, population and radiation functions, atomic and photon optics, counting and higher-order cohe- rence, atomic scattering phenomena. Prereq: 521.

611 Advanced Quantum Mechanics & Field Theory (3) Second quantization, quantization of electromagnetic field, emission, absorption, and scattering of light, bremsstrahlung, pair creation and annihilation, quantum field theory methods in condensed matter physics, and quantum optics. Topics vary according to interests of students, instructor and present state of physics. Prereq: 561 or 561 consent of instructor.

612 Advanced Topics in Quantum Field Theory (3) Relativistic quantum mechanics, quantum chromodynamics, grand unified theories, and advanced topics in quantum field theory. Topics vary according to interest of students, instructor and present state of physics. Prereq: 522 and 542 or equivalent. Prereq or coreq: 561 or consent of instructor.

617-18 Lie Algebras and Mathematics (3,3) (Same as Mathematics 617-18.)

621-22 Nuclear Structure (3,3) General properties of nuclear; two-body scattering problems; saturation and symmetry properties of nuclear forces; theory of light nuclei; nuclear spectroscopy; special nuclear models; theory of nuclear reactions; theory of beta-decay. Prereq: 571-72.

626-27 Elementary Particle Physics (3,3) Survey in elementary particle physics covering experimental methods, conservation laws, invariance principles, and models of interacting particle models, electroweak interactions and unification of ele- mentary forces. Prereq: 522.

631 Advanced Topics in Relativity of Cosmology (3) Concepts in cosmology, applications of general and special relativity to current research and present state of physics. Cosmological solutions of Einstein's field equations, black holes, inflationary uni- verses, unified field theories, interaction between cos- mology and nuclear and elementary particle physics. Prereq: 531 and 561.

641 Advanced Topics in Classical Theory (3) To meet special needs of students. Advanced dynamics and hydrodynamics, electromagnetic theory, statistical mechanics, or theory of nonequilibrium processes. Prereq: 532, 542. May be repeated with consent of department. Maximum 9 hrs.

642 Advanced Topics in Quantum Theory (3) To meet special needs of students. Angular-momentum theory, beta-ray theory, theory of atomic spectra, molecular structure and valence theory, theory of radiation, electric and magnetic susceptibilities, high energy processes, scattering and collision processes, or theory of fields. Prereq: 522. May be repeated with consent of depart- ment. Maximum 9 hrs.

643 Computational Physics (3) Developing computer algorithms for solving representative problems in various fields of physics, celestial dynamics in astrophysics, boundary value problems in electromagnetism, atomic and nuclear structure and structure on solid state physics, transport problems in statistical mechanics, Monte Carlo simulation of liquids, fitting and interpolation of data, computer correlations and optimization strategy. Prereq: 522, 531, 542, and 572.

651-62 Collision Interactions (3,3) Interaction of elec- tromagnetic radiation and charged particles with atoms and molecules or free particles, multiple scattering, ionization, transport and capture, collective excitations, Cerenkov radiation, and stopping power. Prereq: 522.

663 Advanced Plasma Physics I (3) (Same as Electric- al and Computer Engineering 663)

664 Advanced Plasma Physics II (3) (Same as Electric- al and Computer Engineering 664)

671-72 Advanced Solid State Physics (3,3) Lattice dynamics, phonons, Brillouin zones, heat capacity, Einstein and Debye structures and structure on solid state physics, transport problems in statistical mechanics, Monte Carlo simulation of liquids, fitting and interpolation of data, computer correlations and optimization strategy. Prereq: 522, 531, 542, and 572.

681-82 Molecular Spectroscopy (3,3) Spectroscopic methods of determining molecular properties, theoretical and experimental techniques for determining molecular energy and charge transfer, group theoretical methods and selection rules in gases and condensed phases, normal coordinates and potential functions, vibration- rotation interaction theory, intensities, frequencies and line shapes of molecular transitions. Prereq: 532 and 542 or consent of instructor.
### Planning

**Office of the Provost**

**MAJOR DEGREE**

Planning .............................. M.S.P.

James A. Spencer, Director

Professors:

Johnson, David A., Ph. D. .......... Cornell
Kenney, Kenneth B., Ph. D. ......... North Carolina
Shouse, Walter L. (Emeritus), M.C.P. .. Harvard
Spencer, James A., M.C.P. .......... Ohio State

Associate Professors:

Bowen, George E., M.A. .... George Washington
Fisher, Patricia, Ph.D. ............ Florida State

The Graduate School of Planning offers a program of studies leading to the professional degree of Master of Science in Planning. The degree is the normal route for entry into professional positions in urban and regional planning 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 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, analytical methods in planning, economic development planning, and real estate development 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. Courses are available in transportation, health, education, environmental, and social planning.

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, South Carolina, and Georgia. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.

### GRADUATE COURSES

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>401</td>
<td>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.)</td>
</tr>
<tr>
<td>500</td>
<td>Thesis (1-15) P/NP only.</td>
</tr>
<tr>
<td>502</td>
<td>Registration for Use of Facilities (1-3) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/C only.</td>
</tr>
<tr>
<td>510</td>
<td>Fundamentals of Planning (2) History of planning, structure and development of urban areas, operations of contemporary urban growth trends and issues.</td>
</tr>
<tr>
<td>511</td>
<td>Graphic and Oral Communications in Planning (1)</td>
</tr>
<tr>
<td>515</td>
<td>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.</td>
</tr>
<tr>
<td>520</td>
<td>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.</td>
</tr>
<tr>
<td>521</td>
<td>Computers in Planning (3) Basic computer concepts, hardware and software, use of mainframe and microcomputers in planning and government.</td>
</tr>
<tr>
<td>522</td>
<td>Computers in Planning II (3) Software and systems for planning and local government. Content varies. Projects in small groups on regional study model. Prereq: 521 and consent of instructor.</td>
</tr>
<tr>
<td>523</td>
<td>Statistics for Planners (3) Application of 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; selection of one and two sample tests; correlation and regression analysis. Prereq: 520 or consent of instructor.</td>
</tr>
<tr>
<td>524</td>
<td>Advanced Data Analysis (3) Applications of statistical data analysis in planning. Regression analysis, plus selected multivariate, non-parametric, and analytical graphic techniques. Use of computer packages for data analysis. Prereq: 521, 523 and consent of instructor.</td>
</tr>
<tr>
<td>526</td>
<td>Library Research for Planning (1) Survey of publications of interest to planners, resources and research techniques. Use of facilities and collections of library.</td>
</tr>
<tr>
<td>530</td>
<td>Planning Analysis and Forecasting (3) Methods of quantitative analysis and modeling in urban and regional studies. Population, employment, and economic base studies, forecasting techniques. Coreq: 520 or consent of instructor.</td>
</tr>
<tr>
<td>531</td>
<td>Urban and Regional Analysis (3) Past, present and possible future patterns of urban and regional structures drawing on contemporary theories, models, and empirical research.</td>
</tr>
<tr>
<td>532</td>
<td>Planning Methods (5) Preparation of comprehensive plans for urban areas or regions. Development of baseline data and forecasts, formulation of alternative plans and strategies, and development of plan implementation programs. Extensive laboratory experience. Prereq: 510, 520, 530 and 531 or consent of instructor.</td>
</tr>
<tr>
<td>537</td>
<td>Planning and Transportation (3) (Same as Civil Engineering 553.)</td>
</tr>
<tr>
<td>538</td>
<td>Urban and Site Design (3-6) Principles of design of residential subdivisions and some components of physical community, shopping centers, institutional complexes, central business districts. Problems of reviewing alternative designs against each other or written regulations. Extensive laboratory experience.</td>
</tr>
<tr>
<td>539</td>
<td>Planning for Historic Preservation (3) Planning for preservation, restoration, and conservation of state historic buildings, areas and sites as related to comprehensive planning process, National, state, and local government role in preservation, designation of sites, legislative needs, financing and administrative organizations.</td>
</tr>
<tr>
<td>540</td>
<td>Legal Aspects of Planning (3) Legal basis for planning and guiding community development. Legal tools of planning. Prereq: 510 or consent of instructor.</td>
</tr>
<tr>
<td>545</td>
<td>Planning and Property Development (2) Process of urban growth and change, functioning of private sector real estate development and its relationship to planning. Partnership roles of public and private sectors in urban development and redevelopment. Prereq: 510 or consent of instructor.</td>
</tr>
<tr>
<td>550</td>
<td>Economic Development Planning (3) Planning for economic change in industrial and organizational programs. Economic development planning process.</td>
</tr>
</tbody>
</table>
551 State and Regional Planning (3) Theory and practice of planning at state, sub-state, and metropolitan levels.

552 Development Planning in the Third World (3) Seminar on urban and regional development in Third World nations. Population growth, settlement patterns, economic development, land framework of integrated resource management. (Same as Ecology 552.)

553 Natural Resource Management and Environmental Assessment in Developing Nations (3) (Same as Ecology 537 and Botany 537.)

554 TVA, Planning and Development (3) Review and evaluation of U.S. national experiment in river basin planning and development, Tennessee Valley Authority.

555 Environmental Planning (3) Role of planners and planning in maintenance of balance between natural and built environment. (Same as Ecology 555.)

560 Policy Analysis and Strategic Planning (3) Models of policy making process and role of strategic planning and applied decision making. Quantitative and qualitative approaches, evaluative research and program evaluation, and impact assessment.

590 Practicum (6) Prereq: Consent of instructor. S/N or letter grade.

591 Special Topics (1-3) Prereq: Consent of instructor.

592 Readings in Planning (1-3) Prereq: Consent of instructor. May be repeated.

593 Problems in Planning (1-3) Prereq: Consent of instructor.

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Plant and Soil Science

(College of Agriculture)

**MAJOR**

Plant and Soil Science ........................................ M.S., Ph.D.

John E. Foss, Head

Professors:

Bell, Frank F. (Emeritus), Ph.D. ............ Iowa State

Coffey, D. L., Ph.D. ......................... Purdue

Conger, B. V., 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

Hoskinson, P. E., M.S. ....................... Tennessee

Josephson, L. M. (Emeritus), Ph.D. ......... Wisconsin

Mullins, C. A., Ph.D. ......................... Tennessee

Parks, William L. (Emeritus), Ph.D. ......... Purdue

Pickett, B. S. (Emeritus), Ph.D. ............. Michigan State

Reynolds, John H., Ph.D. .................... Wisconsin

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. (Emeritus), Ph.D. ............ Illinois

Winters, Eric (Emeritus), Ph.D. .......... Illinois

Associate Professors:

Allen, Fred L., Ph.D. ....................... Minnesota

Ammons, J. T., Ph.D. ....................... West Virginia

Deyton, D. E., Ph.D. ....................... NC State

Graveel, J. G., Ph.D. ....................... Purdue

Howard, D. D., Ph.D. ....................... Auburn

Krueger, W. A., Ph.D. ....................... Illinois

Lee, S. Y. (Adjunct), Ph.D. ................. Wisconsin

Lessman, Gary M., Ph.D. .................... Michigan State

Lewis, R. J., Ph.D. ......................... NC State

Miller, R. D., Ph.D. ......................... Kentucky

Reich, V. H., Ph.D. ......................... Iowa State

Rhodes, G. N., Jr., Ph.D. ................. NC State

Sams, C. E., Ph.D. ......................... Michigan State

Tyler, D. D., Ph.D. ......................... Kentucky

West, D. R., Ph.D. ......................... Nebraska

Wyatt, J. E., Ph.D. ......................... Florida

Assistant Professors:

Logan, Joanne, Ph.D. ....................... Nebraska

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 three areas: (1) soil and water management, (2) soil science, and (3) ornamental horticulture. Qualifying examination and approval are required by the student's advisory committee, before beginning graduate work.

The program requires writing a thesis based on original research. A minimum of 72 hours is required for the Master's degree program of which 6 credits must be Thesis 500. At least 14 credits must be taken in courses numbered above the 500 level. The student's advisory committee will consist of the major professor, who will act as chair-person 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 covering the thesis and graduate courses.

THE DOCTORAL PROGRAM

A minimum of 72 hours beyond the Bachelor's degree is required for the Master's degree program of which 6 credits must be Thesis 500. A minimum of 26 hours must be completed in courses numbered above 500 exclusive of doctoral research and dissertation, of which 6 must be in courses numbered above 600. A minimum of 9 hours of graduate course work taken during the doctoral program must be outside the department in one or more cognate areas.

The student and the major professor identify a doctoral committee composed of at least four faculty members holding the rank of assistant professor or above, three of whom, including the chair, must be approved by the Graduate Council to direct doctoral research. At least one member must be from outside the department. The committee must approve all coursework applied toward the degree, certify the student's mastery of the major field and any cognate fields, direct the research, and recommend the dissertation for approval and acceptance by the Graduate School.

**GRADUATE COURSES**

411 Soil Microbiology (3) Soil microbial population and role in soil ecosystem, microbial transformations of organic and inorganic compounds, decomposition of residues, dynamics of soil organic matter. Prereq: 210 and Chemistry 110 or 130 or consent of instructor.

412 Soil Genesis, Classification, and Mapping (3) Soil genesis and formation; observing and describing morphology of agricultural soils; chemical and physical properties, classification, mapping. Two Saturday field trips. Prereq: 210 or consent of instructor. 2 hrs and 1 lab. Sp.

413 Soil Chemistry (3) Principles concerning structure and chemical properties of soil materials; colloidal fraction as related to exchange, chemical equilibria, soil acidity, oxidation-reduction potential, nutrient availability and waste disposal. Prereq: 311 or consent of instructor. F.


431 Crop Physiology and Ecology (3) Principles of crop physiology and ecology as applied to crop production. Effects of environmental factors on physiological processes. Prereq: 230, Botany 321, 2 hrs and 1 lab. F.

432 Agricultural Climatology (3) Interactions between world, regional and local climates and agricultural systems; quantification of macro- and micro-climatic influences on plant and animal distributions and productivities. Prereq: 1 yr of physical or biological science. 2 hrs and 1 lab. F.

433 Agricultural Pesticides (3) Regulation of pesticide development, manufacture, transportation, marketing and use. Structure, use, mode of action, degradation and environmental impact of pesticides used in agriculture. F.

453 Principles of Plant Breeding (3) Genetic principles and techniques used in crop improvement. Prereq: Botol 250 or equivalent. 2 hrs and 1 lab. Sp.

471 Statistics for Biological Research (3) Application of techniques to interpretation of biological research. Notation, descriptive statistics, probability distributions, confidence intervals, 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 (1) Application of speaking, writing, and organizational skills in preparation and presentation of scientific material in both scientific and general audiences. Preparation of abstracts for scientific presentations. 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 during the faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N or E.


512 Pedology (3) Physical and chemical weathering processes, factors of soil formation, soil forming processes. Prereq: 412 or consent of instructor. 2 hrs and 1 lab. F.

514 Soil Physics (3) Physical and chemical relations among soil water, air, and mineral phases of soil; effects of macro-microclimatic conditions on crop growth; world climates, crop distribution and productivity, human cultures, and their interaction. Prereq: 471 or equivalent; 431 or equivalent, or Agricultural Climatology or equivalent. 2 hrs and 1 lab. F.

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 ecologies, and agricultural systems; quantification of macro- and microclimatic influences on crop growth; world climates, crop distribution and productivity, human cultures, and their interaction. Prereq: 471 or equivalent; 431 or equivalent, or Agricultural Climatology or equivalent. 2 hrs and 1 lab. F.

551 Advanced Plant Genetics (3) Discovery of genetic control in plants, induced mutations, genome
organization, polyploidy, tetrasomic inheritance, extra-
chromosomal inheritance, apomixis, incompatibility
systems, and genetic engineering of higher plants. Pre-
req: Biology 220. F.A

552 Quantitative Genetics (3) Genetic analysis of
continuous variation. Estimation of genetic variance and
heritability; selection theory and prediction of response
to selection. Prereq: 471, Biology 220. Sp,A

571 Design and Analysis of Biological Research (3)
(Same as Animal Science 571.)

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

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

601 Special Topics in Soil Science (1-3) Ther-
modynamics of soil solutions, clay structure and surface
chemistry, soil mineralogy, plant mineral nutrition, soil
microbiology, water movement and use by plants, soil
structure, soil thermal properties, interaction in the soil-
plant environment. May be repeated. Maximum 6 hrs. E

603 Special Topics in Crop Physiology and Ecology
(1-3) Micrometeorology of agroecosystems, crop dor-
mancy and responses to stress, physiology of crop
growth and reproduction. Interactions of physiology and
geology in crop production. Theory and application of
quantitative methods in crop physiology and ecology re-
search. May be repeated. Maximum 6 hrs. E

605 Special Topics in Plant Breeding and Genetics
(1-3) Genotype by environment interactions, estimation
of quantitative parameters, mutations, chromosome
behavior, genetic engineering, interspecific hybridization,
linkage, screening methods, genome organization.
May be repeated. Maximum 6 hrs. E

613 Advanced Soil Chemistry (3) Surface and colloid
chemistry of soil minerals; recent developments in ion
exchange, movement, surface charge, surface
complexation and soil colloidal stability. Prereq: 413 or
consent of instructor. F.A

631 Advanced Crop Physiology (3) Relationship of
photosynthesis and evapotranspiration. Hardiness and
stress tolerance. Nitrogen fixation. Synthetic and degra-
dative processes in maturation, ripening, and senes-
cence. Preharvest and post-harvest factors affecting quality
of stored plant products. Prereq: 431 or 432. 3 hrs and 1
lab. F.A

633 Plant Growth Control and Herbicide Action (3)
Principles of uptake, translocation, mode of action and
uses of herbicides and plant growth regulators, and their
effects on plant morphology, metabolic systems and
enzymatic activities. Practical aspects and current
commercial uses of plant growth regulators. Prereq: Botany
521 and 522 or equivalent. F.A

653 Advanced Plant Breeding (4) Development and
utilization of concepts of quantitative parameters, in-
breeding, heterosis, methods of selection, in vitro breed-
ing, interspecific hybridization, stability parameters,
genetic resistance and vulnerability to pests and envi-
ronmental stresses. Prereq: 453 or 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 re-
sources and emphasizing experimental design and sta-
tistical techniques. Prereq: 571, Animal Science 572,
Statistics 461i, or equivalent. (Same as Animal Science
671.) F.A

Political Science

(College of Liberal Arts)

MAJORS

Political Science .......... M.A., Ph.D.
Public Administration .......... M.P.A., J.D.-M.P.A.

DEGREES

M.A., Ph.D. ......... M.P.A., J.D.-M.P.A.
M.S.S.W.-M.P.A.

Michael Gant, Head

Professors:

Carlsile, D. H. (Emeritus), Ph.D. North Carolina
Fitzgerald, Michael R., Ph.D. Oklahoma
Gorman, Robert A., Ph.D. New York
Hopkins, Anne H., Ph.D. Syracuse
Iredell, Vernon R., Ph.D. Chicago
Lyons, William, Ph.D. Oklahoma
Plais, Hyram, Ph.D.
Robinson, Nelson M. (Emeritus), Ph.D.
Smith, T. Alexander, Ph.D. Ohio State
Stephens, Otis H. (Distinguished Prof.), Ph.D.
Hopkins, John D., Ph.D.
Ohio State
Ungs, Thomas D., Ph.D. Iowa
Welborn, David M., Ph.D.
Texas

Associate Professors:

Cunningham, Robert B., Ph.D. Indiana
Evans, G. C., Ph.D. Columbia
Fieman, William, Ph.D. Harvard
Freeman, Patricia K.
Garber, I. Jay, Ph.D. Wisconsin
Gant, Michael M., Ph.D. Michigan State
Gibbs, Robert, Ph.D. Yale
Scheb, John M., Ph.D. Florida
Simpson, T. McN., Ph.D. Johns Hopkins

Assistant Professors:

Allende, Juan Augustin, Ph.D. ......... North Carolina
Foiz, David H., Ph.D. Tennessee

The Department of Political Science offers the M.A., M.P.A., and Ph.D. The department also offers a dual program with the College of Law. Inquiries concerning all programs should be directed to the departmental office.

ADMISSION REQUIREMENTS

Three departmental recommendation forms must be submitted to The 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 average of 3.0 is also required together with an average of 3.2 in the last two years of political science or social science. In addition, a composite score of at least 1100 on the verbal and quantitative parts of the GRE is normally required.

Students pursuing the Master of Arts degree may follow one of two options:

Thesis Option: (30 hours) Coursework, preparation of a thesis, and an oral examination on coursework and the thesis, is required. At least 12 of these hours must be in political science, with 6 in the field of methodology (Political Science 510 and 512). Six hours may be earned through thesis credit.

Non-Thesis Option: (36 hours) Coursework, plus a written comprehensive examination on all coursework is required. At least 12 of these hours must be in political science, with 6 in the field of methodology (Political Science 510 and 512), and 3 hours in the 600-level research seminar in the student's first field of interest.

