The University of Tennessee, Knoxville does not discriminate on the basis of race, sex, color, religion, national origin, age, handicap, or veteran status in provision of educational opportunities or employment opportunities and benefits.

UTK does not discriminate on the basis of sex or handicap in the education programs and activities which it operates, pursuant to requirements of Title IX of the Education Amendments of 1972, Public Law 92-318; and Section 504 of the Rehabilitation Act of 1973, Public Law 93-112, respectively. This policy extends both to employment by and admission to the University.

Inquiries concerning Title IX and Section 504 should be directed to the Office of Affirmative Action, 403-C Andy Holt Tower; The University of Tennessee, Knoxville; Knoxville, Tennessee 37996-0144; (615) 974-2498. Charges of violation of the above policy also should be directed to the Office of Affirmative Action.

Publication Authorization Number: E01-0425-009-91
### Agricultural Campus

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<tr>
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<tr>
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<tr>
<td>Animal Science Laboratory</td>
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<td>C.E. Brehm Animal Sciences</td>
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<td>College of Veterinary Medicine</td>
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<td>Crops Genetics Laboratory</td>
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<td>Dairy Products</td>
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<td>Greenhouse A</td>
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<td>Growth Chambers Laboratory</td>
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<td>Library (Pendergrass)</td>
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<td>McClod Hall</td>
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<tr>
<td>Morgan Hall</td>
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<td>Plant Pest Annex</td>
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<td>Power Plant</td>
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<td>Printing &amp; Publications</td>
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<td>Christian Student Center</td>
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<tr>
<td>Christian Student Fellowship</td>
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<td>Episcopcal Student Center</td>
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<td>Hill Foundation, B'nai Brith</td>
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<tr>
<td>Latter Day Saints Institute</td>
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<tr>
<td>Lutheran Campus Ministries</td>
<td>J5</td>
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<td>Methodist Student Center</td>
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<td>Presbyterian Student Center</td>
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<td>Seventh Day Adventist</td>
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<tr>
<td>Alpha Gamma Rho</td>
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<td>Delta Tau Delta</td>
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<td>Delta Upsilon</td>
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<td>Farmhouse</td>
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<td>Kappa Alpha</td>
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<td>Lambda Chi Alpha</td>
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<tr>
<td>Sigma Chi</td>
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<td>Sigma Nu</td>
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### Other Buildings Owned by UT

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<tr>
<td>1809 Andy Holt Ave</td>
<td>701 Sixteenth St</td>
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<td>1818 Andy Holt Ave</td>
<td>1818 Terrace Ave</td>
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<td>1812 Lake Ave</td>
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<td>1814 Lake Ave</td>
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<tr>
<td>2000 Lake Ave</td>
<td>1900 Terrace Ave</td>
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<td>2005 Lake Ave</td>
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<td>2014 Lake Ave</td>
<td>2008 Terrace Ave</td>
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<td>2016 Lake Ave</td>
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<tr>
<td>2102 Lake Ave</td>
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<td>2110 Lake Ave</td>
<td>2022 Terrace Ave</td>
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<tr>
<td>1801 Melrose Ave</td>
<td>2046 Terrace Ave</td>
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<td>1841 Melrose Ave</td>
<td>2106 Terrace Ave</td>
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<tr>
<td>905 Mountcastle</td>
<td>2109 Terrace Ave</td>
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<tr>
<td>907 Mountcastle</td>
<td>2110 Terrace Ave</td>
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<tr>
<td>909 Mountcastle</td>
<td>2111 Terrace Ave</td>
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<tr>
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<td>2124 Terrace Ave</td>
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<tr>
<td>908 Twenty-First Street</td>
<td>916 Twenty-Second St</td>
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</table>
University Calendar for 1991-92

Summer Term 1991

May 30 (Thursday) Classes Begin
July 3 (Wednesday) First Session Ends
July 3 (Wednesday) Change of Registration Deadline, Full Term
July 4 (Thursday) Independence Day
July 5 (Friday) Second Session Begins
August 7 (Wednesday) Second Session Ends
August 9 (Friday) Commencement

Fall Term 1991

August 21 (Wednesday) Classes Begin
September 2 (Monday) Labor Day
September 24 (Tuesday) Change of Registration Deadline
October 10-11 (Thursday-Friday) Fall Break
November 28-29 (Thursday-Friday) Thanksgiving
December 5 (Thursday) Classes End
December 6-7 (Friday-Saturday) Study Period
December 9-13 (Monday-Friday) Final Exams
December 15 (Sunday) Commencement

Spring Semester 1992

January 15 (Wednesday) Classes Begin
January 20 (Monday) Martin Luther King Day
February 18 (Tuesday) Change of Registration Deadline
March 23-27 (Monday-Friday) Spring Break
April 17 (Friday) Good Friday
May 4 (Monday) Classes End
May 5-6 (Tuesday-Wednesday) Study Period
May 7-9, 11,12 (Thursday-Tuesday) Final Exams
May 15 (Friday) Commencement

Summer Term 1992

June 4 (Thursday) Classes Begin
July 3 (Friday) Independence Day
July 8 (Wednesday) First Session Ends
July 9 (Thursday) Second Session Begins
July 14 (Tuesday) Change of Registration Deadline, Full Term
August 12 (Wednesday) Second Session Ends
August 14 (Friday) Commencement

Late registration normally begins two days before classes.

NOTE: Deadlines for degree requirements at end of section on The Graduate School.
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| The Graduate School Administration | 7 |
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| Majors and Degree Programs | 8-9 |

### The Graduate School

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  - Application Procedures
  - Admission Classifications
  - Readmission
  - Registration Procedures
  - Student Identification Number
  - Family Educational Rights and Privacy Act

**Fees, Residency Classification, and Financial Aid**
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- Residency Classification for Tuition Purposes
- Academic Common Market
- Financial Aid

**Student Services**
- Housing
- Vehicle Operation and Parking
- Handicapped Student Services
- Ombudsman Office

**General Regulations**
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- Prerequisites
- Course Listings
- Course Loads
- Change of Registration
- Grading System
- Proficiency Examinations
- English Proficiency
- Minors
- Law Courses
- Auditors and Audited Courses
- Short Courses and Workshops
- Correspondence Study
- Transfer Credits
- Change of Program
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- Theses and Dissertations
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- Appeals Procedure

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- Doctoral Degrees
- Summary of Procedures for Degrees

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  - Architecture and Planning
  - Business Administration
  - Communications
  - Education
  - Engineering
  - Human Ecology
  - Law
  - Liberal Arts
  - Medicine - Knoxville Unit
- Nursing
- Social Work
- Veterinary Medicine
- Nuclear Engineering
- Nursing
- Nutrition
- Ornamental Horticulture and Landscape Design
- Pathobiology
- Philosophy
- Physics and Astronomy
- Planning
- Plant and Soil Science
- Political Science
- Psychology
- Religious Studies
- Romance Languages
- Rural Practice
- Social Work
- Sociology
- Special Programs
- Special Services Education
- Speech Communication
- Statistics
- Technological and Adult Education
- Textiles, Retailing and Interior Design
- Theatre
- Urban Practice
- Veterinary Medicine
- Zoology

### Facilities for Research and Service

- Bureau of Educational Research and Service
- Center for Business and Economic Research
- Center for International Education
- Center for Measurement and Control Engineering
- Centers of Excellence
- Child Development Laboratories
- Communications Research Center
- Computing Center
- Continuing Education and Public Service
- University Evening School
- Non-Credit Programs
- Department of Conferences
- Department of Independent Study
- English Language Institute
- Elderly and Disabled Persons
- Energy, Environment, and Resources Center
- Institute of Agriculture
- Agricultural Experiment Station
- Agricultural Extension Service
- Libraries
- Management Development Center
- Off-Campus Graduate Centers
- Kingsport University Center
- Oak Ridge Resident Graduate Program
- Nashville Graduate Engineering Program
- Chattanooga Graduate Education Program
- UT-OR Graduate School of Biomedical Sciences
- College of Social Work
- Psychological Clinic
- Textiles and Nonwovens Development Center
- Transportation Center
- University of Tennessee Space Institute
- Water Resources Research Center

**Index**

5
The University of Tennessee

Board of Trustees

<table>
<thead>
<tr>
<th>Ex Officio Members</th>
<th>From Congressional Districts</th>
<th>DISTRICT</th>
<th>TERM EXPIRES</th>
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<tbody>
<tr>
<td>Governor, State of Tennessee</td>
<td>R.B. Hailey, Sevierville</td>
<td>First</td>
<td>June 1, 1993</td>
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<tr>
<td>Commissioner of Education</td>
<td>William B. Sansom, Knoxville</td>
<td>Second</td>
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<td>James L. Moore, Jr., Chattanooga</td>
<td>Third</td>
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<tr>
<td>President of the University</td>
<td>William M. Johnson, Sparta</td>
<td>Fourth</td>
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<tr>
<td>Executive Director, Tennessee Higher Education Commission</td>
<td>Marcia A. Echols, Nashville</td>
<td>Fifth</td>
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<tr>
<td>Commissioner of Education</td>
<td>Amon Carter Evans, Columbus</td>
<td>Sixth</td>
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<td>Commissioner of Agriculture</td>
<td>Jack U. Dalton, Parsons</td>
<td>Seventh</td>
<td>June 1, 1994</td>
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<td>Commissioner of Education</td>
<td>Tom Elam, Union City</td>
<td>Eighth</td>
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<td>J. Houston Gordon, Covington</td>
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<td>Ronald Terry, Memphis</td>
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<tr>
<td>Student Member</td>
<td>Cindy T. Smith</td>
<td>July 1, 1991</td>
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<tr>
<th>From Anderson, Bedford, Coffee, Franklin, Lincoln, Moore, and Warren Counties</th>
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<td>Michael Graves</td>
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<td>Donald M. Leake</td>
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<td>James A. Haslam, II</td>
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<td>Governor Ned McWherter, Chairman</td>
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<td>King W. Rogers III</td>
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<td>William M. Johnson, Vice Chairman</td>
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<td>Edward W. Reed</td>
<td>June 1, 1996</td>
<td>Beauchamp Brogan, Secretary</td>
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<td>Joseph E. Johnson, A.B., A.M., Ed.D., Acting President of the University</td>
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<tr>
<td>Joseph E. Johnson, A.B., A.M., Ed.D., Executive Vice President and Vice President for Development</td>
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<tr>
<td>Homer S. Fisher, B.S., M.B.A., Senior Vice President</td>
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<td>Michael T. Nettles, B.A., M.S., M.A., Ph.D., Vice President for Assessment</td>
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<td>D.M. (Petey) Gossett, B.S., M.S., Ph.D., Vice President for Agriculture</td>
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<td>Emerson H. Fly, B.S., CPA, Vice President for Business and Finance</td>
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<tr>
<td>Wesley L. Harris, B.S., Ph.D., Vice President of the UT Space Institute</td>
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<td>James C. Hunt, A.B., M.S., M.D., Vice President for Health Affairs</td>
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<td>Sammie Lynn Puept, B.S., M.S., APR, Vice President for Public Service and Continuing Education</td>
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<td>Beauchamp E. Brogan, B.S., LL.B., J.D., General Counsel</td>
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<tr>
<td>Charles M. Peccolo, Jr., B.S., M.Acc., CPA, CCM, Treasurer</td>
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| UT, Knoxville Administration | |
| John J. Quinn, B.S., Ph.D., Chancellor | |
| Fred Harris, B.S., M.S., MBA, Vice Chancellor for Computing and Telecommunications | |
| Philip A. Scheurer, B.A., M.S., Vice Chancellor for Administration and Student Affairs | |
| Homer S. Fisher, B.S., M.B.A., Senior Vice President | |
| C.W. Minkel, B.A., M.A., Ph.D., Associate Vice Chancellor and Dean of the Graduate School | |
| Thomas C. Collins, B.S., M.S., Ph.D., Associate Vice Chancellor for Research | |
| O. Glen Hall, B.S., M.S., Ph.D., Dean of the College of Agricultural Sciences and Natural Resources | |
| J. William Rudd, B.A., M.A., Dean of the College of Architecture and Planning | |
| C. Warren Neel, B.S., M.B.A., D.B.A., Dean of the College of Business Administration | |
| 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. DeJonge, 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., M.N., Ph.D., Dean of the College of Nursing | |
| Estelle O. Shatz, B.A., M.S., Ph.D., Dean of the College of Social Work | |
| G. Michael H. Shires, B.S., M.S., M.C.R.C.V.S., Dean of the College of Veterinary Medicine | |
| Sam C. Bills, B.S., M.S., Ed.D., Acting Dean of the Division of Continuing Education | |
| Gerald D. Bowker, B.A., M.A., Dean of Admissions (Undergraduate) and Records | |
| Raymond Popp, B.S., M.A., Ph.D., Director of the UT-Oak Ridge Graduate School of Biomedical Sciences | |
| Glenn E. Estes, B.A., M.L.S., Director of the Graduate School of Library and Information Science | |
The Graduate School Administration

C.W. Minkel, B.A., M.A., Ph.D., Associate Vice Chancellor 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 August 1, 1990

Ex Officio Members

<table>
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<tr>
<th>College or Unit</th>
<th>Elected Members</th>
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<th>Proxy</th>
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<td>Agriculture</td>
<td>Dr. Fred Allen</td>
<td>July 31, 1992</td>
<td>Dr. J. L. Collins</td>
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<td>Business Administration</td>
<td>Dr. C. Douglass Izard</td>
<td>July 31, 1991</td>
<td>Dr. Alan M. Schlottmann</td>
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<td>Dr. William Parr</td>
<td>July 31, 1993</td>
<td>Dr. Ernest R. Cadotte</td>
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<td>Communications</td>
<td>Dr. Michael Singletary</td>
<td>July 31, 1993</td>
<td>Dr. Barbara Moore</td>
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<td>Education</td>
<td>Dr. Patricia Beitel</td>
<td>July 31, 1991</td>
<td>Dr. Arnold Davis</td>
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<td>Dr. Don Dessart</td>
<td>July 31, 1992</td>
<td>Dr. Joan Paul</td>
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<td>Dr. John Ray</td>
<td>July 31, 1992</td>
<td>Dr. Peter Husen</td>
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<td>Dr. Phyllis Huff</td>
<td>July 31, 1993</td>
<td>Dr. John Matthews</td>
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<td>Dr. Robert K. Roney</td>
<td>July 31, 1993</td>
<td>Dr. Mark Christiansen</td>
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<tr>
<td>Engineering</td>
<td>Dr. Joseph J. Perona</td>
<td>July 31, 1991</td>
<td>Dr. H.W. Heu</td>
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<td>Dr. J. Reece Roth</td>
<td>July 31, 1992</td>
<td>Dr. Richard M. Bennett</td>
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<td>Dr. Paul N. Stevens</td>
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<td>Dr. Donald R. Pitts</td>
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<td>Dr. Wayman E. Scott</td>
<td>July 31, 1993</td>
<td>Dr. Raymond Buchanan</td>
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<td>Aviation Systems (only at UTSI)*</td>
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</table>

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, Associate Vice Chancellor 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 Kaplan, Assistant Director, Graduate Admissions and Records
Rose 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 the state's oldest, largest, and most comprehensive institution, and is the only state-supported "Research University I" (Carnegie classification) in Tennessee. A wide range of graduate programs leading to the Master's and doctoral degrees is available. The University offers Master's programs in 87 fields and doctoral work in 52. Approximately 6,000 graduate students are enrolled on and off campus under the tutelage of 1450 faculty members.

The Graduate School brings together faculty and graduate students as a community of scholars with a common interest in creative 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's graduate effort. At the same time, the University employs a variety of modes, traditional and non-traditional, in offering quality programs designed to serve a diverse student clientele.

The Graduate School includes the Graduate Council, the Graduate School administrative organization, composed of the Graduate Office, the Office of Graduate Admissions and Records, administrators of the various graduate programs, and the faculty: and the graduate student body.

The Graduate Council is a body composed of elected faculty representatives from each college, the Space Institute, and the Graduate Student Association. Ex-officio members include the Dean and Associate Deans of The Graduate School, the Chair of the Research Council, the Dean of Libraries, the Dean of Continuing Education, and the administrative officer having primary responsibility for the graduate curriculum in each college or school.

The Graduate Council is responsible for standards of admission, retention and graduation, and for curricular matters in graduate programs; the development of interdisciplinary programs; approval of new graduate programs; approval of individuals to direct doctoral dissertation research; financial support of graduate students; and any other matters of educational policy pertaining to graduate programs. Standing committees include academic policy, appeals, credentials, and curriculum.

The Graduate School administration implements the policies formulated by the Council, and has primary responsibility for graduate admissions and records. 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.

When a student is admitted to The Graduate School, the student is assigned an advisor who is a faculty member in the student's graduate program and who is responsible for the student's academic progress.

The University of Tennessee since 1821. The first Master's degree was awarded in 1827. In 1879 the Board of Trustees created a graduate department with authority to confer the Master of Arts, the Doctor of Philosophy, Civil Engineer, and Mining Engineer degrees. The Graduate Department was renamed The Graduate School 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 1943 for Chemistry on the Knoxville campus. A Committee on Graduate Study was appointed in 1914 and coordinated the graduate programs until the Graduate Council was formed in 1949. More than 6,500 doctoral degrees and 36,000 Master's degrees have been awarded to date.

Seven deans have led The Graduate School since 1936: Fred C. Smith, Eugene A. Waters, Dale K. Wantling, Hilton A. Smith, Jack E. Reese, Margaret N. Perry, and C.W. Minkel. They have strived to maintain the rich heritage and the highest quality of graduate programs at UT.

Admission and Registration

Admission to The Graduate School requires a Bachelor's degree with a satisfactory grade-point average from a college or university accredited by the appropriate regional accrediting agency. Admission to The Graduate School does not ensure acceptance into a specific degree program nor admission to candidacy for the degree desired.

When a student is admitted to The Graduate School prior to having received the baccalaureate degree, that degree must be awarded before the date of first registration in The Graduate School. If a student does not enroll within one year after the requested admission, the application process must be repeated. Enrollment in The Graduate School is a privilege which may be withdrawn by the University or any area of graduate study if it is deemed necessary by the Dean of The Graduate School to safeguard the University's standards.
Application 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 non-degree 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. Two letters of recommendation (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 full admission within seven weeks after registration will NOT be permitted to register again until all admission requirements are met. The student's academic advisor at least once each semester will be directed to the appropriate department.

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.

In addition to meeting the minimum requirements for admission to The Graduate School, applicants at the doctoral level must have demonstrated a potential for superior academic performance. To be considered are such criteria as performance in prior undergraduate and/or graduate studies, achievement on admission tests (GRE, GMAT, LSAT), letters of recommendation from professors familiar with the applicant's capabilities, and other evidence of scholarly achievement.

A student who hopes to enter a degree program must meet the following requirements:

1. do not meet the minimum grade-point average requirements;
2. wish to register for graduate courses while meeting the above requirements for non-degree admission; or
3. desire graduate credit for a limited number of courses (one semester only).

The graduate application, a $15 application fee, and proof of the student's degree from a college or university accredited by the appropriate regional accrediting agency are required. No more than one application for non-degree admission within seven weeks after registration will NOT be permitted to register again. All applications do not permit provisional students to register for graduate courses (see pages 8-9 for information on restricted programs). The application must be submitted to the appropriate department.

Application for non-degree status must be made with an academic advisor at least once each semester to discuss his/her program. For a non-degree student who has no declared major, the Associate Dean of The Graduate School or designee is the advisor. Admission to non-degree status does not assure admission to a degree program. The student who seeks to enter a degree program will be directed to the appropriate department. Students must maintain a 3.0 grade-point average to continue enrollment in non-degree status (see Academic Standards).

International students on a non-immigrant visa may not enroll in the non-degree status.

PROVISIONAL ADMISSION

Applicants may be admitted as provisional students for one semester. For one course in each of two semesters who, for example:
1. do not meet the minimum grade-point average requirements;
2. wish to register for graduate courses while meeting the above requirements for non-degree admission; or
3. desire graduate credit for a limited number of courses (one semester only).

The graduate application, a $15 application fee, and proof of the student's degree from a college or university accredited by the appropriate regional accrediting agency are required. Copies of official proof are acceptable. Official transcripts must be received from each college or university attended. The student who has no declared major, the Associate Dean of The Graduate School or designee is the advisor. Any student admitted to the non-degree status must meet the following requirements:

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

A major area must be declared if the intent is to seek an advanced degree. If no degree is desired, 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).

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 either:

1. apply and be admitted to a specific degree program (see Change of Program for 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 at least six hours of graduate coursework 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 the same as those for a degree program.

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 the appropriate academic unit. If no advisor has been assigned, the department head or designee is the advisor. For a non-degree student who has no declared major, the Associate Dean of The Graduate School or designee is the advisor. Admission to non-degree status does not assure admission to a degree program. The student who seeks to enter a degree program will be directed to the appropriate department. Students must maintain a 3.0 grade-point average to continue enrollment in non-degree status (see Academic Standards). An international student on a non-immigrant visa may not enroll in the non-degree status.

Admission and Registration

Application Procedures

To earn graduate credit, a student must be admitted by the Dean of The Graduate School and 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 student who has no declared major, the Associate Dean of The Graduate School or designee is the advisor. Admission to non-degree status does not assure admission to a degree program. The student who seeks to enter a degree program will be directed to the appropriate department. Students must maintain a 3.0 grade-point average to continue enrollment in non-degree status (see Academic Standards).

An international student on a non-immigrant visa may not enroll in the non-degree status.
The University will not enroll any student who has not been approved initially or for transfer by the Immigration and Naturalization Services (INS) to attend UT Knoxville. An international student may not enroll as a provisional or non-degree student. All students whose native language is not English must take an English proficiency examination after arrival at UT Knoxville. Refer to the section on English Proficiency.

TRANSGENDER STUDENT ADMISSION

A student who is enrolled in good standing in a graduate program may apply for admission to The Graduate School. The student must submit the following requirements:

1. A completed application form with a $15 application fee.
2. Official or attested university records, with English proficiency documentation.
3. Results of the Graduate Record Examination (GRE) or Graduate Management Admission Test (GMAT), if required (See pages 8-9).
4. Letters of recommendation or rating forms, if required (See pages 8-9).
5. A statement of personal and professional objectives.
6. A summary of professional career experiences.
7. A statement of interest in the field of study.
8. Evidence of academic excellence.
9. Evidence of financial support.
10. Completion of a course of study equivalent to a Bachelor's degree.

ENTRANCE DATE

The entrance date for admission is summer, fall, or spring. The Office of Graduate Admissions and Records will notify the student of the entrance date after admission has been granted.

ADDITIONAL INFORMATION

Additional information can be obtained from the Office of Graduate Admissions and Records.
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.

Student Identification Numbers

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.

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 previous 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.

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 ........................................ $928

MAINTENANCE AND TUITION (out-of-state students)

PER SEMESTER ........................................ $2,530

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
$135 per semester hour or fraction thereof; minimum charge $270.

Out-of-State
$239 per semester hour or fraction thereof; minimum charge $558.

UNIVERSITY PROGRAMS AND SERVICES FEE

PER SEMESTER ........................................ $111

All students enrolled in excess of eight semester hours per term are assessed an activity fee of $111. Part-time students taking fewer than nine semester hours will be assessed at the rate of $8 per semester hour or fraction thereof; minimum charge $16.