THE MASTER OF PUBLIC ADMINISTRATION PROGRAM

The M.P.A. program is intended to prepare students for public service careers by acquainting them with management principles, analytical tools, and the ethical dilemmas they will face as public administrators. It consists of a total of 56 semester hours, including a core program, an elective specialization, and a recommended internship.

Applicants for admission to the program must have a Bachelor's degree or its equivalent. Normally, an overall average of 3.0 and an average of 3.2 in the last two years of political science or social science courses is required. In addition, a composite score of at least 1100 on the verbal and quantitative parts of the GRE is normally required.

The M.P.A. is a non-thesis program. Specific requirements include the following:

1. Core - 21 hours:
   b. General perspectives - elective courses (3 hours). 556 Policy Analysis; 558 The Politics of Administration.
   c. Analytical skills (6 hours). 512 Quantitative Political Analysis; 514 Research and Methodology in Public Administration.
   d. Management skills (6 hours). Choose two of the following: 560 Public Budgeting and Finance; 562 Public Management; 564 Human Resources Management in Public Organizations.

2. Specialization - 9 hours.

A specialization is designed by the student in consultation with the coordinator of the M.P.A. program. Possible specializations include general government, public health, budgeting and finance, planning, natural resources, program evaluation, criminal justice, public relations, personnel, and others.

3. Recommended internship with a public agency - 6 hours.

Internships are arranged in consultation with the coordinator of the M.P.A. program.

4. A written final examination, which may be followed by an oral examination, is required.

DUAL J.D.-M.P.A. PROGRAM

The College of Law and the Department of Political Science in the College of Liberal Arts offer a coordinated dual degree program leading to the conferment of both the Doctor of Jurispru-
dence 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 applications and, if 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
Curriculum

A dual degree candidate must satisfy the requirements for both the J.D. and the M.P.A. degrees, as well as the requirements for the dual program. The College of Law will award a maximum of 9 semester hours of credit toward the J.D. degree for successful completion of approved graduate level courses (500 or 600 level) offered in the Department of Political Science. The M.P.A. program will award a maximum of 9 semester hours of credit toward the M.P.A. degree for successful completion of an approved course offered in the College of Law. All courses for which such cross-credit is awarded must be approved by the J.D.-M.P.A. coordinators in the College of Law and the Department of Political Science. All candidates for the dual degree must successfully complete Administrative Law (Law 821) and are encouraged to take Local Government (Law 824). An internship is strongly recommended for students in the dual degree program, as it is for all M.P.A. candidates, but an internship is not required.

During the first two years in the dual program, students will spend one academic year completing the required first year of the College of Law curriculum and one academic year taking courses solely in the M.P.A. program. During those first two years, students may not take courses in the opposite area, without the approval of the J.D.-M.P.A. coordinators in both academic years. Students are strongly encouraged to take both law and political science courses each semester.

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 may qualify for credit without regard to the dual program.

Awarding of Grades

For grade recording purposes in the College of Law and the Department of Political Science, grades awarded in courses in the other unit will be converted to either Satisfactory or No Credit and will not be computed in determining a student’s GPA or class standing. The College of Law will award a grade of Satisfactory for an approved M.P.A. course in which the student earns a grade of B or higher and a grade of No Credit for any lower grade. The Political Science Department will award a grade of Satisfactory for an approved law course in which the student earns a grade of 2.0 or higher and a grade of No Credit for any lower grade. The official academic record of the student maintained by the Registrar of the University shall show the actual grade assigned by the instructor without conversion.

THE DOCTORAL PROGRAM

The Ph.D. program prepares students for careers in college teaching, as well as careers in other occupations related to service in the public or private sectors. Applicants for admission to the program should normally have completed a Master’s degree in political science or a related field with a 3.0 GPA (3.5 for international students) and have earned a composite score of at least 1100 on the verbal and quantitative parts of the Graduate Record Examination (GRE).

Students admitted to the program must complete 78 hours of course work beyond the Bachelor’s degree, must successfully pass written and oral comprehensive examinations in three broad subfields of political science, and must pass a final oral examination on the dissertation.

In addition, students must satisfy a research tool requirement. This requirement may be satisfied either by demonstrating competency in one foreign language, or by completing 12 hours of coursework, numbered 500 or above, in empirical methodology.

In addition to the total hours required for the degree, the following requirements must also be met:
1. At least 63 hours must be in political science courses.
2. At least 48 hours in political science courses must be in courses numbered 500 or above.
3. Completion of Political Science 510 and 512.
4. At least 6 hours must be earned in political science courses numbered above 600, exclusive of dissertation hours.
5. A total of 24 hours must be earned by writing the dissertation.

GRADUATE COURSES

410 Special Topics in United States Government and Politics (3) May be repeated with consent of depart- ment. Maximum 6 hrs.
420 Political Attitudes and Opinions (3) Nature, formation, development, and dissemination of politically relevant attitudes and opinions in American political system.
421 Political Parties and Interest Groups (3) Examina- tion of role of political parties and organized groups in American politics and government.
422 Political Campaigns and Elections (3) Analysis of nature of campaigns and elections in American political process.
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.
440 Public Management and Human Resources (3) Mobilization and management of technical and human resources in pursuit of public sector organization goals.
441 Budgetary Process and Financial Management (3) Fiscal planning, budget and expenditure processes in government, their policy and administrative implications.
442 Administrative Law (3) Legal dimensions of admin- istrative power and procedures, and constitutional con- trols 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.
460 Revolution (3) Examination of characteristics, theories, and consequences of revolution with particular focus on left-wing revolutions and movements.
461 Policy Making in Democracies (3) Comparative approach to theory and process of making public poli- cies.
463 Contemporary Middle East Politics (3) Gov- ernments and movements in Middle East, their charac- teristics, bases, and interrelationships.
464 Special Topics in Comparative Government (3) May be repeated with consent of department. Maximum 6 hrs.
469 Soviet Foreign Policy (3) Overview of Soviet international behavior since 1917 and examination of selected problems of Soviet foreign policy post World War II.

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 for the student not otherwise registered during any faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N/C only. E


513 Quantitative 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.

530 Topics in 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.

538 Urban Politics and Administration (3) American urban political structure and processes; expansions of municipalities; limitations on governmental action: questions of structure, role, and administrative choice. May be repeated with consent of department. Maximum 9 hrs.

540 Public Law (3) Selective examination of published research and current approaches in subfields of constitutional law, judicial process, and judicial behavior. May be repeated with consent of department. Maximum 9 hrs.

546 Law and the Administrative Process (3) Constitutional position; decisional processes, regulation and management conflicts; limitations on governmental action: questions of structure, role, and administrative choice. May be repeated with consent of department. Maximum 9 hrs.

550 Political Administration (3) Overview of public administration theory and function.

552 Organization Theory (3) Appraisal of major theories of organization and their applicability to public sector.

556 Policy Analysis (3) Role of administrators in policy analysis and decision making. May be repeated with consent of department. Maximum 9 hrs.

558 The Politics of Administration (3) Examination of public administration in context of American political system, policy making and political roles of public administrators and agencies. May be repeated with consent of department. Maximum 9 hrs.

560 Public Budgeting and Finance (3) Technical and political aspects of planning, preparing and adopting government budgets. Management implications of revenue collection, debt management, treasury function, accounting, internal auditing, purchasing risk management, post-auditing.

562 Public Management (3) Interpersonal and leadership skills, techniques and methods for planning, decision making, and implementation of management strategies in public sector. May be repeated with consent of department. Maximum 9 hrs.


566 Ethics, Values, and Morality in Public Administration (3) Moral-ethical-value dilemmas confronting administrators in American political system.

569 Internship in Public Administration (3-9) Open to students participating in approved internship programs. May be repeated with consent of department. Maximum 9 hrs. S/N/C only.

570 Comparative Government and Politics (3) Selected problems in modern governments. May be repeated with consent of department. Maximum 9 hrs.

572 The Politics of Development (3) Selected topics dealing with political problems of less developed countries. May be repeated with consent of department. Maximum 9 hrs.

574 Area Seminar in Comparative Government and Politics (3) Selected topics in area studies: African, Asian, Latin America, Middle East, Soviet Union and Eastern 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 page 31.

592 Off-Campus Study (1-15) See page 31.

593 Independent Study (1-15) See page 31.

595 Readings and Special Problems in Political Science (1-3-3) Prereq: Consent of instructor. May be repeated with consent of department. Maximum 9 hrs.

596 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.

620 Special Topics in Political Theory (3) Research into selected topics. May be repeated with consent of department. 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.

631 Topics in Parties and Elections (3) Analysis of party systems and electoral behavior. May be repeated with consent of department. Maximum 9 hrs.

634 Topics in American National Institutions (3) Deals with congress, executive or related subjects. May be repeated with consent of department. Maximum 9 hrs.

636 Comparative State Politics (3) Government and political processes of fifty states: general and particular characteristics. May be repeated with consent of department. Maximum 9 hrs.

640 Special Topics in U.S. Constitutional Law (3) Systematic analysis of published research and judicial decision: development of constitutional law as major component of public policy. May be repeated with consent of department. Maximum 9 hrs.

642 The Politics of Criminal Justice (3) Selective examination of contemporary problems of research and public policy formulation: criminal process; law enforcement; administration; criminal court administration; and prison administration. May be repeated with consent of department. Maximum 9 hrs.

654 Contemporary Public Policies (3) Problems in one or more public policy areas from political and administrative perspectives. Topics selected by instructor. May be repeated with consent of department. Maximum 9 hrs.

667 Comparative Public Administration (3) Comparison of policy-making structures and public policies in selected countries. May be repeated with consent of department. Maximum 9 hrs.

668 Special Topics in Public Administration (3) Analysis of selected issues and problems in public administration. May be repeated. Maximum 9 hrs.

670 Special Topics in Comparative Government and Politics (3) Research into selected topics. May be repeated with consent of department. Maximum 9 hrs.

682 Theory and Analysis of U.S. Foreign Policy Processes (3) Theoretical approaches to decision making in foreign policy area and analysis of policy-making process. May be repeated with consent of department. Maximum 9 hrs.

688 Special Topics in International Politics (3) Selected issues and problems in international politics. Specific content determined by instructor. May be repeated with consent of instructor. Maximum 9 hrs.

Polymer Engineering

See Materials Science and Engineering

Psychology

(College of Liberal Arts)

MAJOR DEGREES

Psychology Psychology

MA, Ph.D.

Howard R. Polio, Acting Head

Professors:

Burgard, Gordon M., Ph.D. ............... Chicago
Burstein, Alvin G., Ph.D. ................. Chicago
Calhoun, William H., Ph.D. .............. California
Cohen, Charles P., Ph.D. ................. Kansas
Cureton, Edward E. (Emeritus). Ph.D. .... Columbia
Fine, Harold J. (Emeritus), Ph.D. ........ Syracuse
Fowler, Raymond D. (On Leave). Ph.D. .... Penn State
Handel, Stephen J., Ph.D. ................. Johns Hopkins
Handler, Leonard, Ph.D. ................. Michigan State
Lawler, James E., Ph.D. ......... North Carolina
Lounsbury, John W., Ph.D. .............. Michigan State
Lubier, Joel F., Ph.D. ........ .......... Chicago
Malone, John C., Ph.D. ................. Duke
Newton, Kenneth R. (Emeritus). Ph.D. .... Tennessee
Pollio, Howard R. (Distinguished Prof.). Ph.D. ................ Michigan
Samejima, Fumio, Ph.D. ................. Keio
Shraday, Raymond R. (Emeritus). Ph.D. .... Michigan
Sundstrom, Eric D., Ph.D. .............. Utah
Verplanck, William S. (Emeritus), Ph.D. .... Brown
Wahl, Robert G., Ph.D. ................. Washington
Wiberley, J. Albert, Ph.D. .............. Syracuse

Associate Professors:

Coleman, Lerita (On Leave), Ph.D. ...... Harvard
Johnson, Michael G., Ph.D. .......... Johns Hopkins
Lawler, Kathleen A., Ph.D. ......... North Carolina
McIntyre, Anne, Ph.D. ................ Yale
Morgan, Wesley G., Ph.D. ............. Tennessee
Saudargus, Richard S., Ph.D. ......... Florida State
Travis, Cheryl B., Ph.D. .............. California (Davis)

Assistant Professors:

Baldwin, Debora R., Ph.D. ............ Kent State
Hopson, Ronald E., Ph.D. .............. Michigan State
Nash, Michael R., Ph.D. ............... Ohio
THE MASTER'S PROGRAM

Graduate study leading to the Master of Arts in general psychology is normally available only to students who have completed the doctoral program in psychology. Requirements are (1) a score of at least 630 on the GRE in psychology; (2) at least 30 hours of graduate-level courses in psychology; and (3) a Master's thesis based on 6 hours of Thesis 500. A non-thesis Master's degree is available with the approval of the student's supervisory committee upon successful completion of a total of at least 36 hours in graduate-level courses in psychology and a final written examination.

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 general psychology or clinical psychology. The doctoral program with a concentration in ethology or physiology is offered through the Life Sciences Program. Doctoral study in industrial and organizational psychology is offered through the Intercollegiate Program in Industrial and Organizational Psychology, to which application is made through the Department of Management.

Departmental Requirements

All students in the doctoral program in psychology must obtain a score of at least 630 on the GRE in psychology by the end of the first year, and all students must pass the departmental general psychology examination (a comprehensive, two-day essay exam offered twice each year) by the end of the second year. In addition, each student must pass the doctoral comprehensive examination, complete an acceptable doctoral dissertation, and conduct a satisfactory oral defense of the dissertation. All doctoral students must complete a minimum of 78 hours of graduate-level courses, including courses required by their program; at least 6 hours in courses outside of psychology; and at least 24 hours of dissertation research (Psychology 600).

General Psychology

This program allows students to select from a variety of specializations oriented toward current research in psychology and in psychology in academic, institutional, or industrial settings. The program is highly flexible and individualized and seeks to provide a professional apprenticeship. Specializations include behavioral medicine and health psychology, child and adolescent development, cognitive and symbolic processes, conditioning and learning, ethology, existential phenomenology, psychometrics, psychophysiology, social psychology, and others. Requirements of the program are as follows:

1. Statistics 337-338, or equivalent, and two additional courses numbered above 300 in research methodology, quantitative methods, statistics, or psychometrics.
2. Competence in general psychology, demonstrated by completing Psychology 513 (Foundations of Psychology) or Psychology 420 (History and Systems of Psychology) or equivalent, plus at least one course or sequence equivalent from each of four categories in the following list. (This requirement may be met by passing approved written examinations.)
   a. Biological psychology: 461-469 Physiology of the Nervous System and Behavior Laboratory; 526 Neuroanatomy; 527 Behavioral Neurology.
   d. Developmental psychology: 511 Developmental Psychology; 512 Life-Span Development; 574 Child Psychopathology.
   e. Individual differences and personality: 445 Methods of Research and Testing; 476 Theories of Personality.

Research practicum (509) - research apprenticeship involving participation in the ongoing research of two different members of the faculty during the first two semesters in the program.

4. Pre-dissertation research project completed during the second year, involving the collection of original data or original analysis of existing data, reported in publishable form and acceptable to the doctoral supervisory committee.

5. At least 4 graduate seminars in psychology numbered above 600.

Clinical Psychology

This program is designed to lay the groundwork for a career as a clinical psychologist capable of working in both academic and applied settings. The program emphasizes the theoretical foundation of psychology as well as supervised experience oriented toward the development of practical skills. The program embodies the scientist-practitioner model of clinical psychology. Requirements are as follows:

1. Apprenticeship with one faculty member during the first year, one day each week.
2. Pre-dissertation research project completed before forming a doctoral supervisory committee, reported in written form acceptable to the student's faculty advisor and the director of clinical training.
3. Supervised clinical placement two days (16 hours) each week during the second, third, and fourth years.
4. Satisfactory completion of listed courses (or equivalents) in the following nine categories:
   a. Foundations of Psychology (513);
   b. Measurement and Testing (445);
   c. Personality Theory and Research (570-71);
   d. Lifespan Development (512);
   e. Statistics and research methods (504, 505, 506).
   f. Psychopathology (572, 573, 574);
   g. Psychological Assessment (594-595, 596);
   h. Psychotherapy (670, 671, 673, 675);
   i. Ethical, Legal, and Professional Issues (635).
5. Satisfactory completion of at least 3 additional graduate-level courses in the clinical topics in psychology.
6. Satisfactory completion of a one-year clinical internship at a site approved by the program.

GRADUATE COURSES

400 Cognitive Psychology: Language and Symbolic Processes (3) Psychology 437-438
459 Psycholinguistics (3) Psychology 437-438
461 Physiological Psychology (3) Neuroanatomy, neurophysiology, and the psychological functions of the nervous system. Prerequisites: Psychology 440, 491, 492, and 493 combined may apply toward undergraduate major.
470 Theories of Personality (3) Survey of major theories of personality and their development. Prerequisites: 200 and 300 or 330.
475 Theories of Learning (3) Classical and current approaches to learning and cognition. Prerequisite: 310.
492 Special Topics in Psychology (3) Intensive analysis of special topics: Afro-American psychology or evaluation of programs in community. Prerequisite: 440, Psychobiological or Behavior and Experience: Humanistic Psychology and at least 9 hrs in 300-level courses in Psychology. Prerequisite: 440, Psychological Methods in Psychology or Methods of Research in Psychology. May be repeated. Maximum 6 hrs.
492 Special Topics in Psychology (3) Intensive analysis of special topics: Afro-American psychology or evaluation of programs in community. Prerequisite: 440, Psychobiological or Behavior and Experience: Humanistic Psychology and at least 9 hrs in 300-level courses in Psychology. Prerequisite: 440, Psychological Methods in Psychology or Methods of Research in Psychology. May be repeated. Maximum 6 hrs.
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492 Special Topics in Psychology (3) Intensive analysis of special topics: Afro-American psychology or evaluation of programs in community. Prerequisite: 440, Psychobiological or Behavior and Experience: Humanistic Psychology and at least 9 hrs in 300-level courses in Psychology. Prerequisite: 440, Psychological Methods in Psychology or Methods of Research in Psychology. May be repeated. Maximum 6 hrs.
492 Special Topics in Psychology (3) Intensive analysis of special topics: Afro-American psychology or evaluation of programs in community. Prerequisite: 440, Psychobiological or Behavior and Experience: Humanistic Psychology and at least 9 hrs in 300-level courses in Psychology. Prerequisite: 440, Psychological Methods in Psychology or Methods of Research in Psychology. May be repeated. Maximum 6 hrs.
505 Research Design (3) Techniques for planning and conducting research in controlled and natural settings: experiments, quasi-experiments, observational studies, surveys, and program-evaluations. Development of questions and hypotheses for study. Design of studies to maximize validity. Prereq: Consent of instructor.

506 Readings and Special Issues in Psychology (1-3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

509 Research Practicum (1-3) Required of first-year graduate students in psychology. May be repeated. Maximum 9 hrs. S/N only.

510 Topics in Psychology (3) Intensive examination of selected issues in psychology. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

511 Developmental Psychology (3) Normal processes of human socialization; physical, cognitive, and emotional development from conception through infancy, childhood, and adolescence. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

512 Life-Span Development (3) Theories and research concerning normal human development throughout life, adulthood and old age. Prereq: Consent of instructor.

513 Foundations of Psychology: Biological Factors, Perception, Learning, Thinking, Motivation (4) Intensive study. Prereq: Consent of instructor.

514 Colloquium in Ethology (1) Current research and theory. May be repeated. Maximum 9 hrs. (Same as Zoology 516.) S/N only.

515-18 Proseminar in Industrial and Organizational Psychology (3,3) (Same as Management 567-568.)

520 Interventions for Behavioral Change (3) Principles and techniques for planning, implementing, and evaluating interventions derived from social learning theory. Prereq: knowledge of community: teachers or supervisors. Token economics and strategies for self-control. Prereq: Consent of instructor.

525 Laboratory Techniques and Instrumentation (3) Procedures for laboratory research involving human and nonhuman organisms. Techniques for collecting, transforming, storing, and retrieving data using microcomputers. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

526 General Vertebrate Neuroanatomy (3) Lecture and laboratory. Structure and functioning of central and peripheral nervous system. Prereq: 461, 469, or equivalent and consent of instructor. (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 principles of teaching psychology at college and/or university level. Supervised practice. Prereq: Consent of instructor. S/N only.


545 Advanced Animal Behavior (3) (Same as Zoology 545.)

546 Ethological Psychology (3) Basic ethology and comparative psychology. Implications for human behavior. Prereq: Consent of instructor.

549 Internship in School Psychology (1-6) (Same as Educational and Counseling Psychology 549.)

550 Social Psychology (3) Survey of theory and research concerning interpersonal interaction and individual behavior in social context. Prereq: Consent of instructor.

555 Psychometrics (3) Basic concepts: factor analysis, scaling, test theories, probability models and their applications, computerized adaptive testing and other topics. Prereq: Statistics 537-538 or equivalent. May be repeated. Maximum 6 hrs.


557 Applied Psychological Measurement (3) Issues and techniques in applying psychological measurement in organizational, clinical, and community research. Prereq: Statistics 537-538 or equivalent or consent of instructor. May be repeated. Maximum 6 hrs.

560 Psychology of Learning (3) Review of current evidence from research involving human and nonhuman animals. Prereq: 400 and consent of instructor. May be repeated. Maximum 6 hrs.

570 Personality: Theory and Research I (3) Advanced survey of personality and neo-Freudian approaches to personality; related research. Prereq: 470 or equivalent.

571 Personality: Theory and Research II (3) Advanced survey of behavioral and humanistic approaches to personality; related research. Prereq: 470 or equivalent.

572 Descriptive Psychopathology (3) Diagnostic criteria of the DSM-III. Examples from written case-histories and recorded interviews. Prereq: Admission to doctoral program in clinical psychology or consent of instructor.

573 Dynamics of Psychopathology (3) Psychodynamic view of the causes and symptoms of major psychoses, neuroses, and adjustment disorders. Prereq: Admission to doctoral program in clinical psychology or consent of instructor.

574 Atypical Development in Childhood (3) Research on etiologies of atypical patterns of development in infancy and childhood. Prereq: 511 and consent of instructor. Maximum 6 hrs.

576 Object Relations (3) European and American conceptions of normal and psychopathological development of object relations. Significance for psychotherapy. Prereq: Consent of instructor. Prereq: Admission to doctoral program in clinical psychology or consent of instructor.

578 Clinical Aspects of Human Sexuality (3) Variation in human sexual behavior. Theories of etiology, treatment. Prereq: Consent of instructor.

585 Seminar in Gerontology (1) (Same as Human Ecology 585, Educational and Counseling Psychology 585, Nursing 585, Public Health 585, Physical Education 585, Social Work 585, and Sociology 585.)

591 Foreign Study (1-15) See page 31.

592 Off-Campus Study (1-15) See page 31.

593 Independent Study (1-15) See page 31.

594 Psychological Assessment I (3) Basic concepts and techniques of adult assessment: intelligence tests and personality tests. Prereq: Admission to doctoral program in clinical psychology or consent of instructor.

595 Psychological Assessment II (3) Basic concepts and techniques of adult assessment: intelligence tests and personality tests. Prereq: Admission to doctoral program in clinical psychology and 594 or consent of instructor.

596 Laboratory in Psychological Assessment (1) Prereq: Admission to doctoral program in clinical psychology or consent of instructor. Coreq: 594 or 595. May be repeated. Maximum 4 hrs. S/N only.

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.

605 Seminar in Research and Quantitative Methods (3) Prereq: 505, Statistics 537-538 or equivalent, or 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.

615 Seminar in Behavioral Neuroscience (3) Prereq: 461, 469, and consent of instructor. May be repeated. Maximum 12 hrs.


620 Seminar in Social and Organizational Psychology (3) Prereq: 440 or 550 and 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.

624 Seminar in Psychometrics (3) Prereq: 555 or consent of instructor. May be repeated. Maximum 9 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) (Same as Educational and Counseling Psychology 635.)

638 Current Topics in Industrial/Organizational Psychology (3) (Same as Management 638.)

661 Advanced Psychometrics (3) Construction and standardization of psychological tests, questionnaires, rating scales; theory of errors of measurement; item analysis, scaling, equating, and development of norms; latent trait models; factor analysis; and other topics. Prereq: 555 or consent of instructor. May be repeated. Maximum 9 hrs.

668 Seminar in Psychopathology (3) Prereq: Admission to doctoral program in clinical psychology or consent of instructor. May be repeated. Maximum 12 hrs.

670 Psychodynamic Psychotherapy I (3) Theories and principles. Prereq: Admission to doctoral program in clinical psychology or consent of instructor.

671 Psychodynamic Psychotherapy II (3) Theories and principles. Prereq: Admission to doctoral program in clinical psychology and 670 or consent of instructor.

673 Laboratory in Psychotherapy (2) Prereq: Admission to doctoral program in clinical psychology or consent of instructor. Coreq: 670 or 671. May be repeated. Maximum 6 hrs. S/N only.

674 Group Psychotherapy (3) Theory and practice. Prereq: Admission to doctoral program in clinical psychology or consent of instructor. May be repeated. Maximum 6 hrs.

675 Inference in Psychology (3) Uses of actuarial data for assessment of strategies and tactics in psychotherapy. Prereq: Admission to doctoral program in clinical psychology or consent of instructor.

676 Special Techniques in Psychotherapy (3) Prereq: Admission to doctoral program in clinical psychology or consent of instructor. May be repeated. Maximum 12 hrs.

679 Hypnosis and Imagination (3) Demonstration and practice of hypnotic induction. Survey of clinical applications of hypnosis and imagery. Prereq: Admission to doctoral program in clinical psychology or consent of instructor.

680 Seminar 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.
Religious Studies

(College of Liberal Arts)

Charles H. Reynolds, Head

Professors:

Dungan, David L., Th.D. .................. Harvard
Humphreys, W. Lee, Ph.D. ............... Union
Linge, David E., Ph.D. .................... Vanderbilt
Lusby, F. Stanley, M.Div. ............... Colgate Rochester
Norman, Ralph V., Jr., Ph.D. .......... Yale
Reynolds, Charles H., Ph.D. .......... Harvard

Associate Professors:

Fitzgerald, James L., Ph.D. ............. Chicago
Gwynne, Rosalind W., Ph.D. ............ Chicago
Hodges, John O., Ph.D. ................. Chicago
Levering, Mirm L., Ph.D. ............... Harvard

Assistant Professors:

Ehrlich, Linda C., Ph.D. ............... Hawaii
Hackett, Rosalind L., Ph.D. .......... Aberdeen

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 Moksha Tradition (3) Investigation of selected writings and philosophic problems of traditions of Samkhya, Yoga, Vedanta, Buddhism, or Jainism. Prereq: 374 or 376 or consent of instructor. (Same as Philosophy 412.)

416 Jesus and Paul Compared (3) Central ideas and concepts of each person compared with equivalent concepts in the other. Advanced study of Gospels and Epistles of Paul, involving extensive independent research.

425 Seminar in Western Religions (3) Selected figures, themes, movements, and problems. Content varies. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

430 Seminar in American Religion (3) Selected figures, themes, movements, and problems. Content varies. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

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 Proseminar in Religious Studies (3) For advanced students in religious studies; required for majors. Selected specific topics: nature and function of myth in religion, problem of evil, transcendence, theories of religion, hermeneutics, integrating various disciplines involved in study of religion. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

531 Topics in Religion and Society (3) Prereq: Consent of instructor.

532 Topics in the History of Religions (3) Prereq: Consent of instructor.

544 Applied Ethical Theory (3) (Same as Philosophy 544.)

566 Topics in U.S. Religious History (3) Research in methods and sources for investigating United States religious history. Prereq: 351, 353, 355, 430, or consent of instructor. May be repeated. Maximum 6 hrs. (Same as History 566.)

570 Philosophy of Religion (3) (Same as Philosophy 570.)

591 Foreign Study (1-15) See page 31.

592 Off-Campus Study (1-15) See page 31.

593 Independent Study (1-15) See page 31.

Romance Languages

(College of Liberal Arts)

MAJORS

French ........................................ M.A.
Spanish ........................................ M.A.
Modern Foreign Languages ........ Ph.D.

John B. Romeiser, Head

Professors:

Barrett, Paul E., Ph.D. ............... California
Brady, Patrick, Ph.D. ............... Sorbonne
Cobb, Carl W., Ph.D. ............... Tulane
Elliott, Jacqueline C., M.A. ....... Illinois
Handelman, Michael H., Ph.D. .... Florida
Helfin, William H., Ph.D. ........... Florida
Irving, Thomas B. (Emeritus), Ph.D. .... Princeton
Maurino, Ferdinando D. (Emeritus), Ph.D. .... Columbia
Petrowska, Marija, Ph.D. ........... Kentucky
Pinsky, Clara (Emeritus), Ph.D. .... California
Romaier, Charles B., Ph.D. ......... Vanderbilt
Vazquez-Bigi, A. M. (Emeritus), Ph.D. .... Minnesota
Wallace, Albert H., Ph.D. ........... North Carolina
Washburn, Yulan M., Ph.D. ......... North Carolina

Associate Professors:

Campion, Edmund J., Ph.D. ............ Yale
DeRycke, Robert M., Ph.D. ............ Illinois
DiMarino, Salvatore, Ph.D. .......... Wisconsin
DiPuccio, Denise M., Ph.D. ......... Kansas
Duncan, Cynthia K., Ph.D. .......... Illinois
Levy, Karen D., Ph.D. ................. Kentucky
Rivera-Rodas, Oscar, Ph.D. ......... California

Assistant Professors:

Brizzi, Flavia, Ph.D. ................. Washington
Cazenave, Odile, Ph.D. ............. Penn State
Holmlund, Christine, Ph.D. .......... Wisconsin
Milleret, Margo, Ph.D. ............. Texas
Rodriguez, Alberto, Ph.D. ......... Brown
Young, Dolly, Ph.D. ................. Texas

The Department of Romance Languages offers two advanced degrees: the Master of Arts in French and in Spanish and the Doctor of Philosophy in Modern Foreign Languages. Inquiries should be addressed to the head of the department. The head, through the coordinators of Spanish and French, will make available further departmental requirements, regulations, and materials not listed below.

THE MASTER'S PROGRAM

Thesis Option

1. Completion of a minimum of 24 semester hours in coursework plus at least 6 hours in course 500. In French, 501 is required; in Spanish, 550. A maximum of 6 hours may be taken at the 400 level, the rest at the 500 level, and under certain conditions the student may take 600-level seminars. If the student chooses to have a minor (such as Italian or Portuguese), at least 24 hours (including 6 hours of thesis) must be taken in the major, 6 in the minor.

2. A thesis, with a minimum of 6 semester hours in course 550.

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
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 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 Residency Assistant in the Office of Graduate Admissions and Records.

## French

### GRADUATE COURSES


411 French Literature of the 16th Century (3) Highlights of 16th-century French literature. Excerpts from Rabelais and Montaigne; readings of poems from writers from Lyon and members of Pèleride. Prereq: 212, 218 or equivalent.


413 French Literature of the 18th Century (3) Major works of Enlightenment. Prereq: 212, 218 or equivalent.


416 Survey of Francophone Literature (3) Writing in French outside of France. 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 language. 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: 212, 218 or equivalent. 2 hrs weekly and general courses in Latin and Greek required no knowledge of these

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 an equivalent of an undergraduate major in one of them.

**Requirements for the Ph.D.**

A candidate must complete a minimum of 63 semester hours of course work beyond the Bachelor's degree in addition to 24 hours of doctoral research and dissertation. The program consists of a first concentration, a second concentration, and 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 12 hours at the 500 level (exclusive of thesis hours) including French 504 (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).

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 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.

4. **Additional Requirements**: A student must demonstrate competence in languages of both his/her 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 measures 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
### Italian

**GRADUATE COURSES**

401 Dante and Medieval Culture (3) Introduction to significance of this 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 Pico to Tasso, Quattrocento 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)

510-11 Readings in Italian Literature (3,3) Topics vary. May be repeated with consent of department.

512-13 Special Topics (3,3) Topics vary. May be repeated with consent of department.

591 Foreign Study (1-15) See page 31.

592 Off-Campus Study (1-15) See page 31.

593 Independent Study (1-15) See page 31.

### Portuguese

**GRADUATE COURSES**

431-32 Directed Readings in Brazilian and Portuguese Literature (3,3) May be repeated with consent of instructor.

591 Foreign Study (1-15) See page 31.

592 Off-Campus Study (1-15) See page 31.

593 Independent Study (1-15) See page 31.

### Spanish

**GRADUATE COURSES**

421 Phonetics (2) Prereq: 212, or 218 or equivalent.

422 Advanced Grammar (3) Finer points of grammatical structures. Required of all majors. Native speakers must receive consent of instructor. Prereq: 212, 218 or equivalent.

423-24 Advanced Conversation and Composition (3,3) Advanced conversational and written skills in Spanish for professionals.

426 Introduction to Descriptive Linguistics (3) (Same as French 426, German 425, Russian 428, 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: 311, 312 or equivalent.

432 Cervantes (3) Selections from Don Quixote and study of shorter Novelas ejemplares. Prereq: 311, 312 or equivalent.

433 Masterpieces of Spanish Literature (3) Selections from both Golden Age and modern period of outstanding works of all genres. Prereq: 311, 312 or equivalent.

435-36 Survey of Spanish Literature (3,3) 435—Spanish literature through Golden Age. 436—Spanish literature since 1700. Prereq: 311, 312.


459 Capstone Colloquium in Spanish (3) Integrative experience. Broad range of issues and topics that affect much of Spanish-speaking world and also involve those who specialize in Hispanic studies. Prereq: 311, 312 or equivalent.

460 Capstone Tutorial in Spanish (1) Independent study project supervised closely by faculty member. Prereq: 311, 312, 459 or equivalent.

471 Latin American Civilization (3) Latin America's diverse heritage and major social and political institutions. Prereq: 311, 312 or equivalent.

472 Masterpieces of Spanish American Literature (3) Close reading of selected works by major Spanish American writers, Dario, Paz, Borges, Fuentes and others. Genres and periods vary. Prereq: 311, 312 or equivalent.

473-74 Survey of Spanish American Literature (3,3) 473—Hisistorical survey from Conquest to late 19th century. 474—Major literary movements, writers and works of 20th century. Prereq: 311, 312 or equivalent.

478 Social Protest Literature of Latin American (3) Analysis of literature as means of unmasking social ills that have traditionally beset Latin America. Indigenismo, Black literature, women writers, role of writer in Latin American society. Prereq: 311, 312 or equivalent.

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

512 Teaching a Foreign Language (3) Practical application of methods for teaching and evaluating basic language skills and cultural aspects through seminars, demonstrations, peer teaching, and observation of foreign language classrooms. Required of all M.A. and Ph.D. students holding Graduate Teaching Assistantships, except those whose previous training or experience warrants their being excused by department.

522 Advanced Communication Skills for Teachers and Other Professionals (3) Advancement of oral and written proficiency in Spanish through extensive use of authentic contemporary materials; class lectures and discussions; oral and written presentations and reports. Especially recommended for graduate students, teachers, and other professionals seeking to maintain or enhance high level communicative competency.

531 Old Spanish (3) Old Spanish language and medieval Spanish literature through 13th century.

532 Medieval Spanish Literature (3) Spanish literature of 14th and 15th centuries.

533 The Picarosque Novel (3) Lanzarol de Torres, Guzmán de Alfarache, and Buscón.

534 Don Quixote (3)

535 Golden Age Poetry (3) Garcilaso, Fray Luis de León, San Juan de la Cruz, Lope de Vega, Quevedo, and Góngora.

537 The Golden Age Theatre (3) Major dramatists of period: Lope de Vega, Tirso de Molina, Ruiz de Alarcón, Guillén de Castro, Calderón de la Barca, Moro, and Rojas Zorrilla.

541 Galdós and the 19th-Century Spanish Novel (3) Analysis of works by Galdós and other major 19th-century novelists, Pardo Bazán, Valera, Clarín, and Perea.

542 The Generation of '98 and Ortega (3) Unamuno, A. Machado, Azorín, Valles-Inclán, Benavente, Ortega y Gasset.

543 The 20th-Century Spanish Novel (3) Baroja, Azorín, Valles-Inclán, Pérez de Ayala, Cela, Delibes, Goyeneche, Matute, and at least one present day novelist.

545 Modern Spanish Poetry (3) From Becquer, Unamuno, A. Machado, Jiménez, Lorca, Guillén, Aleixandre, and a contemporary, Celaya.

547 Modern Spanish Drama (3) Major playwrights of 20th-century Spain.

550 Techniques of Literary Analysis and Research Methods (3) Theoretical and critical essays on various techniques of literary analysis. Exploration of bibliographical and research materials.

551 Special Topics in Spanish or Spanish American Literature (3) May be repeated. Maximum 6 hrs.

552 Directed Readings (3)

559 Problems in Linguistics: Romance Languages (3) (Same as French 559 and Linguistics 559.)


573 The Spanish American Novel: Chile and the River Plate Nations (3) Novels from Chile, Argentina, Uruguay and Paraguay. Modern world.


576 Contemporary Spanish American Poetry (3) Major poets of Spanish American from post modernismo to present day.

577 Spanish American Drama (3) Major playwrights of 20th-century Spanish America.


579 The Spanish American Short Story (3) Short story by major writers in Spanish America from Romanticism to present day, theory and criticism of genre.

591 Foreign Study (1-15) See page 31.

592 Off-Campus Study (1-15) See page 31.

593 Independent Study (1-15) See page 31.

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

621-22 Seminar in Spanish Literature (3,3) Topics 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.
Rural Practice
(College of Veterinary Medicine)

MAJOR
Veterinary Medicine .................................................. D.V.M.

G. M. H. Shires, Head

Professors:
Barron, H. T. (Emeritus), D.V.M .... Texas A&M
Grau, H. W. Jr., V.M.D ...... Pennsylvania
Hall, R. F., D.V.M ...... Illinois
Shires, G. M., B.V.Sc., M.R.C.V.S. .... Pretoria

Associate Professors:
Blackford, J. T., D.V.M ...... Colorado State
Geiser, D. R., D.V.M ...... Illinois
Goble, D. O., D.V.M ...... Kansas State
Held, J. P. E., D.V.M ...... Berne
Henten, J. E., D.V.M ...... Michigan State
Hopkins, F. M., D.V.M ...... Georgia
Kerr, L. A., D.V.M ...... Oklahoma State
Linnabary, R. D., D.V.M ...... Ohio State
Toal, R. L., D.V.M ...... Georgia

Assistant Professors:
Adair, H. S., D.V.M ...... Auburn
Andrews, F., D.V.M ...... Washington State
Latimer, F. G., D.V.M ...... Ohio State
Ochowoy, T. W. J., D.V.M ...... Guelph

Residents:
Korenek, N. L., D.V.M ...... Louisiana State
Matthews, H. K., D.V.M ...... Ohio State
Tucker, R. L., D.V.M ...... California (Davis)

Interns:
Roney, S., D.V.M ...... Tuskegee
Sommerdahl, C. S., D.V.M ...... Louisiana State

See Veterinary Medicine for Program Description.

GRADUATE COURSES

500 Thesis (1-15) P/NP only. E
501 Special Topics in Large Animal Medicine and Surgery (1-4) 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 is completed. May not be used toward degree requirements. May be repeated. S/NC only. E
600 Doctoral Research and Dissertation (3-15) P/NP only. E

Russian

See Germanic and Slavic Languages

Social Work
(College of Social Work)

MAJOR
DEGREES
Social Work ................. M.S.S.W., M.S.S.W.-M.Div., M.S.S.W.-M.P.A., Ph.D.

Eunice Shatz, Dean

Professors:
Beasley, Lou M. (On Leave), Ph.D ...... Denver
Bonovich, Robert C. (Emeritus), D.S.W. ...... Washington (St. Louis)
Freyer, Gideon W. (Emeritus), Ed.D ...... Columbia
Grisso, C. A., Ph.D ...... Washington (St. Louis)
Granger, Ben P., Ph.D ...... Brandeis
Hirayama, H., D.S.W ...... Pennsylvania
Kronick, Jane, Ph.D ...... Yale
McLaren, G. (Emeritus), M.S.S.W ...... Tennessee
Mullins, M. Kate, Ph.D ...... Chicago
Nooe, Roger M., D.S.W ...... Tulane
Orten, J. D., D.S.W ...... Alabama
Rubenstein, H., Ph.D ...... Chicago
Shatz, Eunice, Ph.D ...... Brandeis
Wachter, Ann R. (Emeritus), M.S.S.W ...... Tennessee

Associate Professors:
Avory, R. S., Ph.D ...... Brandeis
Bell, W. J., D.S.W ...... Tulane
Cetingok, M., Ph.D ...... Washington (St. Louis)
Charping, J. W., Ph.D ...... Peabody
Cruthirds, C. Thomas, D.S.W ...... Tulane
Faver, C., Ph.D ...... Michigan
Jennings, J., Ph.D ...... Michigan
Moses, A. E., D.S.W ...... California
Rowen, R. B., Ph.D ...... Arizona
Spicuzza, Frank, M.S.S.W ...... Tennessee
Tate, Nellie P., Ph.D ...... Brandeis
Vaughn, H. H., Ed.D ...... Memphis State
Wilks, C. S., Ph.D ...... St. Louis

Assistant Professors:
Blackman, Lorraine, M.S.W ...... Florida State
Campbell, P. M., D.S.W ...... Alabama
Collier, J. C., M.S.W ...... Tulane
Fiene, Judith, Ph.D ...... Tennessee
Lunny, Paul A., M.S.W ...... Case Western Reserve University
Moore, S. T., Ph.D ...... Kansas

Field Practice Coordinators:
Betz, Phyllis (Knoxville), M.S.S.W ...... Tennessee
Lunn, Nina (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) the direct provision of social work services and 2) social welfare administration and planning. These objectives are met through a curriculum requiring all students a professional foundation and a concentration in either social work treatment or social welfare administration and planning.