Graduate, teaching, and research assistants, teaching associates, and fellowship students, who may have waiver of fees (tuition and/or maintenance), 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 3-8 hours may elect to pay the student health fee ($36), plus the appropriate part-time programs and services fee. The student health fee is included in the full $111 programs and services fee.

The University programs and services fee is not refundable. The fee for the summer term is $65.

LATE PAYMENT FEE

Graduated Late Service Fees

Upon 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 per course. 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, without notice or written notice.

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 per semester ............................................. $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 room, 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 must contact the Bursar's Office for details.

Deferred Payment Plan
Additionally, rent, 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 deferment 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
If a student requests 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
(The 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 charges (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 paid, classes have been attended, or the schedule is incomplete. Failure to attend class does not automatically withdraw or drop a student from college or class.

The effective date of withdrawal is the date the Withdrawal Office is notified by completion of the official withdrawal request form. The appropriate percentage of fees will be charged unless this action is completed by the close of the last day designated for regular registration check-in and before the first official day of classes for the semester. Failure to notify the Withdrawal Office promptly when withdrawing could result in a larger fee assessment. Withdrawal does not cancel fees and charges already incurred. 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 an 80 percent fee refund. Withdrawal between 11 and 15 business days following registration check-in permits a 70 percent fee refund. The above withdrawal refund policy does not apply to the off-campus Graduate Centers. Refunds, in accordance with the withdrawal refund policy, will be made after the drop deadline. If financial aid has been received for the term, the refund will be applied to finances in a refund first before the student receives any refund.

Refund of Fees for Dropped Courses
Part-time students may pay fees computed at the appropriate semester-hour rate as indicated above. No charge is made for courses dropped during the first 8 business days following registration check-in. A 20 percent charge is made for courses dropped between 9 and 10 business days following registration check-in. A 40 percent charge is made for courses dropped between 11 and 15 business days. A 60 percent charge is made for courses dropped between 16 and 20 business days. A 100 percent charge is made for courses dropped after 20 business days. Students who drop courses and later decide to re-enroll will be assessed at the regular semester-hour rate for the hours continued plus the percentage assessed for the hours dropped results in an amount less than that paid. A course dropped after the first 8 business days is officially dropped, and the drop becomes effective, on the date that the change of registration form is processed on a drop/add terminal. Any refund due for dropped courses will be made after the final audit at the end of the semester.

Rental charges and adjustments will be determined by the Office of Residence Halls in accordance with the terms of the housing agreement or contract.

Summer Term Fees and Expenses
Fees and expenses for the summer semester are the same as for other semesters during the academic year with the exception of the University programs and services fees as noted above.

Although the summer semester is divided into terms of varying lengths, tuition and fees 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. If an appointment terminates during the term, the student owes the appropriate fees from the termination date until the end of the term. 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 since in-patient care is not provided on campus. Students not otherwise covered are urged to provide insurance for the protection of health 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 students whose programs require special administrative or management services beyond those normally provided. Fees are $250 per semester.

**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 admitted to specific programs at UT Knoxville on an in-state tuition basis. 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-one doctoral, one Specialist in Education, and twenty-six Master's programs at UT Knoxville are approved by the Academic Common Market for residents of these states to enroll at in-state tuition rates. Students must be fully admitted to the appropriate degree program, and the letter of certification must be received in the Office of Graduate Admissions and Records before the last day of registration for a given semester. Residents of member states who seek further information should contact the University. Forms are available from the office of Graduate Admissions and Records, 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 Federal Aid Form (FAF) or Federal Family Statement (FFS): A wide range of jobs is 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. On-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. Referral of graduate 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 or 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 another 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.

Vehicle Operation and Parking

The University of Tennessee endeavors to provide adequate facilities for vehicles operated by students and staff. However, areas available for parking are necessarily limited. To reduce traffic congestion within the campus area, large student parking areas are located on the perimeter of the campus. Presently, free bus service is provided from the Main Campus to the Agricultural Campus and Perimeter Lot located off Concord Street behind Tyson Park. Also, bus service is provided to Married Student Housing Units at a nominal fee.

Each person who operates a motor vehicle in connection with attendance or employment at the University must register that vehicle with the Parking Services Office. A University Traffic and Parking Authority determines the parking policy, traffic regulations, and fees. This information is published each year in the "University Traffic and Parking Regulations", and is available at the Parking Services Office, 1115 UT Drive, at the Campus Information Center at Circle Park, and at the vehicle point of registration.

Handicapped Student Services

Handicapped Student Services provides counseling and academic support services to ensure that handicapped students have access to educational opportunities provided at The University of Tennessee. Any student having a disability which restricts his/her participation in academic life is eligible for services. Services provided include personal and career counseling, interpreters, reader referral, and other services designed to meet the student's individual needs. Assistance is available for making arrangements for special in-class assistance. Information regarding transportation and housing is provided. The office serves in a liaison capacity with the Tennessee Division of Vocational Rehabilitation. Registration and other forms of administrative assistance and academic support are provided through the Office of the Dean of Admissions and Records.

Participation in the services program is on a voluntary basis; confidentiality is maintained. Students desiring any services are encouraged to contact the Office of Handicapped Students Services so that any necessary arrangements can be made. The Office is located at 414 Students Services Building.

Services relating to academic programs for students with physical disabilities, whether permanent or temporary (due to sickness or accident), are coordinated by the Office of the Dean of Admissions and Records, 305 Students Services Building.

These services include assistance during registration (preregistration, collection of class schedules, payment of fees, drop and add); the adjustment of schedules to assure classroom accessibility; the securing of special parking permits, elevator keys, tickets for special events; and similar efforts to relieve the special mobility problems of the students. The Physical Plant Office coordinates efforts to eliminate physical barriers to the degree possible, with priority being given to access and facilities for academic buildings.

Ombudsman Office

Personnel of the Ombudsman Office in the University Center assist students in the resolution of problems encountered with any aspect of the University. The office is open during the regular working day and students are welcome to drop in at their convenience. Problems are treated confidentially and are dealt with expeditiously. The office supplements existing appeals channels and actively seeks better ways for the University to serve students.

General Regulations of The Graduate School

Advisor/Major Professor

Every graduate student must have an advisor from the major department. This professor advises the student about courses, supervises the student's research, and facilitates communication with the major department, to other departments and to The Graduate School. The advisor must approve the student's program each semester. Many departments assign a temporary advisor to direct the student's work during the period in which the student is becoming acquainted with the institution and determining the focus of research interests, and in which the department is forming a judgment concerning the student's promise as a scholar. As early as appropriate the student requests a professor in the major department to serve as the advisor. The major professor and student together select a graduate committee.

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 upper 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 material.
The maximum load for a graduate student is 15 hours, and 9 to 12 hours are considered a full load. Students receiving financial aid should consult with the department/program head concerning appropriate course loads. Courses audited do not count toward minimum graduate hours required for financial assistance. Registration for more than 15 hours during the Fall or Spring semester is not permissible without prior approval of The Graduate School, which may allow registration of up to 18 hours during a semester if the student has achieved a cumulative grade-point average of 3.0 or better in at least nine hours of graduate work with no outstanding incompletes. No more than 12 hours are permissible in the summer term without prior approval.

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 who fail to attend an examination are presumed to be absent and the grade of W will be entered on the permanent record. If a student must withdraw from a course or from the University after the first two weeks of classes, a grade of W will be entered on the permanent record.

Course registration may not be changed 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.

No student may do additional work nor repeat an examination approved by the head of the department offering the course. A student 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, the student must be admitted to The Graduate School 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 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.

No student may do additional work nor repeat an examination approved by the head of the department offering the course. A student 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, the student must be admitted to The Graduate School 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.

Graduation 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, due to unforeseen circumstances, has been unable to finish all requirements. 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 semester, excluding the summer term. If a supplementary grade report has not been received in the Office of Graduate Admissions and Records at the end of the semester, the I 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.

S/NC (carries credit hours, but no quality points), S is equivalent to a grade of B or better, and NC means no credit earned. Courses where NC is received may be repeated for a grade of S. A grade of S/NC is allowed only where indicated in the course description in the Graduate Catalog. The number of S/NC courses in a student's program is limited to one-fourth of the total credit hours required.
P/NP (carries credit hours, but no quality points), P indicates progress toward completion of a thesis or dissertation. NP indicates no progress or inadequate progress.
W (carries no credit hours or quality points) indicates that the student withdrew from the course.

No graduate student may repeat a course for the purpose of raising a grade once received, with the exception of NC. A graduate student may not do additional work nor repeat an examination to raise a final grade.

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. Students 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 maximum of 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 transferrable.
English Proficiency

Any student whose native language is not English must pass the 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. Undergraduate credit and pass with a grade of C or better. A student may not take more than 6 additional hours of coursework 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 assistants. The SPEAK Test is administered on campus by the Learning Research Center. Scores from 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. A minor may consist of a 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. The minor area must be approved by the major and minor academic units, and a member from the minor unit must serve on the graduate committee.

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. If the student earns a 2.0 or better, an S will be recorded on the transcript. Below 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 grade-point average as law courses do not carry graduate credit.

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 transcript until graduation, at which time both the graduate and law cumulative will be added to the permanent record.

A student enrolled in the Ph.D. in Business Administration program may use 6 semester hours or more of law courses for the supporting area under the arrangement described on page 55.

Auditors and Audited Courses

Persons who wish to attend certain classes regularly, without taking examinations or receiving graduate or credit, may do so by completing a graduate application, paying the application fee, registering as an auditor, and paying regular fees. Graduate students paying regular fees also are entitled to audit courses. The names of all auditors properly registered will appear on the intermediate class rolls, but will be removed from the final grade report. No record of audited coursework will appear on the permanent record.

Short Courses and Workshops

The university offers a wide variety of short courses and workshops for graduate credit. Minimum criteria acceptable for such credit are as follows:

1. The number of contact hours should never be fewer than the equivalent of one hour per week during the term for each hour of credit awarded, i.e., 15 hours per semester.
2. For every contact hour, there should be at least two hours of student preparation.
3. For each hour of graduate credit under the semester system, there should be a minimum elapsed time of one week.
4. The Curriculum Committee of the Graduate Council monitors the policy. Each new course or change in a current course must be approved in both content and format.

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. be 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.

Masters 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.

EdS. Degree

A maximum of six semester (nine quarter) hours of coursework beyond the Master’s degree may be transferred. 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.

Change of Program

A student who wishes to change a major program of study must complete a Request for Change of Graduate Program form, which can be obtained from the Office of Graduate Admissions and Records. The form requires the signature of the head of the department in which admission was previously granted. No signature is needed if a student requests to change from non-degree or provisional status to a degree program, or from one degree to another within the same department. Admittance into a new degree program is contingent upon review and approval by that department. If the student is not accepted into the program requested, he/she remains in the former program. The results of each request for program change are communicated to the student by mail.
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.

A statement from doctoral students as to how and during what period of time the residence requirement has been met will be presented 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 a 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 periodically throughout the academic year. The date for each workshop is announced in The Graduate School News.

Webster’s Ninth New Collegiate Dictionary (1983) defines plagiarism as “stealing or passing off ideas or words of another as one’s own”; “the use of a created production without crediting the source.” Any material taken from another work should be presented, and in no case should one present another person’s work as one’s own. Extreme caution should be exercised by students involved in collaborative research to avoid questions of plagiarism. If in doubt, students should check with the major professor and the Graduate School about the project. Plagiarism will be investigated when suspected and prosecuted if established.

The thesis normally should be written in English. Under exceptional circumstances, another language may be used if prior approval is obtained from The Graduate School. A request to write in a language other than English should be submitted to The Graduate School by the student’s thesis committee, with endorsement by the Department Head and the Dean of the College, prior to Admission to Candidacy for the degree sought. The request should include a proposal and justification for the exception. In all cases, one thesis abstract must be written in English.

A basic principle in graduate education is that theses and dissertations produced by graduate students will be published and made available to other researchers in the field. When a graduate student is involved in classified or proprietary research, and such research is intended to lead toward a thesis or dissertation, prior approval must be secured from the Department Head and Dean, and from the Associate Vice Chancellor and Dean of The Graduate School. Should the research become classified in the course of a project, these same persons should be notified immediately so that proper procedures can be assured. Failure to comply with these requirements may lead to the rejection of a thesis or dissertation manuscript.

Academic Standards

Graduate education requires continuous evaluation of the student. This 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, Hilltops, published and distributed annually, contains statements of UT Knoxville standards of conduct and 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. Any individual may ultimately appeal to the President of the University. 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 credit hours of course work. 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 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 23, for a summary of procedures for the degrees.

COURSE REQUIREMENTS

A candidate for a Master's degree must complete a minimum of 30 hours of graduate credit in courses approved by the student's Master's committee. In thesis programs, 6 semester hours of credit in the major (and 9-12 in some approved programs) must be earned in course 500 while the student is preparing the thesis. Hours applied to the Master's degree may be entirely from one major subject or may be distributed to include one or two minor areas. In a 30-hour program, the major subject must include at least 12 hours of graduate coursework, exclusive of course 500, and a minor must include not fewer than 5 nor more than 12 hours of graduate credit.

At least two-thirds of the minimally required hours in a Master's degree program must be taken in courses numbered at or above the 500
toward this requirement.

**MASTER'S COMMITTEE**

A committee composed of the major professor and at least two faculty members at the rank of assistant professor or above should be formed as early as possible in a student's program, and must be formed by the time a student applies for admission to candidacy (see administrative policy, page 15). The responsibility of this committee is to assist the student in planning a course of study and carrying out research, and to assure fulfillment of the degree requirements. If the student has a minor, one member of the committee must be from the minor department.

**ADMISSION TO CANDIDACY**

Admission to candidacy reflects agreement among the student, graduate committee, and The Graduate School that the student has demonstrated ability to do acceptable graduate work and that satisfactory 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 application for the Master's degree is made as soon as possible after the student has completed any required prerequisite courses and nine hours of graduate coursework with a 3.0 average or higher in all graduate work. The student must submit a Major Professor to Candidacy form, signed by the student's committee and listing all courses to be used for the degree, to the Office of Graduate Admissions and Records no later than commencement day of the semester preceding the semester in which he/she plans to graduate.

**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 prepared 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. Each 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 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 before 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.

**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.

**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 23, 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.

Students 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. At least two members of this committee must represent the department or major area. Its responsibilities include formulation of 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 satisfactory 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 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 profes-
sional needs 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 work is being done. The minimum of 600 is required. Additional work offered for the degree. The 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 defense of the dissertation may be subdivided by the committee at its discretion. The dissertation must be properly scheduled before the dissertation will be accepted. A written examination is required and an oral examination is required and an oral examination is required. The defense examination is announced publicly and is open to all faculty members.

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 600-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/NC 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 comprehensive examination is required before the dissertation will be accepted. The dissertation examination is announced publicly and is open to all faculty members. The dissertation examination is announced publicly and is open to all faculty members.
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

#### PROCEDURES

<table>
<thead>
<tr>
<th>PROCEDURES</th>
<th>UNDER DIRECTION OF</th>
<th>DATE</th>
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</thead>
<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

<table>
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<tr>
<th>PROCEDURE</th>
<th>UNDER DIRECTION OF</th>
<th>DATE</th>
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<tbody>
<tr>
<td>Placement of name on graduation list</td>
<td>Student</td>
<td>Indicate on registration materials</td>
</tr>
<tr>
<td>Application for diploma</td>
<td>Office of Graduate Admissions and Records</td>
<td>Deadline available at registration *</td>
</tr>
<tr>
<td>Payment of graduation fee</td>
<td>Bursar's Office</td>
<td>Deadline available at registration*</td>
</tr>
<tr>
<td>Scheduling of Final Examination</td>
<td>Student and Office of Graduate Admissions and Records</td>
<td>Not later than one week prior to Final Examination*</td>
</tr>
<tr>
<td>Final Examination</td>
<td>Master's/Ed.S. Committee</td>
<td>Not later than three weeks prior to Commencement*</td>
</tr>
<tr>
<td>Removal of Incomplete(s)</td>
<td>Instructor of course</td>
<td>Not later than one week prior to Commencement*</td>
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#### GRADUATION REQUIREMENTS FOR THESIS/PROBLEMS OPTIONS

<table>
<thead>
<tr>
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<td>Placement of name on graduation list</td>
<td>Student</td>
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</tr>
<tr>
<td>Application for diploma</td>
<td>Office of Graduate Admissions and Records</td>
<td>Deadline available at registration *</td>
</tr>
<tr>
<td>Payment of graduation fee</td>
<td>Bursar's Office</td>
<td>Deadline available at registration*</td>
</tr>
<tr>
<td>Submission of thesis/problems to Master's/Ed.S. committee</td>
<td>Student</td>
<td>At least two weeks prior to Final Examination</td>
</tr>
<tr>
<td>Scheduling of Final Examination</td>
<td>Student and Office of Graduate Admissions and Records</td>
<td>Not later than one week prior to Final Examination*</td>
</tr>
<tr>
<td>Final Examination</td>
<td>Master's/Ed.S. Committee</td>
<td>Not later than four weeks prior to Commencement*</td>
</tr>
<tr>
<td>Approval and acceptance of final copy of thesis and thesis card</td>
<td>Master's/Ed.S. committee and The Graduate School</td>
<td>After Final Examination and not later than two weeks prior to Commencement*</td>
</tr>
<tr>
<td>Removal of Incomplete(s)</td>
<td>Instructor of course</td>
<td>Not later than one week prior to Commencement*</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>PROCEDURES</th>
<th>UNDER DIRECTION OF</th>
<th>DATE</th>
</tr>
</thead>
<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>*Appointment of doctoral committee</td>
<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 application for 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>
</tr>
</tbody>
</table>

#### GRADUATION REQUIREMENTS

| 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 dissertation to doctoral committee     | Student                                                 | At least two weeks prior to Defense of Dissertation Examination     |
| Scheduling of Defense of Dissertation Examination     | Student and Office of Graduate Admissions and Records    | Not later than one week prior to Defense of Dissertation Examination*** |
| Defense of Dissertation Examination                   | Doctoral committee                                      | Not later than four weeks prior to Commencement***                  |
| Approval and acceptance of final copy of dissertation, doctoral forms, and dissertation card | Doctoral committee and The Graduate School               | After Defense of Dissertation 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***                    |

*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
Colleges

College of Agricultural Sciences and Natural Resources

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 Agricultural Sciences and Natural Resources 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 Agricultural Sciences and Natural Resources 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 Agricultural Sciences and Natural Resources 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 Agricultural Sciences and Natural Resources. 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 Architecture and Planning

J. William Rudd, Dean
William J. Lauer, Associate Dean
James A. Spencer, Director

Schools
- Architecture
- Planning

The College of Architecture and Planning was formed in 1990 with the union of the School of Planning and the School of Architecture into a new academic unit. Both schools had just completed twenty-five years as professional schools committed to preparing students to work with the planning, design or management of our built environment. It was a union whose time had come. The college provides an administrative umbrella for academic programs which share many common objectives and methods, yet retain distinctive identities with their professions.

The School of Architecture offers a program of professional studies which prepares its graduates for the practice of architecture. At present this is accomplished through a five-year Bachelor of Architecture degree program. Students already having a baccalaureate degree in another field may enter a second degree program which awards the B. Arch. degree after three years of accelerated professional study. Plans are underway to add a Master of Architecture degree program which could be taken as a first professional degree or as a second degree program with specialization.
The College of Business Administration offers a program of studies which prepares its graduates for professional practice in urban or regional planning. This is accomplished through a two-year Master's degree program. The school also manages the undergraduate program in Urban Studies which awards a Bachelor of Arts degree.

The faculty and students of both units cooperate in a variety of ways, including joint field projects, guest lectures, service on thesis projects, etc. This expands the resources of talent available to students. The college also has a research and public service arm, the Center for Research, Service and Inquiry. The offices of the dean and other college staff are located at 217B Art and Architecture Center for Research, Service and Inquiry.

The College of Business Administration was originally the School of Commerce, dating back to 1919. Commerce was changed to Business Administration in 1966 and the doctoral program in 1971. In addition, 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 with the Doctor of Philosophy degrees with a major in Communications. In addition, Communications 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, 426 Communications Building, The University of Tennessee, Knoxville, TN 37996-0347.

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 Master of Arts with a major in Economics; the Master of Science with a major in Management and Accountancy; and the Master of Business Administration. 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.

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

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 tuition and fees 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.

The College of Communications grew out of the School of Journalism, which was 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.

The College of Communications offers the Master of Science and the Doctor of Philosophy degrees in Communications. In addition, Communications 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, 426 Communications Building, The University of Tennessee, Knoxville, TN 37996-0347.
College of Engineering
William T. Snyder, 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 of Excellence for Materials Processing

The College has its beginnings in the University when surveying was introduced into the curriculum in 1838. 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.

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. DeJonge, Dean
James D. Moran III, Associate Dean: Graduate Studies
Frances Andrews, Associate Dean: Academic Administration

Departments
Child and Family Studies
Nutrition
Textiles, Retailing and Interior Design

Facilities for Research and Service
Center for Excellence for Materials Processing
Child Development Laboratory
Small Animal Research Laboratory
Textiles and Nonwovens Development Center

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 1985 the name was changed to Human Ecology, reflecting its focus on people interacting with their environments.

Graduate study in Human Ecology prepares the student for teaching, research, and public service in colleges and universities or managerial positions in government, business, and industry.

The Master of Science degree is offered with majors in Child and Family Studies, Human Economics, Interior Design, Foodservice and Lodging Administration, Nutrition (including public health nutrition), and Textiles, Retailing and Consumer Sciences; the Doctor of Philosophy degree is offered with a major in Human Ecology and concentrations in child development, family studies, nutrition, textile science and consumer environments. For additional information, contact the Associate Dean of Graduate Studies, College of Human Ecology, The University of Tennessee, Knoxville, TN 37996-1900, (615) 974-5224.

FACILITIES FOR RESEARCH AND SERVICE
The Small Animal Research Lab, housed in the Jessie Harris Building, has received certification by the American Association for Accreditation of Laboratory Animal Care (AAALAC). Renovated in 1985, it has strict environmental controls, an operating theater and animal holding areas. An Animal Welfare Assurance is on file with AAALAC. The Small Animal Research Lab is used for teaching, research, and animal care.

The College of Human Ecology participates with the College of Engineering in the Center of Excellence for Materials Processing. These research efforts in Textile Science are also supported by the Textiles and Nonwovens Development Center (TANDEC). The Child
College of Law

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

The University of Tennessee College of Law commenced operation in 1930 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 seeks to contribute 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 services to legal institutions and groups within the state, the college seeks to participate in the development and improvement of the society in which it students may eventually practice law.

In combination, the direction and objectives of the college lead to the development not 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.-MBA 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. Ratner, Dean  
Charles O. Jackson, Associate Dean  
Lorary W. Lester, Associate Dean  
Clifton Woods, III, 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

Facilities for Research and Service

Center for Applied and Professional Ethics  
Center for Environmental Biotechnology  
Center for Psychoanalysis and the Humanities  
Center for Quaternary Studies of the Southeastern U.S.  
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. 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 cultivation 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 the 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 Veterinary Medicine

The College of Veterinary Medicine, established in 1971. The Master's program was initiated in 1976 and approval for the doctoral program was granted in 1988. More specific information about the programs may be obtained under Nursing, Facilities for Research and Service, or by contacting the Director of M.S.N. or Ph.D. Program, The University of Tennessee, Nashville School of Social Work, founded in 1942 under the auspices of Vanderbilt University, Scarritt College, and George Peabody College. It joined the University of Tennessee in 1951. By 1974 the three branches, located in Nashville, Memphis and Knoxville, offered the two-year Master's program. The doctoral program was inaugurated in 1980. In 1986 the B.S.S.W. program was added, and the School achieved college status.