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 liberal arts subjects. Those with other academic backgrounds should request consultation regarding ways in which they might be admitted.

2. A grade-point average of 2.5 on a 4.0 scale, with preference given to applicants with 3.0 and above. Applicants with less than a 2.5 may be considered for provisional admission on the basis of supplemental evidence of ability to perform at a satisfactory level.

3. Personal qualifications acceptable for entrance into the professional practice of social work.

Preference is given to applicants with a B average in undergraduate work and substantial preparation in the social sciences. Applications should be filed no later than March 1 for the year in which admission is desired.

Advanced Standing
The University of Tennessee College of Social Work has an advanced standing program. Admission to advanced standing requires: (1) a B.S.W. from an accredited program, (2) an overall undergraduate GPA of 3.0 or greater, and (3) successful completion of all areas of an examination covering the five foundation areas. Students admitted into advanced standing are required to complete a minimum of 39 hours of study in either of the college's concentrations - social work treatment or social welfare administration and planning. These students will follow the curriculum plan and meet all requirements of the concentration during three semesters of study in the program.

Specific information about the advanced standing program is available from the college. Application for admission to the advanced standing program is through the regular admission process.

Extended Study
Planned part-time programs are available in all three branches of the college. Admission requirements are the same as for full-time study. Coursework can be completed over a three- or four-year period. One year of the student's period of study must be on a full-time basis.

Financial Aid
Students may apply directly to the University's Financial Aid Office for assistance such as the National Direct Student Loan or the Work-Study Program. Other stipends are administered by the College and awarded on the basis of financial need. Applications for these funds must be made to the Branch of the College the student will attend. A student must first apply for University assistance, since College funds are considered supplementary to those of the University. Additional information about College stipends may be obtained from the College of Social Work.

General Requirements

1. A minimum of 54 semester credit hours including a) completion of foundation courses and field practice (15 hours), b) the course Social Work with Oppressed Populations (2 hours), and c) at least five courses (15 hours).
and three semesters of field practice (16 hours) in the social work treatment concentration or at least four courses (12 hours) and three semesters of field practice (16 hours) in the social welfare administration and planning concentration.

2. Students may select a thesis or non-thesis option. Those students pursuing the thesis option receive 6 credit hours for successful completion of a thesis.

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 is a 15-semester-hour requirement for all students before entering either of the concentration programs. As the initial phase of the educational program, the foundation curriculum contributes to the process of professional identification while presenting a comprehensive and broad knowledge base from which to operate in the future as practitioners, supervisors, administrators, and planners.

Upon completion of the foundation curriculum (at the beginning of the second semester), students select a concentration in either social work treatment or social welfare administration and planning.

Social Work Treatment: The social work treatment concentration provides the educational basis for practice with individuals, families, and groups in order to enhance their social functioning, ameliorate problems, and prevent social dysfunction. The concentration provides knowledge of theory and methodology basic to individual, family, and group methods applicable in the treatment of diverse client problems.

Social Welfare Administration and Planning: The social welfare administration and planning concentration provides the educational basis for leadership in the design, implementation, and continued delivery of effective human service programs at local, regional, and state levels. That concentration emphasizes theory and skills related to administration and planning, and permits considerable 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.

Field practice 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 and beginning concentration. Within the placement, each student's experiences are planned and designed according to educational objectives.

Second-year students 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 field 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 College of Social Work. Transfer courses must be approved as equivalent to required and/or elective courses taken for graduate credit and passed with a grade of B or better. An S (earned on an S/NC system) for the field practicum is also accepted. In addition, transfer courses must be part of an otherwise satisfactory graduate program (B average) and be approved by the dean. This coursework must be completed within the six-year period prior to the receipt of the degree.

A maximum of 6 semester credits from work earned in disciplines other than social work may be transferred as elective credits. The student's academic committee must approve the request and the transfer credit must meet Graduate School requirements.

Proficiency Examination

Students in the Master's program may earn a maximum of nine hours by proficiency examination, with the exception of field practice courses. Students interested in proficiency examinations are referred to The Graduate School statement describing the procedure for applying for examination.

DUAL M.S.S.W./M.P.A. PROGRAM

The Department of Political Science and the College of Social Work offer a dual degree program leading to the conferral of both the Master of Science in Social Work and the Master of Public Administration degrees. In this program, the M.P.A. and M.S.S.W. degrees can be earned on a full-time basis in five consecutive terms rather than seven to eight terms.

Admission

Applicants for the M.S.S.W./M.P.A. program must be admitted to the College of Social Work and to the Department of Political Science. In the college, applications from dual degree students must be reviewed and approved by the dual degree committee that is responsible for overseeing the program. It is anticipated that some students may apply to the dual degree program before they matriculate in either the M.S.S.W. or the M.P.A. program. Students already enrolled in one program will also be permitted to apply, but must do so prior to the end of the first year of study.
General Requirements

The courses are available only in Knoxville.

The focus of social work education at the doctoral level is to foster the development of an education base of social work practice, and effective participation in leadership roles in social work education, research, and practice.

The emphasis of the doctoral program is on:

- The analysis of direct intervention and social administration of the interrelationships among each of them and their social policy, organizational, and community contexts.
- Research-based knowledge to inform and guide social work, social policy, and social welfare program development.

The program consists of foundation courses, elective courses, and dissertation research. The courses are available in Nashville, Knoxville, and other departments of the University. Students and their committees can develop a plan for completing their research in Nashville and Memphis based on the availability of dissertation resources.

Admission Requirements

The Ph.D. program is designed for students who have completed a Master's degree in an accredited school of social work and have post-Master's social work practice 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) coursework in at least 21 percent of required coursework.
   b) completion of 15 credits of advanced electives, at least 12 of which are taken outside the department, and 9 of those 12 related to the dissertation, and c) completion of at least 24 credits of dissertation research.

2. Successful completion of qualifying and comprehensive examinations.


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, the foundation curriculum is completed and elective coursework begun during the first year of study, the elective requirement is completed and dissertation research begun in the second year of study, and dissertation research is continued in the third year of study. While it is generally expected that the coursework will be completed on a full-time basis, dissertation research can be completed on a planned part-time basis.

Specific courses required are 601, 602, 612, 613, 640, and Statistics 531 and 532. A student working full-time on the dissertation registers for 12 hours of 600 per semester.

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 to determine the student's readiness 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 and grants to support research, travel, and fellowships in social work practice, social policy, and social welfare program development. Graduate assistantships and other forms of assistance are awarded on the basis of merit and interest to applicants who are accepted into the Ph.D. program.

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 or West Virginia. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.

Graduate students majoring in fields other than social work are admitted to certain social work courses with the approval of the Dean of Social Work and the student's major professor.

GRADUATE COURSES

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

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

508 Practicum in Social Work Research (3-6) Supervised practice in application of research methods to social work. Prereq: 510 and consent of faculty conducting investigation. May be repeated. Maximum 6 hrs. S/NC only, E

509 Graduate Seminar in Public Health (1) (Same as Public Health 509, Nursing 509, Nutrition and Food Science 509, Physical Education 509.)

510 Social Work Research (3) Research methodology applied to problems in social welfare. Problem formulation; research design; ethics; instrument construction; data collection, analysis, and reporting; statistical procedures; research reporting; and evaluation and utilization of research. Prereq: Admission to college or consent of instructor. F

512 Social Work Practice (3) Basic theory, values, and methodology generic to social work practice at various levels presented from an ecological perspective. Assessment, planning, intervention, and evaluation skills. Classroom and skills laboratory experiences. Prereq: Admission to college or consent of instructor. F

514 Human Behavior and Social Environment (3) Theories pertaining to individual, family, small group, and community in context of functions, structure, roles, and processes. Systems conceptualized along functional, developmental, and norm-deviant continua. Social, development, and maturation. Open systems approach to understand relationships of biological, psychological, social, and personal variables, implications of culture, race, ethnicity, and gender. Prereq: Admission to college or consent of instructor. F

516 Social Welfare Policy and Services (3) Development of conceptual, theoretical, and applied skills in social welfare policy, at both the micro and macro levels, and the influences of political, economic, and social forces on social welfare policy. Prereq: Foundation or consent of instructor. F

518 Social Work with Oppressed Populations (2) Social work's professional role in working with individuals and groups in American society whose oppression is based upon distinguishing characteristics: age, sex, economic class, religion, sexual preference, handicapping conditions, ethnicity and race. Prereq: Admission to college or consent of instructor. F

520 Social Work Treatment with Individuals and Families (3) Nature and organization of normal and abnormal behavior with individuals and families in helping them resolve or cope with problems of living. Working with disadvantaged clients emphasizing client competence. Prereq: Foundation or consent of instructor. Sp

522 Social Work Treatment with Groups (3) Theories and practice of social work with small groups. Treatment groups, task groups. Prereq: Foundation or consent of instructor.

524 Psychopathology and Social Deviance (3) Theories and recent research in atiology of psychic dysfunction and social variance. Categorical approach to psychopathology. Prereq: Foundation or consent of instructor.

526 Research for Assessment of Social Work Treatment (3) Application of research methods for assessment of social work treatment. Prereq: Foundation, 520 or 522, or consent of instructor. Sp

530 Seminar in Social Work Treatment (2-3) Topics in theory and practice of social work treatment with individuals, couples, families, and groups. Prereq: Foundation and 520, or consent of instructor. Required for group treatment: 522. May be repeated. Maximum 6 hrs.

531 Family Therapy in Social Work Practice (3) Major family therapy models, perspectives on family dynamics and interaction, and therapeutic interventions and their application to families from diverse social and cultural backgrounds. Prereq: Foundation and 520, or consent of instructor.

532 Short-Term Treatment (3) Theory and practice of planned short term treatment, emergency treatment, and crisis intervention. Prereq: Foundation and 520, or consent of instructor.

533 Social Work Treatment with Couples (3) Theories regarding contemporary marriage styles, problem areas in relationships, and application of treatment methods and skills for problem resolution. Prereq: Foundation and 520, or consent of instructor.

534 Social Work Treatment with Children and Adolescents (3) Examination of various treatment modalities for assessing and treating children and adolescents. Prereq: 520 and 522, or consent of instructor.

540 Administration of Social Welfare Programs and Services (3) Analysis of organizations and provision of services to clients. Major elements of social welfare administration, their historical and philosophical perspectives, context for designing organizational structure and processes, planning processes, competing and implementing agency policies and programs, and management of service delivery system. Prereq: Foundation or consent of instructor.

542 Financial Management and Resource Development in Social Welfare Administration (3) Administrative decision-making related to financial planning and resource allocation in social welfare agencies. Knowledge and skills in accounting, budgeting and auditing, techniques in fundraising, grant writing, Deve-
583 Field Practice (6) Instruction and supervision in social work treatment or social welfare administration and planning. Prereq: 582. S/NC only. Sp

584 Field Practice (2-6) Instruction and supervision in social work treatment. Prereq or coreq: 512. May be repeated. S/NC only. E

585 Seminar in Gerontology (1) (Same as Human Ecology 585, Educational and Counseling Psychology 585, Nursing 585, Physical Education 585, Psychology 585, Public Health 585, and Sociology 585.)

593 Independent Study (1-6) Individualized study, student selects, designs, and completes examination of special issue or problem. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. F,Sp

600 Doctoral Research and Dissertation (3-16) P/NP only. E

601 Research for Social Work Practice I (3) Epistemological and methodological considerations for both quantitative and qualitative research for social work practice. F

602 Research for Social Work Practice II (3) Epistemological and methodological considerations for both quantitative and qualitative 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 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


693 Directed Study in Social Work Research (3) Advanced individual study, under faculty guidance, of social work research issues. Prereq: First year required. Ph.D courses or consent of instructor. May be repeated. Maximum 9 hrs. F,Sp

Sociology

(College of Liberal Arts)

MAJOR DEGREES

Sociology ........................................ M.A., Ph.D.

Thomas C. Hood, Head

Professors:

Betz, D. Michael, Ph.D. ............ Michigan State
Black, John A., Ph.D. ....................... Iowa
Champion, Dean J., Ph.D. .......... Purdue
Cleland, Donald C., Ph.D. .......... Michigan State
Hastings, Donald W., Ph.D. .... Massachusetts
Hood, Thomas C., Ph.D. ............... Duke
Ploch, Donald R., Ph.D. ............. North Carolina
Shafer, Neil, Ph.D. ................. Illinois
Wallace, Samuel E., Ph.D. ......... Minnesota

Associate Professors:

Benson, Michael L., Ph.D. ........... Illinois
Kurth, Suzanne B., Ph.D. .......... Illinois (Chicago)
Perrin, Robert G., Ph.D. .......... British Columbia

Assistant Professors:

Cable, Sherry, Ph.D. .................... Penn State
Gaventa, John P., Ph.D. .......... Oxford

The Sociology Department offers graduate study leading to the Master of Arts and the Doctor of Philosophy. The M.A. program includes a thesis and non-thesis option. The graduate program has concentrations in criminology, energy, environment, and resource policy; and political economy. The criminology concentration includes 505, 551, 653, and 655. The energy, environment and resource policy concentration includes 560, 563, 661, 662, 663, and 655. The political economy concentration includes 504, 540, 541, 643, 644, and 645. Both the Master's and the doctoral program allow for the construction of individualized programs of study. Detailed information may be obtained from the Director of Graduate Studies. All incoming students will be advised by the Director of Graduate Studies.

ADMISSION REQUIREMENTS

1. Acceptable scores on the general Graduate Record Examination (GRE scores in sociology are requested but not required).
2. Three letters of recommendation (forms may be obtained from the department).
3. Completion of the appropriate previous degree (baccalaureate, preferably with a major in one of the social sciences, for the M.A. program; Master's degree in one of the social sciences for the doctoral program).

THE MASTER'S PROGRAM

Thesis Option

A minimum of 30 hours beyond the baccalaureate degree, including 24 hours of coursework and 6 hours of Thesis 500, is required. Students must complete Sociology 521, 531, 535, and one course numbered 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, 535, and one of the following: 504, 505, or 560. Sociology 534, 536, and 622 are recommended. Sociology courses at the 400 level may be taken with the approval of the student's committee. A student's plan of study should follow one of the following approaches: Plan 1, 6 hours in one of the department's concentrations and 6 hours in a second area, including areas outside the department, subject to the approval of the student's committee; Plan 2, 12 hours in a special area of study approved by the student's committee and the department's Graduate Program Committee. Students are encouraged to prepare a paper synthesizing their knowledge of the concentration(s). Students who incorporate supervised field experience in their programs are encouraged to prepare a report based on those experiences that demonstrate their...
understanding of research, theory, and report writing. All students must take final written and oral examinations that include questions on their general coursework in theory and methods and on their special areas of study.

Subject to approval by the student's committee, up to 12 hours may be taken in courses outside the department for either program.

THE DOCTORAL PROGRAM

Coursework

Twenty-four hours of coursework beyond the Master's degree are required (exclusive of S/NC credits). Twelve hours of course credit in Sociology at the 600 level are required. Students who enter the program without the courses required for the M.A. degree (521, 531, 535) 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 536 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 (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.

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 Sociology is available to residents of the state of South Carolina. Additional information may be obtained from the Registrar's Assistant in the Office of Graduate Admissions and Records.

GRADUATE COURSES

405 Sociology of Sport (3) Social meaning, organization, and process of sport. Prereq: 291 or consent of instructor. (Same as Physical Education 405.)

413 Formal Organization (3) Analysis of organizational functions, typologies, and theories; hierarchies of authority; communication; interpersonal relations in work settings; organizational change.

414 Sociology of Health Care (3) Organization of health care facilities, staff-patient relationships, demographic changes, 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-system as social system. Its coherence, boundaries, regions, member groups, cleavages, and patterns of conflict. Analysis of who gets what, why, and how in global political economy.


455 Society and Law (3) How laws and legal processes are affected by social change, social impact of legal sanctions, relations between law and social justice.

459 Organizational and Corporate Crime (3) Analysis of crime and deviance committed by organizations. Case studies of corporate and organizational crime, organization and corporate crime, and organized responses to this type of crime by governmental regulatory agencies.

462 Populations (3) Demographic factors and social structure; trends in fertility, mortality, population growth, migration, distribution, and composition; population policy.

464 Urban Ecology (3) Relation of humans to their urban environment: conservation and use of appropriate technology. (Same as Urban Studies 464.)

471 Sociolinguistics (3) (Same as English 471 and Linguistics 471.)

480 Diffusion of Agricultural Technology (3) (Same as Rural Sociology 480.)

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

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

504 Sociological Foundations of Political Economy (3) Survey of contemporary sociological theories of political economy, sources of political and economic power and conflict. Prereq: 521 or consent of instructor.

505 Foundations of Criminology (3) Critical overview of contemporary developments in criminology, theories of crime causation and theories of responses to crime. Prereq: 350 or equivalent.

507 Foundations of Social Psychology (3) Current and classical theoretical perspectives in social psychology.

510 Teaching Sociology (3) Art and craft of teaching sociology from curricular considerations through teaching techniques. May be repeated. Maximum 6 hrs.

521 Sociological Theory I (3) Assessment of what sociological theory is; its major figures and their approaches to understanding society.

531 Research Methods in Sociology (3) Research design; measurement; sampling; quantitative and qualitative data analysis 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.

535-36 Statistical Analysis in Sociology I and II (3,3) Should be taken in sequence. 536--Data reduction, exploratory data analysis, general linear model, introduction to multivariate analysis. Prereq: Sociology 201 or consent of instructor.

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 Sports and Physical Education (3) (Same as Physical Education 542.)

543 Sociology of Development (3) Sociological theories and studies of development: modernization, colonialism, dependency; comparative; contributions of various development paths upon selected aspects of social structure and change.

551 Delinquency and the Social Structure (3) How study of delinquency and juvenile justice is affected by changing structures of childhood and adolescence, changing demographic and institutional influences, and changing views about responsibility and punishment.

560 Environmental Sociology (3) Systematic treatment of current research in environmental sociology. Social impact analysis and conflicts over environmental issues.

563 Demographic Techniques (3) Standard rates and measures of demographic variables, life table analysis, increment-decrement models, and survey techniques of population analysis.

580 Advanced Rural Sociology (3) (Same as Rural Sociology 580.)

585 Seminar in Gerontology (1) (Same as Human Ecology 585, Educational and Counseling Psychology 585, Nursing 585, Psychology 585, Public Health 585, Physical Education 585, and Social Work 585.)

591 Foreign Study (1-15) See page 31.

592 Off-Campus Study (1-15) See page 31.

593 Independent Study (1-15) See page 31.

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. E

611 Complex Organization (3) Selected topics in formal organizations, cases and incident process analysis; examines strategies for dealing with organizational change, authority hierarchies, communication patterns; technology and organizational structure; job satisfaction, motivation, morale and interpersonal phenomena.

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 exploitation of survey problems through student participation in design and analysis of survey. Prereq: 531 or consent of instructor.

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.


653 Sociology of Law (3) Intensive examination of selected topics in sociology of law. Prereq: 505 or consent of instructor.
Special Services Education

(College of Education)

**MAJORS**

Special Education .................................. M.S.
Rehabilitation Counseling .............................. M.S.
Education ............................................ Ph.D.

**DEGREES**

Laurence J. Coleman, Head

**Professors:**

Coleman, Laurence J., Ph.D. Kent State
Dol, E. E. (Emeritus), Ph.D. Pennsylvania
Frey, Roger M., Ed.D. ............................... Illinois
George, Thomas, Ed.D. .................................. Tennessee
Hargis, Charles H., Ed.D. Colorado State
Kronick, Robert F., Ph.D. Tennessee
McClain, T., Ph.D. South Carolina
Miller, James H., Ed.D. Auburn
Schindler, W. Jean, Ph.D. Kent State
Woodrick, William E., Ed.S. Mississippi
Woodside, M. R., Ed.D. VPI

**Associate Professors:**

Bennet, Susan M., Ed.D. Columbia
Cassell, Jack L., Ph.D. Kansas
Colvin, Craig R., Ed.D. Virginia
Hannum, Michael C., Ed.D. Northern Colorado
Kopp, Katherine H., Ph.D. George Peabody
Mulkey, S. Wayne, Ph.D. Florida State
Weich, Oga, Ed.D. Tennessee

**Instructors:**

McLean, J. D., Ph.D. Chicago
Warden, K., Ph.D. Tennessee

**Lecturer:**

Byrd, H. L., Jr., M.S. Tennessee

The Department of Special Services Education offers graduate programs leading to the Master of Science with a major in Special Education or in Rehabilitation Counseling. The department also participates in the Doctor of Philosophy program in Education as described under Education.