The University of Tennessee College of Social Work is the only graduate professional social work education program in Tennessee and offers the full continuum of social work education degrees at the baccalaureate, Master's and doctoral levels.

The primary objective of the college is to enable students to attain essential information, skills, attitudes and behaviors to meet the varied needs of society and the veterinary profession. 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. About two-thirds 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 Armed Forces, 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—research directly benefiting animals and research conducted with animals which benefits humans. Such opportunities are available at colleges and universities and with governmental agencies, private research institutions and biological and pharmaceutical companies.

A dual degree program in Social Work and Divinity is offered by the college's Nashville Branch and the Divinity School of Vanderbilt University. The College also offers a dual degree program with Public Administration on the Knoxville campus. A special bulletin describing facilities, admission, fees, and degree requirements is available from the College of Social Work, Henson Hall, Knoxville, TN 37996-3333.

College of Pharmaceutical Sciences

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 train veterinary students to attain essential information, skills, attitudes and behaviors to meet the varied needs of society and the veterinary profession. 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.

All veterinarians are engaged in private practice. About two-thirds 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 Armed Forces, 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—research directly benefiting animals and research conducted with animals which benefits humans. Such opportunities are available at colleges and universities and with governmental agencies, private research institutions and biological and pharmaceutical companies.

A dual degree program in Social Work and Divinity is offered by the college's Nashville Branch and the Divinity School of Vanderbilt University. The College also offers a dual degree program with Public Administration on the Knoxville campus. A special bulletin describing facilities, admission, fees, and degree requirements is available from the College of Social Work, Henson Hall, Knoxville, TN 37996-3333.

College of Veterinary Medicine

Michael Shires, Dean
James J. Brace, Assistant 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.

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College of Social Work

Eunice Shatz, Dean
William J. Ball, Associate Dean, Nashville
Jane Kronick, Acting Associate Dean, Knoxville
Nellie P. Tate, Associate Dean, Memphis
Paul M. Campbell, Director, Office of Social Work Research and Public Service

The College of Social Work began as the Nashville School of Social Work, founded in 1942 under the auspices of Vanderbilt University, Scarritt College, and George Peabody College. It joined the University of Tennessee in 1951. By 1974 the three branches, located in Nashville, Memphis and Knoxville, offered the two-year Master's program. The doctoral program was inaugurated in 1980. In 1986 the B.S.S.W. program was added, and the School achieved college status.

The University of Tennessee College of Social Work is the only graduate professional social work education program in Tennessee and offers the full continuum of social work education degrees at the baccalaureate, Master's and doctoral levels.

Social work is a helping profession which focuses on providing skilled intervention in the prevention and amelioration of individual and societal problems. It is the purpose of the College to provide an education which fosters growth in both individual and career development.

GRADUATE PROGRAMS

The two-year program (thesis or non-thesis option) leading to the Master of Science in Social Work is fully accredited by the Council on Social Work Education and is offered on all three campuses. The foundation curriculum of the Ph.D. program is available only in Knoxville.

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
Johnie 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 1988. More specific information about the programs may be obtained under Nursing, Facilities for Research and Service, or by contacting the Director of M.S.N. or Ph.D. Program, The University of Tennessee, College of Nursing, 1200 Volunteer Blvd., Knoxville, TN 37996-4110, (615) 974-4151.
FIELDS OF INSTRUCTION
Fields of Instruction

Accounting and Business Law
(College of Business Administration)

MAJORS
Accounting

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

Jan R. Williams, Head

Accounting

Professors:
Dittrich, Norman E., CPA, Ph.D. .... Ohio State
Herring, Hartwell C., III, CPA, Ph.D. .... Alabama
Kiger, Jack E. (Warren L. Slagle Prof. of Acct), CPA, Ph.D. .... Missouri
Read, W. H. (Emeritus), CPA, MBA .... Northwestern
Scheiner, James H., CPA, Ph.D. .... Ohio State
Stanga, Keith G. (Distinguished Prof.), CPA, Ph.D. .... Louisiana State
Williams, Jan R. (Ernst & Young Prof.), CPA, Ph.D. .... Arkansas

Associate Professors:
Anderson, Kenneth E., CPA, Ph.D. .... Indiana
Borthick, A. Faye, CPA, DBA .... Tennessee
Izard, C. Douglass, CPA, Ph.D. .... Mississippi
Posey, Imogene A., CPA, M.S. .... Tennessee
Reeve, James M., CPA, Ph.D. .... Oklahoma State
Roth, Harold P., CPA, Ph.D. .... VPI
Slagle, Warren L. (Emeritus), CPA, M.S. .... Tennessee
Townsend, Richard L., CPA, Ph.D. .... Texas

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

Wolfe, Singleton B. (Emeritus), B.S. .... VPI

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 bachelor's 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 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 503 is available.

In addition to the general admission requirements, The Graduate School requires applicants 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 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. 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 or her cumulative grade-point average is 3.0 or higher at the end of the probationary period. The probationary period is defined as the next semester's coursework as established by the degree program for part-time students.

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

ACADEMIC STANDARDS

A graduate student in the College of Business Administration whose grade-point average falls below 3.0 will be placed on probation. A student on probation will be dropped from the program unless his or her cumulative grade-point average is 3.0 or higher at the end of the probationary period. The probationary period is defined as the next 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, partnership, and fiduciary taxpayers. Prereq: 504 and Finance 501.


513 Seminar in Advanced Auditing (3) Theory and concepts underlying application of philosophy of auditing to current auditing issues. Prereq: 411.

519 Seminar in Accounting and Auditing Research (3) Problem-oriented research design in accounting and auditing. Research methodologies and approaches to particular research questions. Research project. Prereq or coreq: 512 and 513.

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

522 Budgetary Planning and Control Systems (3) Alternative approaches to: (a) formulating and use of planning and control systems to meet organizational objectives; control systems and corporate structure, discretionary expense centers, profit centers, transfer pricing, and control in manufacturing, service, and not-for-profit organizations. Prereq: 521 or 503.

531 Tax Research and Planning (3) Development of expertise in tax research utilizing authoritative sources of tax law and advanced study of tax alternatives available to minimize tax liability compatible with achieving taxpayer objectives. Prereq: 431.

532 Corporate Taxation and Reorganizations (3) Organization and structure, distributions, liquidations, reorganizations, and special problems in taxation of corporations and shareholders. Prereq or coreq: 531.

533 Taxation of Partnerships and S Corporations (3) Formation, operation, termination, and other special problems of partnerships. Election for S Corporations, and comparison of partnerships and S Corporations. Prereq or coreq: 531.

534 Unified Estate and Gift Transfer Taxation (3) Taxation of wealth transfers; transfers at death, inter vivos transfers, and generation skipping transfers. Incorporate taxation of estates and trusts. Determination and payment of state and federal wealth transfer and income taxes. Prereq: 431.

539 Tax Policy and Special Topics (3) Basic concepts of tax policy, current issues in tax policy, and selected topics in taxation. Topics vary. Prereq: 531. Prereq or coreq: 532, 533.


549 Systems Policy (3) Seminar in emerging topics in management systems and knowledge-based systems. Prereq: 541. Prereq or coreq: 542.

552 Graduate Internship in Accounting (3) Full-time resident professional employment for one academic semester involving qualified job experience, written report of responsibilities, and evaluation of student performance. Prereq: Consent of instructor.

553 Individual Research in Accounting (3) Directed research in topic of mutual interest. Prereq: Consent of M.Acc program advisor. May be repeated. Maximum 6 hrs.

584 Graduate Seminar in Accounting (3) Topics vary.

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

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

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

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

Business Law

Professors:
Fisher, Bruce D., LL.M. Tennessee
Townsend, Mahlon L., 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

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

Associate Professors:
Hovland, Roxanne, Ph.D. Illinois
Jackson, DeForrest, M.S. Tennessee
Stankey, Michael J., 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,
Agricultural Economics and Rural Sociology

Agricultural and Extension Education

(College of Agricultural Sciences and Natural Resources)

MAJOR DEGREE

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

Professors:

Carter, Cecil E., Jr., Ph.D. .................. Ohio State
Dickson, Lewis H. (Emeritus), Ed.D. .......... Cornell
Todd, John D., Ed.D. ........................ Illinois

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 any student interested in agriculture or adult and continuing education. The program may be completed under a thesis or non-thesis option with a concentration in either agricultural education or agricultural extension education. Candidates for the Master's degree must meet the general requirements of The Graduate School and those stipulated by the department.

THE MASTER'S PROGRAM

Thesis Option

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

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

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

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

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

5. A final oral examination.

Non-Thesis Option

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

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

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

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

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

5. A creative component designed by the student and approved by the student's advisory committee for 3 hours of non-thesis credit.

6. A written and oral comprehensive examination.

GRADUATE COURSES

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

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

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

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

522 Extension Teaching Methods (3) Teaching learning methods and techniques applicable to extension work, relationships and relative effectiveness.
Cleland, G. L., Ph.D.  Wisconsin
Eastwood, D. B., Ph.D.  Tufts
Keller, L. H., Ph.D.  Kentucky
Klindt, T. H., Ph.D.  Kentucky
Leumond, F. L., Ph.D.  Wisconsin
McLemore, D. L., Ph.D.  Clemson
McManus, B. R., Ph.D.  Purdue
Martin, J. A. (Emeritus), Ph.D.  Minnesota
Mundy, S. D., Ph.D.  Tennessee
Orr, R. H., Ph.D.  Illinois
Pentecost, B. H., J.D.  Tennessee
Ranney, W. P. (Emeritus), Ph.D.  Minnesota
Sappington, C. B. (Emeritus), Ph.D.  Illinois
Whately, T. J. (Emeritus), Ph.D.  Purdue
Williamson, H., Ph.D.  Missouri

Associate Professors:

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

Assistant Professors:

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

Minor

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

Agricultural Economics

GRADUATE COURSES

412 Agricultural Finance (3) Macroe-finance, financial objectives, acquisition of debt and equity funds, capital investments, capital allocation, credit analysis, borrower and lender loan application analysis, insurance strategies, computer applications, kinds and sources of agricultural credit, and financial intermediation. Prereq: 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 of agricultural firms, economic interpretation of technical agricultural production relationships. Prereq: 210 and Economics 311. F

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. Sp

450 Agricultural Price Analysis (3) Analysis of demand and supply mechanisms in agriculture; price determination; spatial equilibrium; temporal price patterns; pricing institutions. Prereq: 350 and Economics 311. F

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

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

470 Natural Resource Economics (3) Nature of natural resources; economic efficiency as basis for natural resource use; factors influencing environmental quality; alternative public policy tools 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 internship and experience. 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. Sp

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

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

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

522 Mathematical Programming Methods in Agri-cultural Economics (3) Application of mathematical programming techniques with empirical applications to problems of firm and region; profit maximization, cost minimization, transversality, and intertemporal decision processes. Prereq: Statistics 461 or consent of instructor. F

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

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 and freightation. Prereq: Economics 311 or consent of instructor. Sp

560 Advanced Rural Economic Development (3) Theoretical and empirical concepts 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 allocation issues; applied welfare economics, external effects and evaluation of public policy. Prereq: 470 and Economics 511 or consent of instructor. F