**THE MASTER'S PROGRAMS**

The Master's program in Special Education offers concentrations in the following areas: 1) hearing impaired; 2) gifted; 3) learning disabilities; 4) mental retardation; 5) multiple disabilities; 6) socially or emotionally maladjusted; 7) early childhood special education; and 8) general special education.

Teacher certification can be obtained while working toward the Master's degree. Course offerings are available that lead to general special education teacher certification and to certification to teach hearing impaired children.

The Rehabilitation Counseling program enables counselors to acquire competencies which facilitate the movement of a person with disabilities toward optimal functioning in the three broad areas of living, learning, and working. The rehabilitation counselor works primarily with adults who are being served in various public and private settings. Students should expect to spend four semesters, including summer, in classroom and in internship. The program requires 54 semester hours.

Both majors have a thesis and non-thesis option. If a student elects to do a thesis, the Master's program in Special Education will contain a minimum of 30 semester hours including 6 hours of Thesis 500. Eighteen semester hours in special education coursework is required.

The non-thesis option requires a minimum of 36 semester hours total with a minimum of 18 in special education. In the non-thesis option, a final written comprehensive with an oral examination is required.

**ADDITIONAL PROGRAMS**

Under the sponsorship of the Office of Special Education and Rehabilitative Services (R.S.A.), specialized institutes for the preparation of professionals to adapt their skills toward services to hearing impaired and deaf people are provided. A federally supported Educational Consortium provides staff development and technical assistance for post-secondary programs serving hearing impaired students in a 13-state southeastern region.

Details concerning each program can be obtained by writing to the department head.

**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 Special Education is available to residents of the states of Kentucky or West Virginia; the M.S. in Rehabilitation Counseling is available to residents of Louisiana. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.

**Special Education**

**GRADUATE COURSES**

410 Pre-Internship Seminar (1) Orientation, objectives, and policies of internship program. Must be completed term immediately preceding internship. Prereq: Admission to teacher education program. SNC or SP, Su.

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) Formally and informally for those planning to work with hearing impaired children. Overview of research related to psychology, social adjustment, communication meth-
504 Clinical Experience in Teaching and Supervision of Exceptional Children (3-9) Placement in educational settings. May be repeated. Maximum 9 hrs. S/NC or letter grade.

506 Internships in Teaching in Special Education and Rehabilitation (3-15) Placement in professional settings in public schools or agencies under supervision of master practitioners. Enrollment limited to those in fifth-year program. S/NC only.

509 Vocational Guidance and Career Planning With Hearing Impaired (3) Attention towards psychological, educational, social-vocational, and management needs of hearing impaired persons. May be repeated. S/NC only.

519 Speech Development of Hearing Impaired (4) Theories of speech development, approaches in training perception and production of speech, and aural habilitation. Practicum experiences.

521 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.


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 errors. Prereq: 521.

524 Linguistics in the Education of the Hearing Impaired (3) Recent research and developments in theoretical and applied linguistics. Prereq: 521, 522, 523, 529.

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 vocabulary development. Prereq: Prior sign language experience or consent of instructor.

526 Advanced Sign Language (3) Intermediate ASL stressing fluency of expressive and receptive communication with deaf people and structure and history of language. Prereq: 525 or equivalent.


529 Teaching Reading to the Hearing Impaired (3) Specific methods necessary to teach the prelingually hearing impaired student. Practice in preparation of program, teaching materials. Methods which assist in integrating hearing impaired students in regular reading curricula and materials. Prereq: 521.

530 Orientation to Rehabilitation (3) History, philosophy, legal and economic bases, current issues, and practices in public and private rehabilitation programs. Qualifications of service providers. Assessment, plan development, and provision of services to people who have disabilities and vocational handicaps. Identification, mobilization, and utilization of rehabilitation resources.

532 Caseeload Management in Rehabilitation (3) Techniques and procedures involved in management of caseeloads in Federal-State vocational rehabilitation agencies. Training in public and private rehabilitation facilities. Analysis of appropriate industrial management models related to rehabilitation programs.

533 Job Analysis, Development, and Placement (3) Determining employment-readiness of people with disabilities, identifying appropriate jobs for selected clients, and assisting clients in seeking, obtaining, and retaining employment. Job analysis, job modification and re-engineering, marketing, and employer-serving techniques; legislation impact on job placement; supported work; and use of occupational information.

535 Vocational Evaluation: Statistical Methods (3) Process and principles of statistical methods in assessing vocational assets and liabilities to people with disabilities. Functional analysis of biographical and interview data; selection and application of statistical instruments; integration of statistical data into diagnostic reports; applications of computer-generated reporting systems.

537 Vocational Evaluation: Clinical Methods (3) Process, principles, and techniques used to assist individuals in determining and understanding their own work behavior and vocational potential. Selection and use of occupational exploration programs and work samples; application of situational tasks, job tryouts, and simulated work experiences in vocational evaluation. Clinical interpretation of data through formal staff conferences, vocational counseling, and report writing.

539 Transition from School to Work (3) Development of programs and procedures to facilitate adjustment of exceptional persons to independent living. Exploring perspectives of work, attributes of effective programs, and interface between school-based programs and rehabilitation agencies.

541 Psychosocial Aspects of Exceptionalities (3) Psychosocial impact of exceptionality on person and family. Reaction to loss, coping with disability, and societal response.

543 Medical Aspects of Disability (3) Etiology and clinical symptoms related to disabling conditions served by special education and rehabilitation personnel. Referral measures to specialized treatment of handicapping conditions, and educational strategies especially for high incidence special education students.

545 Education of the Gifted and Talented Children (3) Orientation to psychometric and behavioral studies of gifted and talented persons. Recent theories, orientation, and present school practices in reference to curriculum and program implementation. Sp

546 Speech and Language Basis of Learning Disabilities (3) Neuropsychological development; understanding of speech and language impairments in school-age students; integration of oral/written language into existing curriculum, especially for high incidence special education students.

547 Psychology of the Exceptional Child (3) Varieties of exceptional children; general characteristics and educational needs. Implications of developmental variations for functioning as adults. Opportunity to expand study upon particular exceptionalty. Enrollment limited to non-special education majors.

471 Internship I: Special Education (3-15) Intensive experience designed to allow student to practice art and science of teaching exceptional children under supervision of experienced teachers. Prereq: 480.

473 Audiology II (3) (Same as Audiology and Speech Pathology 473.)


482 Speech and Language Services in the Schools (3) Survey of educational and administrative delivery systems 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.

484 Internship with Hearing Impaired Children (6) Supervised practicum with preschool, day school and residential students.

490 Field Experience with Moderately and Severely Handicapped Children (3) Field experience in area of rehabilitation; application of concepts, principles, and skills. Prereq: Consent of instructor.

491 Internship in Rehabilitation Counseling (12) Supervised practice in rehabilitation counseling. Full time clinical experience for second-year students (600 clock hrs required).

511 Psychology of Learning Disabilities (3) Overview of learning disabilities: historical perspectives and emerging direction; basic theories of learning disabilities; medical aspects of research, assessment, treatment, characteristics of children and youth, educational implications. Prereq: 451 and 452 or equivalent or consent of instructor.


513 Assessment of Exceptional Students (3) Historical and legal issues related to assessment; concepts of evaluation models; test instruments and assessment processes demonstrated, practiced, results applied to educational programming; basic statistics relative to norm and criterion-referenced testing covered. Coreq: 593.

515 Assessment in Early Childhood Special Education (3) Development of knowledge and skills in appropriate formal and informal assessments of handicapped infants and young children: screening, identification, diagnosis, placement and programming assessment issues. Prereq: 553 or consent of instructor.

545 Assessment of Exceptionalities (3) Historical and legal issues related to assessment; concepts of evaluation models; test instruments and assessment processes demonstrated, practiced, results applied to educational programming; basic statistics relative to norm and criterion-referenced testing covered. Coreq: 593.

556 Characteristics of Social and Emotional Disturbances in Children and Youth (3) Determining employment-readiness of people with disabilities, identifying appropriate jobs for selected clients, and assisting clients in seeking, obtaining, and retaining employment. Job analysis, job modification and re-engineering, marketing, and employer-serving techniques; legislation impact on job placement; supported work; and use of occupational information.
562 Instructional Systems for the Mentally Retarded (3) Specific developmental, behavioral strategies and techniques. Curricular design techniques and evaluation. Educational needs of mentally retarded children and youth. Prereq or coreq: 561 or consent of instructor.

564 Psychosocial Development of Gifted and Talented Children (3) Phenomena of talent development in context of home, school, and society. Implications of maldistribution. Practices for promoting social and emotional development. Prereq: 451 and 452 or equivalent or consent of instructor.

565 Instructional Systems for the Gifted and Talented (3) Instructional methods and systems evaluated in light of effectiveness in various educational environments. Prereq or coreq: 564 or consent of instructor.

568 Early Intervention for Handicapped Children (3) Exploration of characteristics and needs of young handicapped children. Program and curriculum development of early intervention system.

575 Creative Problem-Solving Strategies for Special Educators (3) Techniques for solving problems encountered by special educators in any setting.

579 Special Topics (1-3) Prereq: Admission to graduate program. May be repeated. Maximum 6 hrs. S/NC or letter grade.

585 Seminar in Research Techniques in Special Education (3) Evaluation of appropriate research methodology and evaluation. Prereq: Admission to doctoral program or consent of instructor.


590 Application of Microcomputer Technology in Special Education and Vocational Rehabilitation (3) Application of microcomputer technology with all categories of exceptionalities and across all chronological and functioning age ranges. Microcomputer adaptive software. Special switch access. Authoring systems. Telecommunication and strategies for cognitive development.


595 Clinical Experience in Assessment and Instruction (3) Academic remediation applied in lab/field setting: tasks related to teaching: assessment, preparation of lessons, and delivery of instruction. Coreq: 553. S/NC or letter grade. E

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

601 Seminar in Educational Theories in Special Education and Rehabilitation (3) Education theories: education and rehabilitation of exceptional persons. Theory applications in educational settings. Prereq: Admission to doctoral program or consent of instructor.

602 Seminar in Social Processes in Special Education and Rehabilitation (3) Social phenomena which influence the development of disability on person and on significant others. Implications for habilitation. Prereq: Admission to doctoral program or consent of instructor.

603 Seminar in Research in Special Education and Rehabilitation (3) Development and implementation of research. Independent research studies. Research proposals. Prereq: 9 hrs of research core and consent of instructor.

610 Internship in College Teaching and Supervision (3-9) Supervised practice in college teaching and supervision. Prereq: Admission to doctoral program or consent of instructor. May be repeated. Maximum 9 hrs. S/NC only.

620 Internship in Research Special Education and Rehabilitation (3-9) Placement with professional engaged in theoretically-based research: public school, institutions, agencies or university settings. Prereq: 9 hrs in statistical and research methods. May be repeated. Maximum 9 hrs. S/NC only.

630 Internship in Institutional Leadership in Special Education and Rehabilitation (3-9) Advanced level field experiences under supervision of practitioner. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/NC only.

679 Special Topics (1-3) Prereq: Admission to doctoral program. May be repeated. Maximum 9 hrs. S/NC or letter grade.

Speech Communication

(College of Liberal Arts)

Lorayne W. Lester, Head

Professors:

Julian, Faye D., Ph.D. Tennessee State
Lester, Lorayne W., Ed.D. Tennessee State
Yeomans, G. Allan (Emeritus), Ph.D.

Associate Professors:

Ambrose, M. L., Ph.D. Ohio State
Buckley, J. E., Ph.D. Northwestern State
Cook, N. C., M.A. Alabama State
Glenn, Robert W., Ph.D. Northwestern State

Assistant Professor:

Ambler, R. S., Ph.D. Ohio State
Haas, John W., Ph.D. Kentucky State

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

GRADUATE COURSES

420 Communication and Conflict (3) Communication as significant factor in development, management, and resolution of conflict at interpersonal, small group, organizational or societal levels.

440 Organizational Communication (3) Organizational setting and variables of communication process that affect quality of human interaction both within and outside organization.

460 History of Rhetorical Theory (3) Western rhetorical theory from Plato to present.

465 Studies in Rhetorical History and Criticism (3) May be repeated. Maximum 6 hrs.

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

470 Theories of Argumentation (3) Studies of conceptual bases of argumentation from classical to contemporary theorists. Prereq: Consent of instructor.

480 Ensemble Interpretation (3) Study and presentation of literary texts through group performance.

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

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

505 Fundamentals of Graduate Research in Speech Communication (3) Techniques of historical, descriptive and experimental research.

510 Studies in Persuasion (3) Prereq: 310 or equivalent or consent of instructor.

Speech Communication

(College of Liberal Arts)

Lorayne W. Lester, Head

Professors:

Julian, Faye D., Ph.D. Tennessee State
Lester, Lorayne W., Ed.D. Tennessee State
Yeomans, G. Allan (Emeritus), Ph.D.

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Glenn, Robert W., Ph.D. Northwestern State

Assistant Professor:

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480 Ensemble Interpretation (3) Study and presentation of literary texts through group performance.

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

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

505 Fundamentals of Graduate Research in Speech Communication (3) Techniques of historical, descriptive and experimental research.

510 Studies in Persuasion (3) Prereq: 310 or equivalent or consent of instructor.

Statistics

(College of Business Administration and Intercollegiate Program)

MAJORS

DEGREES

Statistics ............................................. M.S.
Business Administration ........................ MBA

David L. Sylwester, Chair

Professors:

Downing, Darryl L. (Adjunct), Ph.D. Florida State
McLean, Robert A., Ph.D. Purdue
Parr, William C., Ph.D. Southern Methodist
Phlipot, John W., Ph.D. VPI
Sanders, William L. (Adjunct), Ph.D. Tennessee State
Sylwester, David L., Ph.D. Stanford
Thigpen, Charles C., Ph.D. VPI

Associate Professors:

Guess, Frank M., Ph.D. Florida State
Mee, Robert W., Ph.D. Iowa State
McGuire, Stephen S. (Adjunct), Ph.D. Kansas State
Ranney, Gipsie B. (Adjunct), Ph.D. NC State
Sanders, Richard D., Ph.D. Texas State
Wright, Tommy (Adjunct), Ph.D. Ohio State
Younger, M. S., Ph.D. VPI

Assistant Professors:

Leitkamer, Mary G., Ph.D. Kentucky State
Lin, Dennis K. J., Ph.D. Wisconsin
Walker, Esteban, Ph.D. VPI

Lecturer:

Schmidhammer, James L., Ph.D. Pittsburgh
Curriculum

A minimum of 33 credit hours must be completed for the Master's degree. Required of all students are 6 hours in statistical methods, 6 hours in statistical theory, 1 hour in statistical computing, and 3 hours in either supervised consulting or internship. Students must complete at least 21 hours in approved statistics courses, exclusive of consulting, internship, independent study, or thesis.

Thesis or Independent Study

The thesis option for the Master's degree requires the student to complete 6 hours for the thesis. Alternatively, the non-thesis option requires a minimum of 3 hours for an independent study project.

Comprehensive Examination

Students must pass a two-part written comprehensive examination covering 1) theory and 2) methods. Upon failing either part of the examination, the student may retake it. The result of the second examination is final. For students writing a thesis, this examination must be passed before the thesis is defended.

INTERCOLLEGIATE GRADUATE

STATISTICS PROGRAM

The Intercollegiate Graduate Statistics Program is a formal University of Tennessee academic program established to recognize graduate students for completing the requirements of a major or minor in Statistics as part of their degrees. The program enables a student to obtain the M.S. in Statistics simultaneously with the Ph.D. or Ed.D. in another department. The program also enables a student to obtain a Statistics minor along with the M.S., Ph.D., or Ed.D. in another department. The program is administered by an executive committee with advisory input from the program faculty. The program is open to well-qualified graduate students in all departments which have an approved minor/major in Statistics as part of the student's program.

Degree Requirements

The program offers the M.S. in Statistics with a minor in another department, a joint major program in which the student earns a Master's or doctoral degree in the student's sponsoring department along with the M.S. in Statistics, and a joint major and minor program in which the student earns a Master's or doctoral degree in the student's sponsoring department along with a minor in Statistics. The table below presents the minimum number of semester hours in statistics for each of these alternatives. The hours do not represent the minimum required for the degree program. The student selects courses to satisfy the requirements established by the student's sponsoring department and approved by the Program Executive Committee.

The student's committee must include a faculty member of the Statistics Department at the rank of Assistant Professor or above. The student's formal examination procedure as established by the sponsoring department must include an appropriate section on statistics. Successful completion for the Statistics minor/major is recognized by appropriate documentation on the student's transcript. Students who do not complete all requirements for the Statistics minor/major will still receive academic credit for courses they have successfully completed.

Degree Program: Hours*

M.S. in Statistics, minor outside of Statistics 21
M.S. outside of Statistics, minor in Statistics 8
M.S. outside of Statistics, usual separate Statistics requirements for both degrees 16
Doctorate outside of Statistics, minor in Statistics 24
Doctorate outside of Statistics, minor in Statistics 24
M.S. in Statistics 157

*Approved Statistics courses from the Department of Statistics and/or other departments.

**Courses taken for the minor or the Master's degree in Statistics may fulfill requirements for the doctoral degree. Contact the home department for details.

BUSINESS ADMINISTRATION

CONCENTRATION

For complete listing of MBA program requirements, see Business Administration.

MBA Concentration: Statistics.

Minimum course requirements are 571, 566, 572 with prerequisite 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 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.
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.D. programs in Technological and Adult Education are available to residents of the state of South Carolina; the Ed.D. program is available to residents of West Virginia. Additional information may be obtained from the Residency Assistant in the Office of Graduates and Admissions.

GRADUATE COURSES

401 Utilization of Community Resources (3) Strategies of developing linkages between vocational education and private sector through advisory councils, and working partnerships. Development and management of public relations programs. Prereq: 3 yrs experience. Sp

415 Coordination Techniques (3) Necessary procedures, duties and responsibilities of implementation, maintaining and evaluating successful cooperative education program. Prereq: Senior standing and consent of instructor. F

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. Sp

432 Methods and Materials in Business and Marketing Education (3) Teaching techniques, aids and evaluation in subject matter fields. Prereq: Consent of instructor. F,Su

436 Supervised Occupational Experience (3-6) Practicum experience in business and marketing settings under supervision of practicioner and departmental representative. May be repeated. Maximum 9 hrs. Su

439 Areas of Marketing (3) Marketing, personnel development, operations, and management as affects instructional leadership program in marketing education. Prereq: 430. F

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


456 Organization and Operation of VICA/HOSA (3) Planning, organizing and implementing youth-club activities in vocational-technical programs. Prereq: Senior standing or consent of instructor. Pa,Su

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

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

503 Problems in Lieu of Thesis (3) May be repeated. Maximum 6 hrs. S/NC only. E

504 Research in Technological and Adult Education (3) Solution of problems encountered in technological and adult education. Review of studies unique to technological and adult education. Prereq: 12 hrs of graduate credit. F,Su

505 Selection, Placement, and Follow-up Procedures in Vocational-Technical Education (3) Methods and procedures utilized in establishing criteria for trainee selection and placement in instructional programs and in evaluating, analyzing, and reporting follow-up data appropriate for making program improvements. Prereq: Consent of instructor. Sp, Su

506 Adult Continuing Education: A General Survey (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

509 Internship in Technological and Adult Education (3) Practical field experiences in selected settings under supervision of practitioner and departmental representative. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

510 Foundations of Technological and Adult Education (3) Philosophical, historical, economic, social, cultural, and psychological foundations of vocational, technical and adult education; fundamental principles and contemporary objectives. Prereq: Consent of instructor. F

511 Issues and Trends in Technological and Adult Education (3) Historical, philosophical, economic, social, and psychological foundations of adult education; fundamental principles and contemporary objectives. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E

514 Individual Study in Technological and Adult Education (3) Prereq: Consent of supervising instructor. Approval form must be filed in office of department head. May be repeated. Maximum 8 hrs. E

515 Microcomputer Operations and Programming in Education (3) Operating procedures and BASIC programming for education and training applications. Hands-on experience in operating and programming microcomputers, writing, debugging, and running educational programs using sequential data files. Prereq: Teaching, administrative, or 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 bimapped graphics for educational environments. Hands-on learning and program development. Prereq: 515 or consent of instructor. E

518 Education Specialist Research Thesis (3) May be repeated. Maximum 9 hrs. P/NP only. E

521 Program Development and Operation in Technological and Adult Education (3) Specific objectives, activities, and methods of gathering and analyzing data in program planning and development. Prereq: Consent of instructor. F

522 Adult Development (3) Changes in characteristics of adults over life span and implications for adult education. Prereq: Consent of instructor. F

523 Post-Secondary Education for Adults (3) History, evolution, philosophy, structure and functions of post-secondary education, sub-university institutions, their programs and clientele. Prereq: Consent of instructor. Sp, Su

524 Continuing Professional Education (3) Theories and concepts supporting design and management of education/training programs for adults in professions. Prereq: 510 or equivalent. Sp

530 Methods and Materials for VOE Programs (3) Development of instructional aids, recent developments and research, instructional and occupational clusters. Prereq: 510 or equivalent. Sp

531 Organization and Supervision of VOE and Marketing Programs (3) Developing office and marketing programs in secondary and post-secondary school settings. Prereq: Consent of instructor. F

532 Improvement of Instruction in Basic Business and Marketing Education (3) Issues, research findings, methods, and models of 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 models of instruction in office technology. Prereq: Consent of instructor. F,Su

534 Improvement of Instruction in Accounting and Data Processing (3) Principles of learning issues, research findings and materials in basic accounting, 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. F

536 Organizing and Teaching Adult Business and Marketing Education (3) Planning, organizing, promoting, teaching and evaluating continuing education programs in business and marketing programs; utilizing trade associations, employment agencies, business groups, and advisory committees in program implementation. Prereq: 3 yrs teaching experience and consent of instructor. F,Su

537 Measurement in Business and Marketing Education (3) Testing and evaluation of learner performance in business and marketing education instruction. 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 6 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 projects in teaching of business and marketing education and related areas. Prereq: Consent of instructor. E

550 Administration of Industrial Education Programs (3) Developing, staffing, administering and evaluating trade, industrial and technical education programs in secondary and post-secondary school settings. Prereq: Consent of instructor. Sp

551 Supervision of Industrial Education Programs (3) Techniques used to improve industrial education programs; supervisory development, curriculum improvement and program updating techniques. Prereq: 455 or equivalent. F,Su

552 History and Philosophy of Industrial Education (3) Social, political, and economic events that impact development of industrial education. Philosophical problems: justification, values, principles and concepts of industrial education. Prereq: Consent of instructor. F

553 Planning Technical Education Facilities (3) Preparation of educational specifications, site selection, and working relationships with other professionals involved in process of planning technical-education facilities. Prereq: Consent of instructor. Sp,Su

554 Technical Program Planning (3) Instructional systems attending to analysis, design, development, implementation, and evaluation of trade, technical and related trade programs. Prereq: Consent of instructor. F

555 Curriculum Planning for Industrial Education Programs (3) Developing performance-based, criteria-referenced instructional programs. Prereq: 374 or 554 or consent of instructor. Sp,Su

556 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
Textiles, Merchandising and Design

(College of Human Ecology)

MAJORS

Textiles and Apparel .................................. M.S.