593 Special Topics in Agricultural Economics (1-3) Topics to be assigned. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. SNC 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 and empirical agricultural supply analysis; estimating agricultural supply relationships using regression techniques, production functions, mathematical programming, firm growth models and simulation models. Prereq: 540 or consent of instructor. F,A

650 Operations Analysis in Marketing (2) Components and functions of marketing system, levels of analysis and tactics, operations research and competition. Prereq: 450 and 550 or consent of instructor. Sp,A
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 synthesis 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 transportation. 2-3 hrs. 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. Pre-req: Electrical Engineering 360. 2-3 hrs and 1 lab. Sp,A

455 Waste Management System Design (2) Waste renovation principles and livestock waste handling tech-

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 credit 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. At least two supporting areas (outside the Agricultural Engineering Department) in related engineering, agricultural, mathematics, and other scientific fields comprising at least 24 hours. The remaining minimum 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

MAJORS DEGREES

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

D. Houston Luttrell, Head
Bobby L. Bledsoe, Associate Head

Professors:

Bledsoe, B. L., PE, Ph.D. ...... Oklahoma State
Henry, Z. A., PE, Ph.D. ...... NC State
Luttrell, D. Houston, Ph.D. ...... Iowa State
McDow, John J., PE, Ph.D. ...... Michigan State
Mote, C. R., PE, Ph.D. ...... Ohio State
Sewell, J. I., PE, Ph.D. ...... NC State
Shelton, C. H. (Emeritus), M.S. ...... VPI
Tomkins, F. D., PE, Ph.D. ...... Tennessee
Wilhelm, Luther R., PE, Ph.D. ...... Tennessee

Associate Professors:

Grandle, George F., Ph.D. ...... Tennessee
Wills, James B., M.S. ...... Tennessee

Assistant Professors:

Baxley, D. O., M.S. ...... Missouri
Burcham, Timothy N., Ph.D. ...... Clemson

Agricultural Engineering

430 Mobile Hydraulic Power System Design (2) Functional and operational characteristics of mobile hydraulic system components; pumps, valves and actuators; analysis and synthesis 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 transportation. 2-3 hrs. 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. Pre-req: Electrical Engineering 360. 1 hr and 1 lab. Sp,A

455 Waste Management System Design (2) Waste renovation principles and livestock waste handling tech-
Agricultural Engineering Technology

GRADUATE COURSES

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

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 the student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N/C only. E

510 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, A

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

530 Research Problems in Agricultural Engineering (1-3) Theoretical and experimental studies relating to current problems in agricultural engineering may be repeated. Maximum 5 hrs. E

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

610 Seminar (1) Current research and literature. May be repeated. Maximum 3 hrs. E

620 Computer Simulation of Agricultural Systems (3) Scientific approach to digital simulation; system definitions and boundaries, formulation of models; algorithms and solution techniques, encoding of prediction equations models, 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

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

640 Research Problems in Agricultural Engineering (2) Research and manuscript preparation for a technical meeting presentation and submission to refereed journals. May be repeated. Topics are 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 8 hrs. Sp

Agriculture

(College of Agricultural Sciences and Natural Resources)

GRADUATE COURSES

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

Animal Science

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

MAJOR DEGREES

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

Kelly Robbins, Head

Professors:

Barth, K. M., Ph.D. Rutgers
Bell, M. C., Ph.D. Oklahoma State
Bleiter, J. K. (Emeritus), Ph.D. Ohio State
Chamberlain, C. C. (Emeritus), Ph.D. Iowa State
Erickson, B., Ph.D. Kansas State
Hale, O. G., Ph.D. Iowa State
Hansard, S. L. (Emeritus), Ph.D. Florida
Lidvall, E. R. (Emeritus), M.S. Tennessee
McDonald, T. P., Ph.D. Tennessee
McLaren, J. B. (Emeritus), Ph.D. Auburn
Merck, D. M. (Emeritus), D.V.M. Michigan State
Miller, J. K., Ph.D. Georgia
Murphee, R. L. (Emeritus), Ph.D. Wisconsin
Richardson, D. O., Ph.D. Ohio State
Robbins, K. R., Ph.D. Illinois
Shirley, H. V. (Emeritus), Ph.D. Illinois
Shrode, R. R., Ph.D. Iowa State
Tugwell, R. L. (Emeritus), Ph.D. Kansas State

Associate Professors:

Backus, W. R., Ph.D. Tennessee
Bell, B. R., Ph.D. NC State
Eiler, H., D.V.M., Ph.D. Illinois
Godkin, J. D., Ph.D. Massachusetts
Heitmann, R. N., Ph.D. Maine
Henry, R. W., D.V.M., Ph.D. Ohio
Hitchcock, J. P., Ph.D. Michigan State
Kattesh, H. G., Ph.D. VPI
Masincuppo, F. B., Ph.D. Kansas State
Oliver, S. P., Ph.D. Ohio State
Schultz, T. W., Ph.D. Tennessee
Simms, M. H., Ph.D. Auburn
Waller, J., C. Ph.D. Nebraska

Assistant Professors:

Baumbach, G. A., Ph.D. Florida
Chestnut, A. B., Ph.D. Illinois
Quigley, J. D., Ph.D. Virginia Tech
Smolling, J. D., Ph.D. Texas A&M
Smith, M. O., Ph.D. Oklahoma State

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

During the first fall term of matriculation in each degree program, all graduate students are required to enroll in 595. Students are also required to enroll in 596 each fall term, and in 597 each spring term.

THE MASTER'S PROGRAM

For admission to the M.S. program, a student must have obtained a 3.0 grade-point average on a 4.0 scale (or a 3.0 each term during the junior and senior years) in a completed undergraduate degree program in one of the
animal sciences or in a related area. The student must submit evidence (letters of recommendation, personal interview, etc.) that indicates ability to complete requirements for the M.S. Prerequisite courses may be required if the student has insufficient undergraduate background. If the student has an unsatisfactory grade-point average, acceptance may be on a probationary (non-degree) basis and a minimum of 12 hours of graded 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. The final oral examination which consists of a 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 program. Structure of industry, enterprise establishment, systems of production, production practices and herd improvement programs. Alternatives evaluated: production responses and economic returns. Prerequisite: Animal science sophomore and junior core courses or consent of instructor. 2 hrs and 1 lab. F

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 responses and economic returns. Prerequisite: Animal science sophomore and junior core courses or consent of instructor. 2 hrs and 1 lab. F

483 Pork Production and Management (3) Integration of principles of nutrition, 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. Prerequisite: 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. Prerequisites: 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 responses and economic returns. Alternatives evaluated: production responses and economic returns. Prerequisite: Animal science sophomore and junior core courses or consent of instructor. 2 hrs and 1 lab. Sp, A

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

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

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

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

522 Principles in Physiological Recording (1) Theories of acquisition and interpretation of physiological data. Experiments: principles involved in obtaining physiological data from animals using modern recording devices. Prerequisite: Animal Science-Veterinary Medicine 521. 1 lab. F

523 Advanced Mammalian Reproduction (3) Current topics and "new frontiers" in reproductive biology. Prerequisite: Animal Science 522. 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. Prerequisite: Animal Science 523 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. Prerequisite: Consent of instructor. 1 hr and 2 labs. F

532 Experimental Techniques in Animal Nutrition (3) Animal experimental techniques and concepts for growth, digestion, balance and radiotrace tracer studies. Prerequisites: Animal Science 531. 1 hr and 2 labs. Sp

533 Nonruminant Animal Nutrition (3) Physiological development in digestive system of nonruminant animal during the life cycle. Concepts and methodology concern nutrition and metabolism and effects of dietary composition, value and deficiencies of nutrients. Nonruminant additives, environmental and nutrient utilization; nutritional effects on products. Prerequisite: Animal Science 532. Sp

541 The Genetics of Populations (2) Application and extension of principles and concepts learned in basic courses in genetics, breeding and statistics to convey usable comprehension of the genetics of populations. Prerequisite: Basic courses in genetics, breeding and statistics.

542 Applied Animal Breeding (3) Procedures for estimating population parameters, determination of response to various selection methods and breeding systems, estimation of genetic and phenotypic interrelationships among metric traits, estimation of breeding values, optimum methods of simultaneously selecting several economic characters, selection of appropriate animal breeding methodology. Prerequisite: Animal Science 541 or equivalent. Sp, A

571 Design and Analysis of Biological Research (3) Experimental design: basic principles of experimental design and analysis of variance. Descriptive statistics and confidence interval estimation. Probability distribution theory. Inference based on sample statistics and confidence intervals. Hypothesis testing and interpretation of data. Principles of experimental design and analysis of variance applied to the evaluation of various treatments. Application of these principles and methods to the analysis of single treatment or factor experiments and factorial experiments. Prerequisite: Elementary algebra. Sp, A

572 Least-Squares Analysis (2) Least-squares estimation and hypothesis testing procedures for linear models with possible singular covariance structures; maximum likelihood, variance component models; estimability. Prerequisite: Statistics 571 or equivalent. 2 hrs and 1 lab. F

573 Intermediate Statistical Computing (2) Application of statistical procedures to analysis and handling of data using computer and programming languages. Basic skills in analysis and presentation of study data and statistical analysis methods with high speed digital computers. Prerequisite: Statistics 571 or equivalent; knowledge of UTK mainframe and software package, 2 hrs and 1 lab. F

581 Advanced Livestock Management (3) Objective functions to evaluate alternative livestock production management policies. Systems approach to analysis and integration of reproductive management programs, genetic improvement policies, alternative feeding systems, and animal health programs. Consideration of time, risk, and uncertainty in livestock production. Tools, linear programming, as aids in decision-making and resource allocation. Prerequisite: Management, economics, computer science, statistics. 2 hrs and 1 lab. F

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

596 Discipline Oriented Seminar (1) Required of all animal science graduate students. Prerequisite: Animal breeding, animal nutrition; animal physiology, animal management or animal anatomy. May be repeated. Maximum 5 hrs. S/NC only. Sp

597 Commodity Oriented Seminar (1) Required of all animal science graduate students. Presentations: beef and sheep, dairy, poultry, swine and veterinary sessions. May be repeated. Maximum 5 hrs. S/NC only. Sp

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

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

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

Animal Science 45
Animal Science-Veterinary Medicine

See Veterinary Medicine for program description.

GRADUATE COURSES

501 Special Topics in Anatomy and Physiology of Domestic and Laboratory Animals (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/N only. E

521 Advanced Mammalian Physiology I (4) Membrane, neuron, central nervous system, muscle, cardiovascular system, and control mechanisms. Prerequisite: general undergraduate anatomy and physiology and Biochemistry 410 or equivalent or consent of instructor. Recommended prerequisite: Biochemistry 419. (Same as Zoology 521.) 3 hrs and 1 lab.

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

551 Mammalian Organon (3) Microscopic study of structure of organs and major organ systems. Prerequisite: Embryology, histology, and/or consent of instructor. 2 hrs and 1 lab. Sp.

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

553 Anatomy of Farm Animals (3) Gross dissection by regions of horse, cow and pig with lecture/demonstration. Prerequisite: 552 or consent of instructor. Sp.

554 Comparative Hematology (3) Morphology, physiology, and development of blood and blood forming organs: similarities and differences of major domestic and laboratory species. Prerequisite: Undergraduate physiology and/or consent or instructor. 2 hrs and 1 lab. Sp.

555 Anatomy of the Central Nervous System (1) Gross and microscopic anatomy of mammalian brain and spinal cord using sheep as model. Prerequisite: Consent of instructor. Sp.

651 Advanced Topics in Animal Anatomy (1-4) Current and future research methodology, laboratory situations, recent advances in quantitative techniques for gross and microscopic anatomy. Prerequisite: Consent of instructor. May be repeated. Maximum 6 hrs. E

652 Disorders of the Endocrine System (2) Pathological and physiological aspects of diseases; endocrine glands of various animal species. Prerequisite: 521 or consent of instructor. Sp.