Human Ecology ........................................ Ph.D.

Larry Wadsworth, Acting Head

Professors:

Blakemore, Robbie G., Ph.D. ......... Florida State

Delong, A., J., Ph.D. ............. Penn State

DeLong, Jacquelyn O., Ph.D. .... Iowa State

Drake, Mary Fran, Ph.D. ......... Penn State

Duckett, Kermit E., Ph.D. .......... Tennessee

Moran, W., J., M.S. .............. Wiscconsin

Wadsworth, Larry C., Ph.D. ...... NC State

Associate Professors:

Brebce, Randall R., Ph.D. ........ Florida State

Dyer, C. L., Ph.D. ............... North Carolina

Rabun, Josette, Ph.D. .......... Tennessee

Assistant Professors:

Houser, T. L., M.S. ............... Tennessee

Simpson, Ethel, Ph.D. .......... Oklahoma

Interior Design

The Department of Textiles, Merchandising and Design offers a Master's degree in Interior Design. This program is accredited by the Foundation for Interior Design Education Research (FIDER). The program of study will provide a balance between creative and theoretical foundations of the field. The goal of the graduate program in interior design is to provide the student with scholarly and professional experiences through seminars, studio work, and research. Interdisciplinary thrusts will increase the depth of understanding of the field of interior design essential to function as educators or as independent professionals.

Areas of emphasis within interior design may include: history of interior design, computer-aided design, and human environment interaction. Supporting courses are available in lighting, furniture design, business practices, etc.

ADMISSION REQUIREMENTS

A complete 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 Dean's Office, College of Human Ecology.

In addition to specified entrance requirements stipulated by The Graduate School, admission to the graduate program in Interior Design requires: 1) a background in interior design, 2) a cumulative GPA of 3.0 or above (on 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. Superior students, deficient in one or more of the above requirements, may be admitted at the discretion of the department's graduate faculty.

ACADEMIC STANDARDS

1. Evaluation of student progress will normally occur prior to enrollment for thesis hours and during the second semester of full time enrollment in interior design. The review of the student will be undertaken by the interior design 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.

THE MASTER'S PROGRAM

Major (Required courses: 510, 552, 562, 564, 590) 18-21 hours

Cognate Area 9 hours

Research Methods 3 hours

Thesis 6 hours

TOTAL 36 hours

A comprehensive oral examination, administered by the thesis committee, will occur upon completion of thesis research. A non-thesis option is not available.

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 Kentucky or Louisiana. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records. For the Ph.D. see Human Ecology.

GRADUATE COURSES

410 Environment as Code (3) Advanced theoretical issues in considering environment as medium of human communication. Prereq: 200, 400 or consent of instructor. Sp, A

475 History of American Interior Architecture (3) Major styles of interior architecture, decoration, and
Textiles and Apparel

The Department of Textiles, Merchandising and Design offers the Master's degree. Students are expected to have a solid foundation in one of these areas to enter the program. The program of study will prepare students for careers in industry, business, public and private agencies, and educational institutions. Interested students should contact the department head for more information.

ACADEMIC STANDARDS

Each graduate student will be evaluated at the end of the second semester (or after completing a minimum of 18 graduate hours). If the student's GPA is below 3.0, the faculty may recommend probation with specific goals set for a specified time or termination.

THE MASTER'S PROGRAM

Major (Required courses: 540, 550/552*, 580, 590)

Cognate Area

Statistics 6 hours

TOTAL 34 hours

*Students with textile science background must take 550; students without it must take 552.

A comprehensive oral examination, administered by the thesis committee, will be given upon completion of the thesis research.

A non-thesis option is not available.

THE PH.D. CONCENTRATION

Students enrolled in the Ph.D. program in Human Ecology with a concentration in textiles and apparel take one common course which provides a foundation for the integration of textiles and apparel in the context of the near environment. A required departmental seminar exposes students to research being conducted in all areas of study in the department. Textiles and apparel concentration requirements include:

1. Nineteen hours in required textbooks and apparel courses: 550, 552, 540, 590, 641, 685, and 695;
2. College Professional Seminar, Human Ecology 610;
3. Research Seminar, 590. Attendance at seminar is required for all full-time students;
4. Nine credit hours in research methods involving 6 hours of 500-level statistics;
5. Nine hours in University research;
6. Textiles and apparel courses in area of specialization (16-20 hours);
7. Dissertation (24 hours).

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at U.T. Knoxville on an in-state tuition basis. The M.S. program in Textiles and Apparel is available to residents of the states of Kentucky or Mississippi. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records. For the Ph.D., see Human Ecology.

GRADUATE COURSES

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

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

510 International Retail Systems (3) Acquisition and management of information for retail decision; analytical decision making skills; retail management; computer-aided decision making. Prereq: E 470 or equivalent. E

525 Textile Microscopy and Physical Testing (3) Optical and electron microscopes and techniques for textile fibers, yarns and fabrics. Methods and equipment used in physical testing following approved textile standards. Prereq: E 321 or 428. E

534 Advanced Textile Dyeing and Finishing (4) Chemistry, processing and fastness of chemical finishes and various classes of dyes on different fibers. Prereq: E 522 or equivalent. E

535 Physical Properties and Processing of Textiles (3) Methods and mechanisms of processing staple and continuous filament yarns; mechanics of deformation of fibers, yarns and fabrics; physical behavior and textile structure. Prereq: E 521 or 427. E

548 International Textiles (3) Development of traditional textile technologies into consumer products. Economic developments in processing textile fibers, yarns and fabrics; computer-aided design and computer applications; improvements which give U.S. industry competitive edge. Prereq: E 522 or equivalent. E

552 Fiber Chemistry (4) Chemistry of textile fibers; structure, preparation and reactions; dyeing and finishing of fabrics. Introduction to color science. Prereq: General chemistry, 2 hrs and 4 labs. Sp

574 Environmental Design Analysis (3) Integrative problem-solving study from multidisciplinary perspectives. Systems approaches. Available to students from design disciplines and social and behavioral sciences. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. F.A

850 Directed Study in Interior Design (1-3) Independent advanced research in selected areas from field of interior design. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E

851 Directed Study in Interior Preservation (1-3) Independent advanced research in historic preservation relevant for interior design. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E

852 Directed Study in Historic Design (1-3) Independent advanced research in historic stylistic movements in interior design. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E

853 Directed Study in Furniture Design (1-3) Independent advanced research in furniture design. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E

854 Directed Study in Environmental Design (1-3) Independent advanced research in environmental design analysis. Prereq: 574 or consent of instructor. May be repeated. Maximum 9 hrs. E

900 Research Seminar (1-2) S/N only. E

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

508 Seminar in Interior Design (3) Twentieth-century design concepts, persons, motivation, and creative components leading to visual innovation. Prereq: E 470 or consent of instructor. F

520 Integrative Interior Design Studio (3) Identification, integration and synthesis of multidisciplinary data input. Advanced programming techniques and design evaluation. Lecture and studio. Prereq: 510, 564, or consent of instructor. Sp

526 Design Theory (3) Basis of creativity in selected agencies, organizations, or firms that focus on solutions to problems in interior design. Prereq: 9 hrs graduate level interior design or consent of instructor. E

531 Research Methods in Historic Preservation (3) Methodology for historic preservation problems in interior design. Prereq: Architecture 403 or consent of instructor. Sp

542 Special Topics: History of American Interior Design (3) Philosophical and stylistic movements, America of seventeenth, eighteenth, or nineteenth centuries. Topics vary. Prereq: E 475 or consent of instructor. May be repeated. Maximum 9 hrs. F

552 Seminar in Interior Design (3) Twentieth-century design concepts, persons, motivation, and creative components leading to visual innovation. Prereq: E 470 or consent of instructor. F

563 Research Methods in Interior Design (3) Methodology for interior design problems. Prereq: 9 hrs graduate level interior design or consent of instructor. May be repeated. Maximum 9 hrs. E

564 Environmental Factors in Interior Design (3) Human factors and associated research techniques and design methodologies related to interior architectural environments. Design requirements from anatomy, physiology, anthropometry and social and behavioral sciences. Prereq: 6 hrs behavioral science and 6 hrs natural science, or consent of instructor. Sp

574 Environmental Design Analysis (3) Integrative problem-solving study from multidisciplinary perspectives. Systems approaches. Available to students from design disciplines and social and behavioral sciences. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. F.A
The Department of Theatre offers the Master of Fine Arts in Theatre with area concentrations in acting/directing, playwriting/dramaturgy, and design/technical production.

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 is required of all applicants as well as a written comprehensive exam, usually administered in the second year of residency. All M.F.A. applicants must submit three letters of recommendation. 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.

For detailed information about the graduate program, contact the Director of Graduate Studies, Department of Theatre.

THE MASTER'S PROGRAM

At least 60 semester hours, 40 of which must be at the 500 level or above are required for the degree. A Master of Fine Arts with a major in Theatre, which is normally to be completed in three consecutive years of full-time residence. Theatre 501 is required the first semester of residence. Also required are Theatre 401, 310-11, and at least 3 hours in dramatic theory and criticism. 310-11 may be waived by proficiency examination. Students passing this examination must complete 6 hours in advanced theatre history and dramatic theory/criticism, including at least one course from each of the two areas.

Students in the MFA program are evaluated annually by juried performance or portfolio submissions. In addition, each area of concentration has specific requirements. Theatre 500, (6 hours) must be completed satisfactorily before the degree is conferred. Continuance in the program is with the approval of the faculty committee for the MFA program. Satisfactory completion of the comprehensive examination is prerequisite to entry into the third year. Thesis and oral defense (Theatre 500, 6 hours) 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 580 Design and Technical Production Seminar, and at least 3 hours in the projects courses. theatre 401 Principles of Design is required the first year of residence. Theatre 430 Play Directing is required of scene design students lacking an appropriate undergraduate foundation in directing.

Acting

Theatre 520-21-22-23-24-25 Master Class are required, along with one course in directing and 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 area of 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 Liberal Arts, and the Dean of The Graduate School.

Any such credits applied from a previous graduate program would be from courses that are directly relevant to the student's MFA curriculum and must have been earned within the time limit (6 years) established for completion of the MFA degree.

GRADUATE COURSES

401 Principles of Theatrical Design (3) Fundamental principles of design; visual and structural relationships. Projects assigned to develop understanding and perception.

409 Stage Make-up (3) Problems in make-up design and application, character analysis, physiognomy and chiaroscuro. Prerequisite: 100

410 Dramatic Theory and Criticism (3) Theatre aesthetics from Aristotle to present.

420 Special Studies in Acting (3) Content varies. Exercises in selected areas such as styles, techniques, approaches, etc., Shakespeare, movement, humor. Prerequisite: Advanced Acting and consent of instructor. May be repeated. Maximum 9 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 languages. Prerequisite: Consent of instructor.

430-31 Principles of Play Directing (3,3) Problems in composition, picturization, rhythm, movement. Prerequisite: Acting. Must be taken in sequence.

440-41 Advanced Theatre Costume Design (3,3) Costume as expressive element in dramatic production. Prerequisite: 340.

445 Advanced Costume Construction (3) Advanced studies in construction technique, tailoring, vacuum forming, plastic molding, and cobbling. Prerequisite: 345 or consent of instructor.

446 Costume Patternmaking (3) Draping patterns for period costumes. Corsets and study of historical patterns 1500-1900. Prerequisite: 345 or consent of instructor.

450 Advanced Scenery Technology I (3) Study and practice of theatre woodworking; production participation required. Prerequisite: 250. Graduate credit to theatre M.F.A. students only.

451 Advanced Scenery Technology II (3) Study and practice of metalworking and plastics for theatrical productions; production participation required. Prerequisite: 250. Graduate credit to theatre M.F.A. students only.

452 Advanced Scenery Technology III (3) Study and practice of stage rigging for theatre productions; production participation required. Prerequisite: 250. Graduate credit to theatre M.F.A. students only.

454 Scenery Painting (2) Introduction to materials, techniques, and principles of craft. Gaining skill and understanding through studio experience. Prerequisite: Consent of instructor.

460 Advanced Lighting and Sound Technology (3) Projects in lighting and sound coordination. Opera, dance, musical theatre, and "rock videos." Final projects of five productions. Developing artistic sensitivity and subtleties in control. Prereq: 260 or consent of instructor.

461 Special Effects in Lighting and Sound (4) Projects in special effects, creative application of technology. Problem solving, drafting, and execution of effects for production. Participation required. Prereq: 260 or consent of instructor.

462 Advanced Lighting Design (3) Advanced problems in lighting design and theory, lighting musical theatre, opera, and dance. Prereq: 262 or consent of instructor.

463 Sound Design (3) Sound design for performing arts. Review of equipment and acoustical factors that affect sound production. Sound design plotted from selected scenes. Final projects mixed, edited, and cues for production.

465 Introduction to Lighting Design for Non-Designers (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 for the theatre. Prereq: 355 and consent of instructor.

491 Foreign Study (1-15) See page 31.

492 Off-Campus Study (1-15) See page 31.


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

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. E

510 Studies in Theatre History (3) Intensive study of selected topics in theatre history. May be repeated. Maximum 9 hrs.

520-21-22-23-24-25 Master Classes 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 directing involving various lengths and kinds of scripts. May be repeated. Maximum 9 hrs.

539 Play Production in the Secondary Schools (3) Principles and methods for directing high school dramatic programs.

542 The Social History of Costume (3) Study and analysis of costume as related to society's manners and mores, architecture and furniture.


545 Millinery for the Stage (2) Pattern making and construction techniques for hats from antiquity to present. Prereq: Consent of instructor.

546 Advanced Costume Patternmaking (3) Advanced studies in patternmaking period costume. Development of historical patterns through flat pattern method. Prereq: 446.

549 Projects in Costume Technology (1-3) Individualized studies in costume technology in theatre production. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.


553 Projects in Scenic Design (1-3) Conception and completion of major projects, both theoretical and actual, in scene design. May be repeated. Maximum 9 hrs.

554 Studies in Scenic Design (3) Advanced scene design techniques and approaches to design for complex dramas and varied dramatic forms. May be repeated. Maximum 6 hrs.

560 Projects in Lighting Design (1-3) Conception and completion of major projects, both theoretical and actual, in lighting design. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

562 Special Problems in Lighting Design (3) Advanced problems in lighting design and theory, problems in step production and touring. Prereq: 462 or consent of instructor. May be repeated. Maximum 9 hrs.

570 Dramaturgy: Theory and Practice (3) Methods and materials. Prereq: Consent of instructor.

571 Seminar & Projects in Dramaturgy (3) Directed study and experience. Prereq: Consent of instructor. May be repeated. Maximum 18 hrs.

573 Seminar in Playwriting (3) Exercises and projects tailored for advanced students in playwriting. Prereq: Consent of instructor. May be repeated. Maximum 18 hrs.

575-76 Studies in Dramatic Theory and Criticism (3,3) Broad-based study of major ideas about drama.

580 Design and Technical Production Seminar (1-6) Selected aspects of scenic design and technical production. Prereq: Consent of instructor. May be repeated. Maximum 18 hrs.

585 Production Workshops (1-6) Directed experience in production collaborations. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.


599 Project and Thesis (1-6) Available to theatre MFA students only. Prereq: Minimum of 30 hrs toward MFA degree and consent of advisor. May be repeated. Maximum 9 hrs.

Transportation

See Marketing, Logistics and Transportation

Urban Practice

(College of Veterinary Medicine)

MAJOR

Veterinary Medicine D.V.M.

D. J. Krahkinkel, Head

Professors:

Brace, J., D.V.M. California (Davis)
Bright, R. M., D.V.M. Ohio State
Dorn, A. S., D.V.M. Illinois
Krahkinkel, D. J., D.V.M. Auburn
Legendre, A. M., D.V.M. Auburn

Associate Professors:

DeNovo, R. C., Jr., D.V.M. Illinois
Gompil, R. E., D.V.M. Ohio State
Paddieford, R. R., D.V.M. Missouri
Selker, R. A., D.V.M. Texas A&M
Wiegell, J. P., D.V.M. Colorado State

Assistant Professors:

Bright, J. M., D.V.M. Purdue
Brooks, D. E., D.V.M., Ph.D. Florida
Daniel, G. B., D.V.M. Auburn
Harvey, R. C., D.V.M. Tennessee
Jenkins, C. C., D.V.M. Tuskegee
Laratta, L. J., D.V.M. Michigan State
Pardo, A. D., D.V.M. California (Davis)
Schmetzel, L. P., D.V.M. Auburn

Clinical Associate:

Averis, S., D.V.M. Michigan State

Clinical Research Associate:

Sackman, J. E., D.V.M. Michigan State

Residents:

Abrams, K., D.V.M. Oklahoma State
Cook, S., D.V.M. Minnesota
Graehler, R., D.V.M. Auburn
Hawks, D., D.V.M. California (Davis)
Hodges, R., D.V.M. Tuskegee
Hoskinson, J., D.V.M. Washington State
Okrasinski, E., D.V.M. Georgia
Purvis, D., V.M.D. Pennsylvania
Ross, W., D.V.M. Tuskegee
Thompson, L. D. V.M. Auburn

Intern:

Bradley, D., D.V.M. Ohio State

See Veteran Medicine for program description.

GRADUATE COURSES

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

501 Special Topics in Small Animal Medicine and Surgery (1-4) 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 is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

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

Veterinary Medicine

(College of Veterinary Medicine)

MAJOR

Veterinary Medicine D.V.M.

DEGREE

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 met at any accredited college or university that offers courses equivalent to those listed.
to those at The University of Tennessee, Knoxville, and must be completed by the end of the spring term of the year in which the student intends to enroll. Biochemistry requirements must have been satisfied within five years of the time the student wishes to enter the program.

Subject Area | Semester Hours
--- | ---
English | 6
Humanities and Social Sciences* | 18
Calculus | 6
Physics | 8
General Chemistry | 8
Organic Chemistry | 8
Biochemistry** | 4
General Biology | 8
Genetics | 3
Cellular Biology*** | 3
TOTAL | 72

*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. An appropriate microbiology course may be approved if cellular or molecular biology is not offered.

Admission Procedures

Admission of new students is for the fall semester, with first priority given to residents of Tennessee.

Forms and instructions for making application for admission may be obtained, after September 1 each year, from Director of Admissions, 201 Student Services Building, The University of Tennessee, Knoxville, TN 37996-0200.

Applications must be completed and mailed in time to reach the UT Knoxville Director of Admissions by January 15 each year. All supporting documents, official transcripts, Veterinary College Admission Test (VCAT) (formerly VAT) results from a test taken within 24 months of the January 15 application deadline date, and the student’s report must arrive no later than 30 days after the application deadline date. 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 semester six and is a continuous clinical training schedule extending over one calendar year.

The first year consists mostly of pre-clinical subjects such as anatomy, physiology, histology, and microbiology. Included in this first year also are subjects such as physical diagnosis and anesthesia. Considerable integration of subject matter is incorporated during this time.

The second and third years include the study of diseases, their causes, diagnoses, treatment and prevention and are team-taught on a body system-oriented basis.

The final year (three semesters) is devoted to intensive training in the solving of animal disease problems, including extensive clinical experience in the CVN Teaching Hospital. The final year consists of a series of clinical blocks through which each student will rotate.

An innovative feature of this curriculum is the designation of semester six as one in which the individual student may select his or her course of study. This format allows select students with an interest in advanced or dual-degree programs to enroll in all, some, or none of the regularly scheduled courses during that semester. Students will be required to complete at least 16 hours of hours and three hours will be credited toward the D.V.M. The semester of elective study offers a unique educational alternative for select students in the CVM which is intended to enhance professional growth, concentration and additional career choices.

In addition to education in the science and art of veterinary medicine, students receive instruction in preclinical subjects such as animal behavior, veterinary communications, professional ethics, jurisprudence, economics, and practice management.

The curriculum requires successful completion of 154 semester credits.

Extramural Programs

The opportunity to participate in off-campus learning experiences may be available for a limited number of students during the latter half of the final year of the professional curriculum. Selection of an extramural learning experience requires approval by the department concerned and the College of Veterinary Medicine Curriculum Committee. The extramural program identified by the student must represent a learning experience not available within The University of Tennessee, Knoxville.

THE GRADUATE PROGRAM

The College also administers a graduate program involving all departments and leading to the Master of Science and the Doctor of Philosophy. The program is under the joint administration of the interdisciplinary departmental administration of the College of Veterinary Medicine, the faculty have opportunities in the graduate programs of other instructional units, including Animal Science (nutrition and physiology), Microbiology (bacteriology, virology and immunology), Ecology (environmental toxicology), Public Health, and Comparative and Experimental Medicine.

The majority of the graduate students and graduate faculty of the College of Veterinary Medicine are involved in the Comparative and Experimental Medicine program. (Refer to other sections of this catalog for a full description of these programs.) The curriculum of the graduate students and graduate faculty of the College of Veterinary Medicine are involved in the Comparative and Experimental Medicine program (see page 64). This program provides a wide spectrum of interdisciplinary training that prepares graduates to assume positions in biomedical environments and in teaching or research capacities involving humans or animals.

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 Ph.D. programs in Comparative and Experimental Medicine are available to residents of the state of Kentucky. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.

PROFESSIONAL COURSES


817 Special Problems in Microbiology (1-8) Extramural and specially designed study for students interested in select topics in bacteriology, mycology, virology and immunology.

821-22 Anatomy ULI (4.4) Gross and applied anatomy. Neuropsychiatric structure of common domestic animals: dog, cat, horse, cow. Dissection of embalmed specimens, prosections, slides, models, and living animals.

823-24 Physiology ULI (4.4) Introduction to concepts and problems in physiology which form base for clinical applications and for formal training in pharmacology, medicine, pathology, and surgery. Cellular, neural, cardiovascular, renal, respiratory, digestive, endocrine, and reproductive physiology.

825-26 Histology/Organography (3.3) Histology and organography of animal body systems, structural and functional interrelationships. Embryonic development from fertilization through organogenesis. Correlated with 823-24.

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 (1) Paramedical subjects important to veterinary practice: practice management, interpersonal relations, communications, jurisprudence, ethics, careers, animal behavior and veterinary history. May be repeated. SDN 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.


834 Hematopoietic System (3) Hematology, the pathology, and clinical management of diseases of the hematopoietic and lymphoid organs and tissues. Principles, methods, and laboratory evaluation of diseases from other organ systems.

835 Medical Interaction (2) Multidisciplinary laboratory sections and lectures of physiologic, pharmacologic and surgical concepts. Applied techniques in animal handling to facilitate anesthesia, surgery, post-surgical recovery and wound healing. Demonstration of physiologic processes and drug effects.

836 Toxicology (2) Principles of toxicology, molecular mechanisms, pathologic processes and clinical and clinical aspects of animal diseases caused by common toxic agents.

840 Integumentary System (3) Pathophysiology, special pathology, medicine and surgery of diseases of the integumentary system of all species of animals. Laboratory examination, pathology, diagnosis and treatment.

841 Reproductive System (4) Pathophysiology, special pathology, medicine and surgery of diseases of male and female reproductive systems and mammary gland of all species of animals.

842 Alimentary System (5) Pathophysiology, special pathology, medicine and surgery of diseases of alimentary systems of all species of animals.

843 Musculoskeletal Systems I (3) Pathophysiology, special pathology, medicine and surgery of diseases of muscular and skeletal systems of all species of animals. Basic principles, pathologic changes and radiographic interpretation.
844 Musculoskeletal System II (3) Pathophysiology, special pathology, medicine and surgery of diseases of musculoskeletal systems of all species of animals. Advanced principles, radiographic interpretation and surgical procedures.

845 Principles of Medical Science (2) Physiologic 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, pathophysiologic, medicine, and surgery of avian species, laboratory and zoo animals and reptiles. Species and diseases seen by practicing veterinarian. Current topics on foreign animal diseases.

847 Current Topics in Veterinary Medicine (1-3) Elective subjects in veterinary medicine: basic sciences, clinical specialties and issues related to veterinary practice. May be repeated. S/NC only.

848 Art of Veterinary Medicine II (1) 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.

849 General Elective in Clinics (2) Special rotation with clinical training in urban practice, rural practice, environmental practice and pathobiology. S/NC or letter grade.

850 Introduction to Clinics (1) Clinical veterinary practice with discussions and practical experience. Problem-solving and integration of basic sciences with clinical applications. Problem-oriented veterinary medical record.

851 Urinary System (3) Pathophysiology, special pathology, medicine and surgery of diseases of urinary system of all species of animals. Urinary-renal system in health and disease.

852 Cardiovascular System (2) Pathophysiology, special pathology, medicine and surgery of diseases of cardiovascular systems of all species of animals. Anatomic, physiologic and pharmacologic principles which provide basis for treatment.

853 Endocrine System (2) Pathophysiology, medicine and surgery of diseases of endocrine system of all species of animals. Mechanisms of endocrine and metabolic diseases: therapy and prevention.

854 Respiratory System (3) Pathophysiology, special pathology, medicine and surgery of diseases of respiratory system of all species of animals. Upper and lower respiratory system: infections and noninfectious diseases.

855 Radiology (3) Basic, advanced and special techniques of x-ray interpretation and use of radiologic and related techniques in diagnosis and treatment of diseases of all species.

856 Special Senses (2) Pathophysiology, special pathology, medicine and surgery of diseases of visual and auditory systems of all species of animals.

857 Nervous System (3) Pathophysiology, special pathology, medicine and surgery of diseases of nervous system of all species of animals: 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, excretion, important idiosyncrasies and clinical application.

865 Clinical Rotation in Environmental Practice (2) Clinical training in avian medicine, laboratory animal and zoo avian medicine, toxicology, public health, and other related disciplines.

867 Special Problems in Environmental Practice (1-8) Extramural and specially designed study for students interested in selected topics in avian medicine, laboratory animal medicine, zoo animal medicine, epidemiology, public health, pharmacology or toxicology.

871 General Pathology (4) Principles of pathobiology: causes of disease, disturbances of cell growth, inflammation, and neoplasia.

872 Pathobiology (3) Principles of pathology: zoo, medical and surgical specialties of companion animals. Direct responsibility for diagnosis, patient care, and treatment of clinical patients.

875 Clinical Rotations in Pathobiology (2) Clinical training and demonstrations in laboratory diagnosis: post-mortem examination and clinical pathology, parasitologic and microbiologic techniques.

876 Clinical Rotations in Pathobiology II (2) Clinical training and demonstrations in laboratory diagnosis: post-mortem examination and clinical pathobiologic and microbiologic techniques.

877 Special Problems in Pathobiology (1-6) Extramural and specially designed study for students interested in select topics in morphologic 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, patient 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, patient 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, patient 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, patient care, and treatment of clinical patients.

885 Clinical Rotation in Radiology (1-2) Clinical training in radiographic techniques and interpretation of radiographs as part of diagnostic process.

887 Special Problems in Urban Practice (1-6) Extramural and specially designed study for students interested in select topics in medicine, surgery, anesthesiology, radiology, and medical specialties of small companion animals.

891 Clinical Rotations in Rural Practice (4) Clinical training in medicine, surgery, specialty disciplines and herd health of food animals and horses. Direct responsibility for diagnosis, patient care and treatment of clinical patients.

892 Clinical Rotations in Rural Practice II (4) Clinical training in medicine, surgery, specialty disciplines and herd health of food animals and horses. Direct responsibility for diagnosis, patient care and treatment of clinical patients.

893 Clinical Rotations in Rural Practice III (4) Clinical training in medicine, surgery, specialty disciplines and herd health of food animals and horses. Direct responsibility for diagnosis, patient care and treatment of clinical patients.

894 Clinical Rotations in Rural Practice IV (4) Clinical training in medicine, surgery, specialty disciplines and herd health of food animals and horses. Direct responsibility for diagnosis, patient care and treatment of clinical patients.

895 Clinical Rotation in Radiology II (2) Clinical training in radiographic techniques and interpretation of radiographs as part of diagnostic process.

897 Special Problems in Rural Practice (1-6) 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 animals. Prereq: Consent of instructor.

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.

537 Multispecies Medicine (4) Anatomy, pathophysiology, medicine and surgery of birds, reptiles and laboratory and zoo mammals. Common species and diseases. Prereq: Consent of instructor.

545 Principles of Medical Science (2) Physiologic and pathologic principles underlying mechanisms of disease. Selected examples of human and animal diseases; recent scientific advances in biomedical science. Prereq: Consent of instructor.

Zoology

(Major of College of Liberal Arts)

DEGREES

Zoology M.S., Ph.D.

Arthur C. Echternacht, Head

Professors:

Bagby, R. M., Ph.D. ..... Illinois

Bunting, Dewey L., Ph.D. ..... Oklahoma State

Carlson, J. G. (Emeritus) (Distinguished Prof.), Ph.D. ..... Pennsylvania

Echternacht, Arthur C., Ph.D. ..... Kansas

Etter, D. A., Ph.D. ..... Minnesota

Handel, Mary Ann, Ph.D. ..... Kansas State

Jean, K. W., Ph.D. ..... London

Joy, D. C. (Distinguished Scientist), Ph.D. ..... Oxford (UK)

Kennedy, J. R., Ph.D. ..... Iowa

Liles, J. N., Ph.D. ..... Ohio State

MacCabe, J. A., Ph.D. ..... California (Davis)

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

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

Roth, L. Evans, Ph.D. ..... Chicago

Shivers, C. A., Ph.D. ..... Michigan State

Tanner, J. T. (Emeritus), Ph.D. ..... Cornell

Vaughan, G. A., Ph.D. ..... Duke

Welch, H. G. (Emeritus), Ph.D. ..... Florida

Whiston, G. L., Ph.D. ..... Iowa

Associate Professors:

Burnham, K. D. (Emeritus), Ph.D. ..... Iowa

Chen, T. T., Ph.D. ..... Florida

Fox, David J., Ph.D. ..... Johns Hopkins

Greenberg, Neil, Ph.D. ..... Rutgers

McCracken, G. F., Ph.D. ..... Cornell

Pan, M. L., Ph.D. ..... Pennsylvania

Research Associate Professor:

Ashley, T., Ph.D. ..... Florida State

Assistant Professors:

Boake, C. R. B., Ph.D. ..... Cornell

Drake, J. A., Ph.D. ..... Purdue

Ganguly, R., Ph.D. ..... Nebraska

Gittleman, J. L., Ph.D. ..... Sussex

Hall, J. C., 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.
404 General Genetics Laboratory (2) 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.

410 Advanced Cell Biology (3) Molecular and supramolecular structure and functions of eukaryotic cells; regulatory mechanisms of cellular responses. Prereq: Biology 210. 2 labs.

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 (2) (Same as Microbiology 430.)

439 Immunology Laboratory (1) (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.)

456 Human Genetics (2) Genetic and molecular principles and problems of human inheritance. Prereq: Biology 220.

470 Aquatic Ecology (3) Introduction to physico-chemical 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. 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.

474 Ichthyology (3) Evolution, classification, collection and identification, distribution and biology of fishes, freshwater fauna of Eastern North America. Prereq: Biology 230 or consent of instructor. 2 hrs and 2 labs.

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.)

490 Comparative Endocrinology (3) Comparative analysis of physiology and morphology of endocrine glands in vertebrates and invertebrates, their role and interaction in maintenance of organism and species. Prereq: 440 or equivalent.

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

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/NCo only.

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


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/NC 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.

508 Methods of Taxonomy (2) Speciation, taxonomic decisions, approaches to systematics and rules of nomenclature. Prereq: Consent of instructor.

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.)

520 Advanced Mammalian Physiology (5) Cellular and organ systems physiology. Prereq: Undergraduate general anatomy and physiology. Recommended prereq: Biochemistry 410 or equivalent or consent of instructor.

521 Experimental Physiology (2) Laboratory principles and techniques in modern physiology; principles of physiological recording. Prereq: 520 or consent of instructor. 2 labs.

522 Advanced Muscle Physiology (3) Cellular and molecular aspects of muscle contraction and nerve control of contraction, and their relationship to locomotor adaptations in whole animal. Prereq. 440 or 445.

523 Physiology of Hormones (3) Cellular and organizational action of hormones in invertebrate and vertebrate animals. Prereq: 450 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 extremes of physical and biotic environment. Terrestrial vertebrates. Prereq: Undergraduate courses in animal physiology and ecology. 440 and Biology 230 or equivalent.

525 Physiological Ethology (3) Behavioral endocrinology and neurology from ethological perspective; reciprocal relationships of physiology and behavior in natural context. Term paper, review of assigned topic, creative development of special aspect. Prereq: 450 or equivalent. Recommended prereq: Undergraduate physiology, or consent of instructor.

526 General Vertebrate Neuroanatomy (3) (Same as Psychology 526.)

540 Insect Taxonomy I: Major Orders (3) Survey of classification of major orders of insects, with practical experience in identification of insects at family level. Prereq: Consent of instructor. 4 hrs combined lecture and lab.

541 Insect Taxonomy II: Minor Orders (3) Survey of classification of minor orders of insects, with practical experience in identification of insects at family level. Prereq: 540 or consent of instructor. 4 hrs combined lecture and lab.

542 Insect Structure and Function (3) Integrated study of morphology and physiology at tissue and cellular level of insects. Prereq: Consent of instructor.

543 Aquatic Insects (3) Taxonomy and biology of aquatic insects, immature forms. Prereq: Consent of instructor. 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 (2) Second-level course in ethology; emphasis on general animal behavior, evolutionary aspects, and animal physiology. Prereq: 450 or equivalent. (Same as Psychology 545.)

555 Seminar in Quaternary Studies (3) (Same as Geology 555 and Botany 555.)
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.)

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 page 31.

592 Off-Campus Study (1-15) See page 31.

593 Independent Study (1-15) See page 31.

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

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.

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.
FACILITIES FOR RESEARCH AND SERVICE
Facilities for Research and Service

Bureau of Educational Research and Service
(College of Education)

Timothy J. Pettibone, Director

Four major types of activities—research, development, educational services, and publications—are channeled through the Bureau of Educational Research and Service (BERS), located in 212 CEB. The research activities relate to the development of research proposals, conducting and/or assisting in research, and assisting others in development of research proposals in the College of Education. Developmental activities relate to change efforts in curricular content and instrumental methodology. Educational services include a wide list of activities such as in-service educational programs, consultant services, and technical assistance and administrative training programs. Official publications of the College of Education are developed through the Bureau. A limited number of graduate student assistantships are available.

Center for Business and Economic Research
(College of Business Administration)

David A. Hake, Director

The staff of the Center for Business and Economic Research engages in studies of the business and economic environment in Tennessee, the southeast, and the nation. The Center, located at 100 Glocker, serves the business community, state government, individuals, and The University through dissemination of various kinds of economic and socioeconomic information; supports the faculty of the College in seeking funding for research projects; and, through its Computer Resources Group, provides support for integration of technology in the College of Business Administration. Staff members conduct research in regional economics, public finance, and areas related to socioeconomic problems in the region. The Center publishes the results of research in monograph form so that significant developments in the various business disciplines and economics can achieve widespread exposure. In addition, the Center staff does contract research on business and economic problems for governmental organizations and private industry. The Center publishes the Tennessee Statistical Abstract and the Survey of Business. The Center is a member of the Association for University Business and Economic Research.

Center for Computer Integrated Engineering and Manufacturing
(College of Engineering)

William T. Snyder, Acting Director

The Center for Computer Integrated Engineering and Manufacturing (CCIEM) was established in 1985 and is an interdisciplinary organization within the College of Engineering. The Center, located at 124 Perkins Hall, provides education, research, and service to American industry in the integration of engineering design, manufacturing, and management. CCIEM state-of-the-art computer hardware and software enables faculty and staff to undertake a design and manufacturing agenda crucial to industry. The goals of the Center are to: (1) utilize state-of-the-art CAD/CAM and CIM technologies in engineering research, education, and practice; (2) perform research in communication technologies between heterogeneous computers and control devices; (3) develop computer-based education course-ware; and (4) work with industry in the automation of manufacturing processes and office functions.

CCIEM is supported by U.S. corporations through a variety of funding mechanisms with The University of Tennessee. CCIEM, in turn, supports industry, as well as the academic needs of the College of Engineering faculty, through research and access to necessary computer hardware and software.

Center for International Education
(Office of Vice Provost/Student Affairs)

James Gehlhar, Acting Director

The Center for International Education (CIE), 201 Alumni Hall, telephone 974-3177, promotes and supports all aspects of international education and international exchange at UT Knoxville, both for American students and faculty and for students and faculty from other countries. The administration of official linkage agreements between UT Knoxville and institutions of higher education in other countries is coordinated by CIE.

American students: CIE provides information and advice about study-abroad options open to UT Knoxville students, including the exchange programs it administers between UT Knoxville and universities in thirty countries on six continents. CIE coordinates campus administration of such international grants and scholarships for students as the Fulbright, Rhodes, and Marshall programs, and provides information about other sources of funding for overseas study and research, including the Rotary Foundation, St. Andrews, and German Academic Exchange Service (DAAD) grants. Within its library on study, work, and travel abroad, CIE has information about student summer job programs in seven countries.

International students and scholars: CIE provides information and assistance in matters relating to United States visa regulations, to UT Knoxville requirements for international students, and to UT Knoxville academic policies and registration procedures. It publishes The Link, a newsletter for UT Knoxville's international community, and administers the insurance policy required of all international students at the University. International student advisors are available to discuss academic and personal concerns. Orientation programs conducted at the beginning of each term facilitate adjustment to the campus and community, as does the international student orientation camp prior to the fall term.
The International House, 1515 Cumberland Avenue, is CIE’s on-campus social, recreational, and programming center that serves as a meeting place for international and U.S. students, faculty and staff.

International students seeking admission to UT Knoxville should write directly to the Office of Graduate Admissions and Records.

Center for Measurement and Control Engineering

(College of Engineering)

E. C. (Bud) Muly, Director
The Measurement and Control Engineering Center, 101 Perkins Hall, is a University/Industry Cooperative Research Center sponsored by the College of Engineering of The University of Tennessee, the Instrumentation and the Control Division of Oak Ridge National Laboratory, and the National Science Foundation. The Center’s program combines education, research, and technology transfer. Interested graduate students apply for affiliation with the Center and are required to take graduate-level courses in measurement science and control theory. Graduate assistantships are provided for qualified students by the Center. The research is funded by major U.S. industrial companies and focuses on theoretical and practical developments in measurement and control, concentrating on areas that will significantly improve the productivity, reliability and safety of industrial systems and processes.

Centers of Excellence

The Centers of Excellence grew out of Tennessee’s Better Schools Program, an initiative to upgrade state-aided education at all levels. State officials and legislators wanted to give a few outstanding academic programs in state-aided colleges and universities a special push toward prominence, well beyond regular annual increases for all programs.

In 1984, the General Assembly appropriated $10 million for the first Centers of Excellence throughout the state. The public colleges and universities submitted their proposals for Centers of Excellence to the Tennessee Higher Education Commission, which made the final determinations. Funding has been extended each successive year, and now five of the University’s ten Centers of Excellence are sponsored by UT Knoxville.