653 Advanced Mammalian Neurophysiology (3) Advanced physiological theories and principles related to normal function of central and peripheral nervous systems. Special senses and current electrophysiologic procedures for evaluating neural systems. Prerequisite: Advanced course in animal physiology or equivalent and an advanced mammalian anatomy course, or Psychology 526, and consent of instructor. Sp.

Anthropology

(College of Liberal Arts)

MAJOR

DEGREES

Anthropology

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, Fay E., Ph.D. Stanford
Harrison, Ira E., Ph.D. Syracuse
Howell, Benita J., Ph.D. Kentucky
Klippel, Walter E., Ph.D. Missouri
Logan, Michael H., Ph.D. Penn State
Schoedel, Gerard F., Ph.D. Washington State
Simek, Jan F., Ph.D. SUNY Binghamton

Assistant Professors:

Bass, Mary Ann, Ph.D. Kansas State
Köngsberg, L., Ph.D. Northwestern
Witley, P. S., Ph.D. Tennessee

Research Associate Professor:

Chapman, Jefferson, Ph.D. North Carolina

Research Assistant Professors:

Smith, Maria O., Ph.D. Tennessee
Tardif, 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 33 hours for graduate credit. A minimum of 24 of these hours must be in anthropology, including the following:
   a. 510 and 550
   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

2. These requirements must be met prior to taking the Graduate Evaluation Examination.

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. Formation 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. Students should plan to devote a minimum of 4 years beyond the B.A. to attain the Ph.D.

4. Demonstration of competence in statistics by completing Statistics 531 and 532 with a grade of B or better.

5. 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 a major 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, with a grade of B or better.

6. 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 Residence Assistant in the Office of Graduate Admissions and Records.

GRADUATE COURSES

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

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

412 Folklore in Anthropology (3) Introduction to anthropological study of folklore, using folklore and folktale 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, ethnohistoric, and contemporary cases. Prereq: 130.

414 Political Anthropology (3) Organization and dynamics of power and politics in both stateless and state-structured societies, and sociology of institutions producing and reproducing power relations. Relationship between actors (individuals and structures). Encapsulation, taxation, trade, political forms and systems within modern states. Prereq: Cultural anthropology or consent of instructor.

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

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

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

440 Cultural Ecology (3) Concepts and methods in studying dynamic interaction between prehistoric and present day cultures and their environments; ecological theory and methods; review of selective 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.

459 Selected Topics in Anthropology (3) Theoretical issues in anthropology for undergraduate students. Topics may include practical experience or laboratory study of anthropological materials. Prereq: Either Human Origins, Prehistoric Archaeology, Cultural Anthropology or consent of instructor. May be repeated. Maximum 6 hours.

461 African Prehistory (3) African cultural history from earliest traces of human habitation to time of European contact: Stone age of African south of Sahara. Prereq: 120 or consent of instructor. (Same as African-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 Early Agricultural Age in Europe, Asia, and Africa. Prereq: 120 or consent of instructor.

464 Principles of Zoarchaeology (3) Basic osteological studies of major vertebrate groups; aboriginal use of mammal and fish remains. Identification and interpretation of archaeologically derived molluscan and vertebrate remains. Introduction to laboratory use of comparative collections. Prereq: 120 or consent of instructor.

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

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

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

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

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


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

499 Human Response to Environmental Stress (3) Physiological perception of stress from physical environment and physiological, anatomical and behavioral responses to stress. Prereq: Consent of instructor.

500 Thesis (1-15) IP/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 student not otherwise registered during any semester when facilities are in operation. Prereq: Consent of instructor.

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

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

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

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

514 Anthropology of Development (3) Application of anthropological theory, methods, and findings to community and national development programs. Analysis of anthropological 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 patterns, theories of disease causation, and models of therapy. Theoretical and applied aspects of the anthropological study of health and disease. Prereq: Consent of instructor.

516 Nutritional Anthropology (3) Anthropological contributions to study of food-related cultural and biological variability in past and present populations. Prereq: 110, 120, 130, 410. Recommended prereq: 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; insights 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 anatomy and comparative collections. Prereq: Consent of instructor. May be repeated. Maximum 8 hrs.

522 Seminar in Archaeology (3) Theoretical and practical aspects of archaeology. Prereq: Either human origins, paleoethnobotany, taphonomy, ceramic analysis, archaeological origins, and regional archaeological cultures or consent of instructor.

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. May be repeated. Basic and advanced statistical analyses and other mathematical methods. Prereq: Consent of instructor.

560 Theory in Archaeology (3) Considered detailed considerations of theory in contemporary archaeology: models of scientific explanation, research design, archaeological formulations, processes, and methods of analysis and interpretation.

561 Archaeological Resource Management (3) Federal, state and local laws regulating the identification, protection, and management of cultural resources. Professional ethics and responsibilities and relationships of federal and state agencies, public interest groups, and professional archaeologists in conduct of federalally sponsored archaeology. May be repeated. Maximum 6 hrs.

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

563 Lithic Artfact Analysis (3) Methods for analyzing prehistoric stone tools; stone tool use 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 human populations. Biological races and macroanatomical response to load-bearing and other factors. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.


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

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 microscopic structure, cellular anatomy, hormonal regulation and micro and macroanatomical response to load-bearing and other factors. Prereq: Human Origins, 480. 581 or consent of instructor. 2 hrs and 1 lab.
Architecture

(College of Architecture and Planning)

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

Professors:

Anderson, G. L., M.Arch. Illinois
Conley, G. (Emeritus), B.Arch. Harvard
Grieger, F., M.Arch. Pennsylvania
Kelso, R. M., M.S. Tennessee
Kersavage, J. A., D.Sc. Southern Cal
Lauer, W. J., M.S.Arch. Eng. 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, J. W., M.Arch. Northwestern
Shell, W. S., M.Arch. Columbia
Watson, J.S., M.Arch. Pennsylvania
Wodehouse, L. M., Ph.D. St. Andrews

Associate Professors:

Herz, M. D., B.Arch. Columbia
Kinzy, S. A., M.Arch. Illinois
Martella, W. E., B.Arch. California
Narancon, V., B.Arch. Belgrade
Rabin, J. S., M.A. Texas

Assistant Professors:

Coddington, J., M.Arch. Pennsylvania
French, R. C., B.Arch. Tennessee
Kaplan, M., M.Arch. Harvard
Livingston, M., M.F.A. Wisconsin
Reno, J. E., M.Arch. UCLA

Stucky, H., B.Arch. Kansas State
vonBoulow, P., B.Arch. Tennessee
Ware, S. M., B.Arch. Tennessee

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 program leading to a Bachelor of Architecture to 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 may have attended 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 free-hand 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 Architecture the summer before entering the second degree program and take an intensive drawing course which will fulfill the prerequisite.

Please consult the University of Tennessee Undergraduate Catalog for the minimum requirements of the Second Degree 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 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 Residency 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 principles. Design processes and urban analysis.

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. Prehistoric 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 buildings in Tennessee. Reading assignments, lectures, discussion, and field trips. Historical research using primary material.

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

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


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-efficient structures: Methods and economic analysis of energy efficient design features. Architectural program analysis of external and internal load dominated buildings. Prereq: 341.

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

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

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

(College of Liberal Arts)

MAJOR DEGREE

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

Don. F. Kurka, Head
William C. Kennedy, Associate Head

Professors:

Blain, Sandra J., M.F.A. .......... Wisconsin
Brooke, P. M., M.F.A. .......... Yake
Clarke, R. A. (Emeritus), M.S. .......... Wisconsin
Cleaver, Dale G. (Emeritus), Ph.D. .......... Chicago
Fallsetti, Joseph S., M.S. .......... Ohio State
Goldenstein, M. B., M.F.A. .......... Nebraska
Kennedy, William C., M.F.A. .......... Wisconsin
Kurka, Don F., Ph.D. .......... New York
Lee, B., M.F.A. .......... Yake
Leland, W. E., M.F.A. .......... Tennessee
Livingston, P. R., M.F.A. .......... Wisconsin
Martinson, Fred, Ph.D. .......... Chicago
Nichols, P. G., M.F.A. .......... Michigan
Pearl, T., M.F.A. .......... Iowa
Riesz, T. J., M.F.A. .......... Nebraska
Stewart, F.C., M.F.A. .......... Claremont

Associate Professors:

Daehnert, R. H., M.F.A. .......... Wisconsin
Habel, Dorothy, Ph.D. .......... Michigan
LeFevere, Richard, M.F.A. .......... Rochester IT
Lyons, B., M.F.A. .......... Arizona State
Moffatt, Ph. D. .......... Chicago
Neff, A., Ph.D. .......... Pennsylvania
Saup, T., M.F.A. .......... Wisconsin
Wilson, D., M.F.A. .......... California (San Diego)
Yates, S., M.F.A. .......... North Carolina (Greensboro)

Assistant Professor:

Longobardi, Pam, M.F.A. .......... Montana State

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

THE MASTER'S PROGRAM

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

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

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

M.F.A. REQUIREMENTS

A minimum of 60 hours is required:

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

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

The candidate's committee will consist of a minimum of 5 members and a maximum of 6 members and will be appointed prior to registration for Art 599. Three members of the committee shall be as follows: one from the candidate's concentration area who shall be the major professor, one from art history, and one from a studio discipline outside the concentration area.

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

ACADEMIC STANDARDS

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

ACADEMIC MINOR MARKET

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

GRADUATE MINOR IN THE HISTORY OF ART

A graduate minor in Art History may be arranged with consent of the student's committee, the instructors involved, and The Graduate School. Prerequisite is an undergraduate Art History minor, or consent of committee, and knowledge of French, German, or Italian, unless waived by the Art History faculty.

GRADUATE COURSES

401 Fiber: Advanced Projects (3-6) Prereq: 302 or consent of instructor. May be repeated. Maximum 12 hrs.

402 Fabric: Advanced Projects (3-6) Prereq: 301 or consent of instructor. May be repeated. Maximum 12 hrs.

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

406 Goldsmithing (3-6) Metal-smithing techniques: granulation, electroforming, electroplating, electrolysis; applications as techniques for independent studio problems and development of personal style of expression. Prereq: 6 hrs of metal-smithing or consent of instructor. May be repeated. Maximum 12 hrs.

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

411 Drawing IV (6) Individualized pursuit of personal drawing technique and concepts, supplemented by individual and group critiques: weekly life drawing sessions. Prereq: 311. May be repeated. Maximum 12 hrs.

413 Painting IV (6) Individual concepts and personal expression with varied media. Prereq: 313. May be repeated. Maximum 12 hrs.


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


422 Ceramics: Advanced Projects (3-6) Development of theoretical investigation of specific concept using appropriate methods, materials and presentation. Prereq: 421. 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 forms in clay and individual formulations. May not be used toward art history requirement. Prereq: 321 and 322.

426 Kilns: Design, Construction and Operation (3) Designing kilns, traditional and modern refractories, construction methods, and operation of wood, gas, and electric kilns. 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 de-
482 Museology II: Exhibition Planning and Installation (3) Exhibition concept and implementation techniques. Prerequisites: M.F.A. candidate or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

571 Studies in Medieval Art (3) Art and architecture of Middle Ages: major monuments from Byzantium or western Europe. Prerequisite: M.F.A. candidate or consent of instructor. May be repeated with consent of department. Maximum 6 hrs.

572 Studies in Italian Renaissance Art (3) Art and architecture of 14th, 15th, and/or 16th centuries in Italy. Early or High Renaissance or Mannerist periods. Prerequisite: M.F.A. candidate or consent of instructor. May be repeated with consent of department. Maximum 6 hrs.