Concurrently, the University has received state funding, which it must match dollar for dollar, for Chairs of Excellence. These Chairs are $1 million endowed professorships in areas of significance to the University and to the individual, foundation, or corporation providing the matching gift money.

The combination of the Centers of Excellence and Chairs of Excellence adds a dimension to The University of Tennessee that is not easily equaled by other institutions. UT’s reputation as the premiere university in the state and as a regional and national leader in instruction, research, and public service is enhanced as a result of the infusion of these special funds.

For information concerning the individual centers sponsored by UT, contact:

**Center for Laser Applications**
Dr. Dennis Keeler, Director
UT Space Institute
Tullahoma, TN 37388
(615) 455-0631 Ext. 475

**Center for Livestock Diseases and Human Health**
Director
108 Morgan Hall
UT Knoxville
Knoxville, TN 37996
(615) 974-7262

**Center for Materials Processing**
Dr. Joseph C. Danko, Director
101 Perkins Hall
UT Knoxville
Knoxville, TN 37996
(615) 974-0816

**Science Alliance**
Dr. Lee Riedinger
611 Physics Building
UT Knoxville
Knoxville, TN 37996
(615) 974-7805, 974-6765

**Waste Management Research and Education Institute**
Dr. William Cotogneau
327 South Stadium Hall
UT Knoxville
Knoxville, TN 37996
(615) 974-4251

Communications Research Center

(College of Communications)

Michael Singletary, Director
The Communications Research Center, 98 Communications Bldg., is an adjunct to the communications graduate program. Objectives of the Center are (1) to conduct original research in mass and public communication; (2) to disseminate research-generated information; and (3) to provide research services to faculty and students, professional communicators, and others interested in improving the quality of human communications.

Computing Center

Gordon Sherman, Director
The University of Tennessee Computing Center (UTCC) provides computing facilities and services for the University’s teaching, research, public service, and administrative activities. UTCC offices and principal computing facilities are located on the first two floors of Stokely Management Center (SMC) and on the third floor of Dunford Hall.

The Computer Access for Education (CAFE) program provides every UT Knoxville student the opportunity for computing experience through an individual UTCC account. Student accounts for use in coursework are requested by the department through which the course is offered. Faculty and staff members can request a UTCC account by completing a request for computing services. Forms are available from the receptionist at 200 SMC. Each UTCC account is assigned a consultant who is available to answer questions about UTCC resources and to assist in accessing the UTCC library of computer programs.

Noncredit short courses covering levels of computing from personal computing to supercomputing are taught about the year. Topics include programming languages, job control language, vector processing, the use of graphics, and the statistical and mathematical programs available at UTCC. Many courses are available on videotape in Audio Visual Services in the John C. Hodges Library. Short courses are announced in the UTCC Newsletter, the "Campus Capsule" section of the UT Daily Beacon, and the College of Engineering's on-campus social, recreational, and programming center that serves as a meeting place for international and U.S. students, faculty and staff.

International students seeking admission to UT Knoxville should write directly to the Office of Graduate Admissions and Records.
Energy, Environment, and Resources Center

(Office of Vice Provost)

E. William Colglazier, Jr., Director

The Energy, Environment, and Resources Center, 329 South Stadium Hall, was created to encourage interdisciplinary research directed at solutions to problems related to energy and the environment. The Center provides assistance to faculty interested in developing research and public service projects, manages research and development projects that involve several disciplines, and advises state government and industry in specific problems related to energy, environmental, resources, and technology policy issues. The Center has a close working relationship with researchers at the Oak Ridge National Laboratory and the Tennessee Valley Authority.

Current research includes solid, hazardous and radioactive waste management, information systems, environmental assessment of biotechnology, the physical and value issues in technology policy. The Center operates the Waste Management Research and Education Institute, a state-funded Center of Excellence.

Institute of Agriculture

D. M. (Pete) Gossett, Vice President

The Institute of Agriculture traces its history to 1869 when the University was designated as Tennessee’s Federal Land-Grant Institution. Under terms of the Federal Land-Grant Act, the University was enabled to offer instruction in agriculture and the mechanic arts for the first time. Since 1869, agricultural programs at the University have been expanded to include research for the development of new knowledge and extension for dissemination of such knowledge to rural people. Thus the Institute of Agriculture has come to include the work of four major program areas: Agricultural Experiment Station, Agricultural Extension Service, College of Agriculture, and College of Veterinary Medicine.

AGRICULTURAL EXPERIMENT STATION

Don O. Richardson, Dean

Thomas H. Kilnidi, Assistant Dean

The Agricultural Experiment Station was established by The University’s Board of Trustees on June 8, 1882, five years before the passage of the Hatch Experiment Station Act by the U.S. Congress. The University was one of the first five institutions in the U.S. to establish an Agricultural Experiment Station. Since its beginning, the Station has given first attention to investigations of concern to the agriculture of Tennessee.

The objectives of the Tennessee Agricultural Experiment Station are the creation and utilization of new knowledge through research. Fundamental research is directed toward: (a) understanding the basic science of the processes of plant and animal production through conversion into usable products and services; (b) understanding the resource and market forces which affect the production, transfer, processing, and utilization of agricultural commodities and the resulting impact on the economic well-being of the agricultural sector, rural areas, and the State of Tennessee; (c) understanding the interaction of agricultural production and land use on natural resources and the environment as they relate to long-term productivity and affect the quality of rural life; (d) understanding the impact of food and fiber resources and the chemicals used in their production on people’s well-being and the quality of life. Applied research utilizes these understandings to formulate effective production and marketing systems and to foster the development of a physical and economic environment that provides for the needs of rural, farm, and urban citizens.

The investigations of the Station follow a systematic method of gaining and applying knowledge efficiently to the biological, physical, and economic phases of producing, processing, and distributing farm and forest products; to the social and economic aspects of rural living; and to consumer health and nutrition. Both farm and urban populations benefit from the research and development projects of the Agricultural Experiment Station. Examples of some of these accomplishments are new and improved varieties of crops, new and better methods of controlling crop and livestock pests, more efficient production of crops and pasture through improved fertilization and mechanization, and more efficient feeding and management of livestock.

The program is designed and administered through ten subject matter departments located at Knoxville. A majority of the faculty have teaching responsibilities in addition to their research. To assist in the research program, the Station supports extension projects. To serve Tennessee’s diverse agriculture, branch stations are operated at Crossville, Grand Junction, Greeneville, Jackson, Knoxville, Lewisburg, Martin, Milan, Oak Ridge (forestry), Springfield and Spring Mill. Professional and technical staff are in residence at these locations.

AGRICULTURAL EXTENSION SERVICE

Billy G. Hicks, Dean

Mildred F. Clarke, Associate Dean

D. Ray Humble, Assistant Dean

The Agricultural Extension Service was established in 1914. Its purpose is to extend through various educational means agricultural and home economics information to farm families and others in the state who do not have the opportunity to enroll in resident courses of instruction at colleges.

The educational program is carried on through offices in each of the 95 counties of the state. Educational emphasis includes work in four major program areas: agriculture and natural resources, community resource development, home economics, and education of young people through 4-H Clubs. County Extension staff members working directly with local people are supported by various information fields by a specialist staff, members of which are stationed either in Knoxville, Nashville, or Jackson.

The Agricultural Extension Service operates administratively as one of four units of the Institute of Agriculture. For administration, the state is divided into five districts with supervisors located in their respective districts. District headquarters are maintained in Knoxville, Chattanooga, Cookeville, Nashville, and Jackson.
The Agricultural Extension Service operates as a three-way partnership among county, state, and federal governments. The University of Tennessee represents state and federal government and a County Agricultural Extension Committee represents county government in this partnership.

Libraries, The University of Tennessee, Knoxville

Paula Kaufman, Dean

The University of Tennessee, Knoxville Libraries currently subscribe to more than 1,600,000 manuscripts, 70,000 microfilm reels, and 1,600,000 items of other microtext, plus audio and video recordings, and United States and United Nations documents. The UT Knoxville Libraries currently subscribe to more than 70,000 serial titles. The Libraries' membership in the Association of Research Libraries reflects the University's emphasis on graduate instruction and research and the support of large, comprehensive collections of library materials on a permanent basis.

Library holdings in Knoxville are housed in the new 350,000 square foot facility, the John C. Hodges Library, and its branch libraries for agriculture, veterinary medicine, and music. The Hodges Library has comfortable study space for 3,500 students, 308 graduate student carrels, and 196 faculty studies.

The Special Collections Library in the James H. Kessinger Building is a repository of regional and local materials, Tennesseeana, and other specialties, including legislative papers and mementoes of many Tennessee political figures. Special Collections materials are of particular interest to scholars in the fields of history, political science, social sciences, biological sciences, and the arts.

Library research holdings are augmented by Resource Sharing Library and by Interlibrary Loan. Reference and Information Services provides research assistance and access to commercially available databases. In the reference room, users may search a number of CD-ROM databases at no charge. Interlibrary Loan borrows monographs and obtains copies of other material from libraries around the world. Library holdings are accessible via a sophisticated online catalog which can be searched both in the library and from home and office computers.

The Law Library on the Knoxville campus and the libraries located on the campuses in Chattanooga, Martin, Memphis, and Tullahoma are individually administered. Each library at The University of Tennessee is accessible to all students and faculty in the system.

Management Development Center

(College of Business Administration)

John E.Riblett, Director

The College of Business Administration's continuing education efforts are offered through the Management Development Center, 709 Stokely Management Center. The Center emphasizes consistent high-quality program-
general public as well as to University students, upon referral by a physician.

**Transportation Center**

(Office of Vice Provost)

Stephen H. Richards, Acting Director

The Transportation Center was created in 1970 to foster and facilitate interdisciplinary research and public service in the field of transportation at The University of Tennessee. It began operating full-time in 1972 and since then has contributed greatly to the overall research program of The University.

The Center, 357 South Stadium Hall, is a University-level organization administratively positioned with the Office of the Vice Provost for Research at UT Knoxville. The Center's staff is presently organized into eight research divisions: Energy and Environment; Systems Analysis and Data Management; Policy and Services; Rail and Water; Safety and Operations; Structures and Construction; Highway Engineering; and Training and Technology Transfer.

The Center has three goals. The first is to conduct a program of research in transportation that is recognized for its excellence, comprehensive, innovation, productivity, and national leadership. The second is to develop and sustain the technical expertise for high quality transportation research by the faculty and students within the various departments and colleges of UT. The third goal is to serve the transportation research, service, and training needs of state and local government, business, and industry in Tennessee, the southeast region, and the nation.

**The University of Tennessee Space Institute**

Wesley L. Harris, Vice President

The Space Institute is a graduate education and research institution located on a 365 acre lakeshore campus in Middle Tennessee. UTSI was established in 1964 and has evolved into an internationally recognized institution for graduate study and research in engineering, physics, mathematics, and computer science. The accredited academic programs and educational policies of the Space Institute have their origins in appropriate departments of The University of Tennessee, Knoxville. The more than 45 faculty members of the Institute carry out these accredited academic programs through classroom teaching, informal seminars, active research, and directing the research of their students in an environment of creative work and advanced study. Programs are available to students devoting full-time or part-time effort toward M.S. and Ph.D. degrees, those interested in continuing education for updating and broadening knowledge, and those who wish to pursue post-doctoral research.

Graduate degree programs are available with majors in Aerospace Engineering, Aviation Systems, Chemical Engineering, Computer Science, Electrical Engineering, Engineering Science, Industrial Engineering (engineering management concentration), Mathematics, Mechanical Engineering, and Physics. In addition to the fundamental studies characteristic of each discipline, research opportunities are available in many areas including aerodynamics, atmospheric science, fluid mechanics, advanced space propulsion, knowledge engineering, energy conversion processes, thermal sciences, coal combustion, magnetohydrodynamics, plasma physics, space systems, remote sensing, propulsion, computational fluid dynamics, and other aspects of atmospheric and space flight.

The Institute has an established Center of Excellence in Laser Applications and offers graduate studies and research opportunities in laser diagnostics, laser materials interactions, pico-second processes, and coherent and nonlinear optics.

The Institute was established in part to increase the research and engineering resources of Tennessee through education and practice in relevant scientific and technical areas and in part to interface University faculty and student research with the Air Force Arnold Engineering Development Center. The faculty, research activities, and facilities of the Institute, and those available at Arnold Center through appropriate contractual arrangements, provide students an unusual opportunity for significant research in these areas. Students who enroll at UTSI are admitted to the Graduate School, The University of Tennessee, Knoxville. Graduate Research Assistantships are available for qualified students. Further information may be obtained from the Dean, The University of Tennessee Space Institute, Tullahoma, Tennessee 37388.

**Water Resources Research Center**

(Office of Vice Provost)

E. William Colglazier, Director

The Water Resources Research Center, 428 South Stadium Hall, is a federally designated institute for the conduct of water research for the state. The purposes of the Center are: (1) to assist and support all the academic institutions of the state, public and private, in pursuing water resources research which addresses a wide range of problems of interest to the state, region, and nation; (2) to provide for information dissemination and technology transfer services to state and local government agencies, academic institutions, professional groups, environmental organizations, and others, including the general public, who have an interest in water resources matters; (3) to promote education in fields relating to water resources and to encourage the entry of promising students into careers in these fields.
Index

Master of Science, 38, 39, 41, 42, 48, 51, 52, 53, 54, 56, 59, 60, 62, 63, 66, 68, 71, 73, 76, 78, 80, 84, 89, 90, 91, 93, 94, 97, 101, 102, 104, 105, 107, 112, 114, 116, 118, 121, 125, 128, 132, 134, 136, 140, 154, 156, 158, 160, 163, 165
Master of Science in Library Science, 111
Master of Science in Nursing, 130
Master of Science in Planning, 139
Master of Science in Social Work, 149
Materials Processing, Center of Excellence for, 31, 172
Materials Science and Engineering, 31, 116
Mathematics, 32, 118
Measurement and Control Engineering, Center for, 31, 172
Mechanical and Aerospace Engineering, 31, 121
Mechanical Engineering, 121
Medical Biology, 32, 124
Medical Ethics, 135
Medicine, College of:
Medical Biology, 32, 124
Merchandising and Design, 160
Metallurgical Engineering, 116
Microbiology, 32, 125
Microbiology--Veterinary Medicine, 33, 126
Minors, 20
Modern Foreign Languages, 96, 146
M.S.S.W.-M.P.A. Program, 149
M.S.S.W.-M.P.A. Program, 141, 149
Music, 32, 126
Music Education, 48
Music Ensemble, 128
Music Fees, 16
Music General, 127
Music History, 127
Music Instrumental, 127
Music Jazz, 127
Music Keyboard, 127
Music Performance, 128
Music Theory, 127
Music Voice, 127
Nashville Graduate Engineering Program, 174
New Venture Analysis, 57
Non-Degree Admission, 14
Non-Thesis Programs, 8-9
Non-Thesis Registration, 23
Nuclear Engineering, 31, 128
Nursing, 32, 130
Nursing, College of, 32
Nutrition, 132
Nutrition and Food Sciences, 31, 132
Oak Ridge Graduate Resident Graduate Program, 174
Oak Ridge School of Biomedical Sciences, 53, 174
Off-Campus Centers, 174
Off-Campus Housing, 18
Off-Campus Study, 32
Office Hours, inside front cover
Ombudsman, 19
Oral Examinations, 23, 24
Ornamental Horticulture and Landscape Design, 29, 134
Out-of-State Fee Classification, 18
Parking Rules, 19
Passing Grades, 20
Pathology, 35, 134
Payment Plans, 17
Philosophy, 32, 135
Physical Education, 102
Physically Disabled, 19
Physics, 136
Physics and Astronomy, 32, 136
Physiology, 113
Planning, School of, 139
Plant and Soil Science, 29, 140
Plant Pathology, 89

Plant Physiology and Genetics, 113
Political Science, 32, 141
Polymer Engineering, 116
Portuguese, 148
Pre-MBA Program, 57
Prerequisites, 19
Privacy Act, 15
Probation, 22
Procedures:
Admission, 15
Appeal, 22
Doctoral Degree, 24, 26
Master’s Degree, 22, 25
Readmission, 15
Registration, 15
Specialist, 23
Education Degree, 23, 25
Proficiency Examinations, 20
Proficiency Fee, 17
Provisional Admission, 14
Psychological Clinic, 32, 174
Psychology, 32, 143
Psychology, Industrial and Organizational, 104
Public Administration, 141
Public Health, 97
Public School Programs for Cooperative Research, 30
Qualifying Examination, 24
Rating Form, inside front cover, 8-9
Reading Center, 30
Readmission, 15
Repeating Courses, 20
Recreation and Leisure Studies, 97
Refund of Fees, 17
Registrar, inside front cover
Registration:
Change of, 20
Continuous, 24
Dates of, 4
Dissertation, 24
Procedure, 15
Research, 23
Thesis, 22
Use of Facilities, 23
Regulations, Graduate School, 19
Rehabilitation Counseling, 154
Reinstatement Fee, 16
Religious Studies, 32, 135, 146
Requirements:
Admission, 8-9, 13-15
Course, 23, 24
Doctoral Degrees, 23
Grades, 20
Graduate School, 19
Graduation, 25-26
Language, 8-9, 24
Master’s Degrees, 22
Research, 22-24
Residence, 21
Specialist in Education Degree, 23
Research Centers and Institutes, 171
Research Registration, 22-24
Research Requirements, 22-24
Residence Halls, inside front cover, 19
Residence Requirements, 21
Residency Classification, Fees, 18
Responsibility, Graduate Students, inside front cover
Restricted Programs, 8-9, 13, 14
Restricted Theses and Dissertations, 21
Returned Check Policy, 16
Revision of Program, 21
Romance Languages, 32, 146
Rural Practice, 33, 149
Rural Sociology, 41
Russian, 97
Safety, 97
Safety Center, 30
Safety Education and Service, 97
Scholarships, inside front cover, 18

School Health Education, 97
Schools:
Architecture, 46
Biomedical Sciences, 53, 174
Library and Information Science, 111
Planning, 32, 140
Science Alliance, 32, 172
Seniors, Admission of, 15
Services Fee, 16
Services, Student, 18
Services to the Physically Disabled, 19
Short Courses and Workshops, 21
Social Science Research Institute, 32
Social Security Number, 16
Social Work, 149, 174
Social Work, College of, 33, 149, 174
Sociology, 32, 152
Soil Science, 140
Space Institute, 31, 175
Spanish, 146
Special Education, 154
Special Programs, 154
Special Services Education, 30, 154
Specialist in Education Committee, 23, 25
Specialist in Education Degree, 8-9, 23, 25, 70, 78, 79, 97, 158
Speech and Hearing Science, 49
Speech Communication, 32, 156
Speech Pathology, 49
Sponsored International Students, 18
State Testing and Evaluation Center, 30
Statistics, 29, 156
Student Apartments, inside front cover, 18
Student Employment, inside front cover, 18
Student Health Insurance, 17
Student Housing, inside front cover, 18
Student Identification Number, 16
Student Loans, 18
Student Services, 18
Summary of Procedures for Degrees, 25-26
Summer Term Fees and Expenses, 17
Table of Contents, 5
Teacher Certification, 31
Technological and Adult Education, 30, 158
Terminals, 22
Test of English as a Foreign Language, 14, 15, 20
Textiles and Apparel, 161
Textiles, Merchandising and Design, 31, 160
Theatre, 32, 162
Theses, 21, 22
Theses and Dissertations, 21, 22-24
Thesis Registration, 22
Time Limit, 22-24
Timetable of Classes, inside front cover, 15, 19
Traffic Rules, 19
Transcripts, inside front cover, 13, 14
Transfer Credits, 21
Transient Admission, 15
Transportation and Logistics, 116
Transportation Center, 175
Trustees, Board of, 5
Tuition, 16
Tuition Payment Plans, 17
University Administration, 6
University Apartments, 18
University Calendar, 4
University Computing Center, 172
University Evening School, inside front cover
University Fees, 16-18
University International House, 172
University Libraries, 174
University Programs and Services Fee, 16
Urban Practice, 33, 163
Urban Studies, 107
Use of Facilities Registration, 23
UT, Knoxville Administration, 6
Vehicle Operation, 19
Venture Analysis, 57
Veterans' Benefits, inside front cover, 18
Veterinary Medicine, 33, 44, 89, 125, 134, 149, 163
Veterinary Medicine, College of:
Animal Science--Veterinary Medicine, 33, 44
Environmental Practice, 33, 89
Microbiology--Veterinary Medicine, 33, 126
Pathobiology, 33, 134
Rural Practice, 33, 149
Urban Practice, 33, 163
Veterinary Medicine Students, 15, 163
Vocational-Technical Education, 158
Waiver of Fees, 17
Waste Management Research and Education Institute, 172
Water Resources Research Center, 175
Wildlife and Fisheries Science, 91
Withdrawal, 17, 20
Women's Studies, 107
Workshops and Short Courses, 21
Work-Study, inside front cover, 18
Written Examination, 23, 24
Zoology, 32, 165