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

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

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

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

579 Special Topics in Art History (3) Student- or instructor-initiated course offered at convenience of department. Prerequisites: M.F.A. candidate or consent of instructor. May be repeated with consent of department. Maximum 9 hrs.

590 Seminar in Art Criticism (3) Theory and practice. Prerequisites: M.F.A. candidate 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.

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

598 Projects in Lieu of Thesis (19) Prerequisite: All graduate courses work and successful second year evaluation by graduate faculty. May be repeated. Maximum 20 hrs. S/NC only.

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

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

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

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

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

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

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

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

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

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

490 Wood (2-4) Intermediate to advanced. May be repeated.
### MAJORS AND DEGREES

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<td>Music Education</td>
<td>M.S.</td>
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**Charles H. Ball, Head**

**Professors:**

Ball, Charles H., Ph.D. ........................................ Peabody
Hull, H. N., Ed.D. ........................................ Peabody
Humphreys, A. W. (Emeritus), Ed.D. ................. Illinois
Jones, J. H. (Emeritus), Ed.D. ......................... Columbia
Julian, W. J., Ph.D. ......................................... Northwestern
Moore, M. C., Ph.D. ......................................... Michigan
Root, Patricia, M.A. ......................................... Washington State
Tipp, A. W., Ph.D. ............................................ Michigan

**Associate Professors:**

Gill, H. L. (Emeritus), B.S. ......................... Milwaukee State Teachers
McDaniel, Walter H. (Emeritus), M.S. .......... Tennessee
Mintz, J. O., Ed.D. ........................................ Columbia
Sparks, J. R., M.S. .......................................... Tennessee
Watkins, J. Paul, M.S. .................................... Tennessee

**Assistant Professor:**

Root, Patricia, M.A. ......................................... Washington State

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**Art Education**

The department offers two tracks for the Master of Science degree in Art Education. Track 1 is for students who are already certified to teach in the discipline or those who are seeking the M.S. degree without certification. Track 2 is designed for students seeking initial licensure. Thesis and non-thesis options are available for both tracks.

**Track 1 - The thesis option requirements**

- Art Education 510, 520, and 563; 6 hours of 500-level elective courses in art history; 6 hours of 400 or 500-level elective courses in studio art; Curriculum and Instruction 580; 6 hours of 500-level elective courses in education; and 6 hours of Art Education 500 for a total of 36 semester hours. The non-thesis option requires the completion of 36 hours of coursework in art education (including practical), and education, including 6 hours of 590 Special Topics culminating in an exhibition. The exhibition of original 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 philosophical statement, an explanation of process and media for each work presented, and a compositional analysis of each work.

**Track 2 - The non-thesis option requirements**

- Art Education 510, 520, 530, 540, and 563; 6 hours of 500-level elective courses in art history; 6 hours of 400 or 500-level elective courses in studio art; Curriculum and Instruction 580; 6 hours of 500-level elective courses in education; and 6 hours of Art Education 500 for a total of 36 semester hours.

**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

**Music Education**

The department offers two tracks for the Master of Science degree in Music Education. Track 1 is for students who are already certified to teach in the discipline or those who are seeking the M.S. degree without certification. Track 2 is designed for students seeking initial licensure. Thesis and non-thesis options are available for both tracks.

**Track 1 - The thesis option requirements**

- Music Education 510 and 520. For the thesis option, 6 additional hours of Thesis 500 are required for a total of 42 hours. Diagnostic tests in theory, music history, music education, and applied music will be required. A final written and oral examination will be required.

**Graduate Courses**

- **500 Thesis (1-15)** P/NP only. E
- **502 Registration for Use of Facilities (3-15)** Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E
- **510 Foundations of Music Education (3)** Historical, philosophical and aesthetic bases. Prereq: Consent of instructor.
- **520 Research in Music Education (3)** Definition of research problems, data collection and analysis, and research report writing. Application of knowledge of research techniques to analysis of existing research literature in music education. Prereq: Consent of instructor.

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**Audiology and Speech Pathology**

**College of Liberal Arts**

**MAJORS DEGREES**

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<th>MAJOR</th>
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<td>Audiology</td>
<td>M.A.</td>
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<td>Speech and Hearing Science</td>
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<td>Speech Pathology</td>
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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 and animal communication processes. 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 processes;
4. Technical skills in instrumentation and experimental design which enable the student to investigate problems pertaining to speech and hearing processes.

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

The total program is a minimum of 60 semester hours, including a minimum of:
1. 24 semester hours in dissertation 600.
2. 6 semester hours in a research tool.
3. 6 semester hours in a cognate area outside the department.
4. 24 semester hours in 600-level coursework within the department, of which:
   a. a minimum of 6 semester hours in the topic of major interest;
   b. a minimum of 6 semester hours in topics(s) of related interest;
   c. 2 semester hours in 611; and
d. 3 semester hours in supervised teaching experience.
5. A comprehensive examination to demonstrate scholarly knowledge of audiology, speech and language pathology, and speech and hearing science; and advanced knowledge of the 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 Grad Admissions Office in Austin.
538 Advanced Clinical Practice in Speech-Language Pathology: Public Schools (1-4) May be repeated. Maximum 6 hrs. Consent of instructor. May be repeated. Prior departmental approval.

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

540 Structural Speech Disorders (3) Etiology, diagnosis and clinical management of craniofacial speech disorders and laryngeal problems. Prereq: 506. S/NC only.


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

546 Advanced Audiology (3) Theory and practice of advanced pure tone and speech audiometry; instrumentation and interpretation of audiometric findings with differential diagnosis. Prereq: 473.

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

548 Special Study in Audiology (1-3) Special reading, consultation, and research activities in field of audiology. May be repeated. Maximum 6 hrs.

550 Seminar in Audiology (1-3) 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 548.

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.

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

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

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

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.

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

594 Advanced Aural Rehabilitation (3) Procedures; assessment and counseling for communicative function of hearing impaired. Prereq: 494.

595 The Verbo-Tonal System (3) Theory, procedures, and instrumentation of Verbo-Tonal System in habilitation, rehabilitation, diagnosis, speech management and foreign languages. Prereq: 571. Recommended prereq: 305, 473, and 494.

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

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

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

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


608 Advanced Clinical Concepts and Models in Hearing Science (3) Theoretical concepts of clinical manifestations in pathological condition of ear. Electrical, mechanical, and mathematical models of normal and abnormal auditory mechanism function. Prereq: Consent of instructor.

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

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

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

619 Advanced Technology in Speech and Hearing (2) Applications of recent technological advances, computers, to speech and hearing research. Prereq: Consent of instructor.

620 Advanced Seminar in Audiology (2) Topics vary. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

625 Advanced Seminar in Speech and Language (2) Topics vary: aberrations of voice, articulation, speaking rate, rhythm, language development or use, and language symbolization. Prereq: Consent of instructor. May be repeated. Maximum 8 hrs.

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

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

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

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

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

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

Aviation Systems

(UT Space Institute)

MAJOR

DEGREE

Aviation Systems ........................................... M.S.

R. D. Kimberlin, Program Chair

Professors:

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

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

Roberts, R. M., Ph.D. ........................................... AFT

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

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

Associate Professors:

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

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

Assistant Professor:

Soltes, U. P., Ph.D. ............................................. Tennessee

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

To qualify for admission to this program, the applicant must possess a Bachelor's degree in engineering or science from an accredited institution, show evidence of ability to pursue and benefit from the program, and fulfill The University of Tennessee Graduate School admission procedures and grade-point standards. It is expected that the student will have a basic knowledge of computer utilization and statistics; an understanding of aerodynamic fundamentals, aircraft propulsion, and performance; and some understanding of economics. Both thesis and non-thesis programs are available. The thesis program involves a minimum of 30 semester hours credit while the non-thesis program involves a minimum of 33 semester hours credit.

THESIS OPTION

The thesis program involves satisfactory completion of the following requirements:

Research and Development Specialization

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

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

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

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

**Biochemistry**

(University of Liberal Arts)

**MAJOR**

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<tr>
<th>DEGREES</th>
<th>Biochemistry</th>
<th>M.S., Ph.D.</th>
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**WESLEY D. WICKS, HEAD**

**PROFESSORS:**

- Churchich, Jorge E., Ph.D. 
- Huang, Leil, Ph.D. 
- Joshi, J. G., Ph.D. 
- Mority, Kenneth J., Ph.D. 
- Salo, T. P. (Emeritus), Ph.D. 
- Wicks, Wesley D., Ph.D. 
- Feinberg, R. H. (Emeritus), Ph.D. 
- Howell, Elizabeth E., Ph.D. 
- Roberts, Daniel M., Ph.D. 
- Serpersu, Enghi H., Ph.D. 
- Farkas, W., Ph.D. 
- Georgiou, S., Ph.D. 
- Kennel, S., Ph.D. 
- Duke

**ASSISTANT PROFESSORS:**

- Koontz, John W., Ph.D. 
- Serpersu, Enghi H., Ph.D. 
- Feinberg, R. H. (Emeritus), Ph.D. 
- Howell, Elizabeth E., Ph.D. 
- Roberts, Daniel M., Ph.D. 
- Serpersu, Enghi H., Ph.D. 
- Farkas, W., Ph.D. 
- Georgiou, S., Ph.D. 
- Kennel, S., Ph.D. 
- Duke

**ADJUNCT FACULTY:**

- Duke

**DEGREES**

- M.S., Ph.D.

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

501 Aviation Systems: An Overview (3) Aviation systems, present and future. Socioeconomic base, aerospace and propulsion technology, meteorology, air traffic control, airport community interface, and technological 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/C only. E.

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

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

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

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

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


THE MASTER'S PROGRAM

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

4. At least six hours of advanced seminar courses from the following: 601, 603, 604, 605, 606.

6. Six hours of Master's research and a thesis.

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 (Elective) Behavior; chemistry and structure of proteins; enzyme behavior and biological function; catalysis and energy capture; synthetic metabolism; nucleic acid functions; protein synthesis and quaternary structure of proteins; regulation of biochemical processes. Prereq: Chemistry 350-60 and Biology 110-20. 3 hrs and 1 discussion. F,Sp

419 Cellular and Comparative Biochemistry Lab (2) Experiments with enzymes, nucleic acids, and mem-
606 Current Topics in Biomedical Membrane Research (1) Prereq: 410 or equivalent. May be repeated. Maximum 9 hrs. (Same as Microbiology 606) S/N only. F, Sp

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

Biomedical Sciences

Office of the Vice Chancellor for Academic Affairs

MAJOR

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

Raymond A. Popp, Director

Professor:

Olins, Donald E., Ph.D. Rockefeller Research Professor:

Olins, Ada L., Ph.D. New York Research Associate Professor:

Ch'ang, Lan-Yang, Ph.D. Vanderbilt Research Assistant Professor:

Foote, Robert S., Ph.D. ......... Duke Uberbacher, Edward C., Ph.D. Pennsylvania

Shared Faculty:

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


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

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

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 microbiology. Areas are such subjects as immunology, protein and enzyme chemistry, nucleic acid chemistry, cytology, radiation and environmental biology, virology, developmental biology, experimental pathology, microbial and mammalian genetics, mutagenesis, 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 2039, Oak Ridge, Tennessee 37891-0677.

The DOCTORAL PROGRAM

1. Satisfactory (B grade or better) completion of the following core courses or their equivalent:

- Biochemistry (511): Biophysical Biochemistry (514); Genetics (515); Molecular Genetics (517); Cell Biology (519-19); Computing for the Life Sciences (525); and Statistics for Biologists (574).

- Cell Biology (519-19):

- Molecular Genetics (517):

- Biochemistry (511):

- Biophysical Biochemistry (514):

- Genetics (515):

- Cell Biology (519-19):

- Computing for the Life Sciences (525):

- Statistics for Biologists (574).

- General Chemistry, Organic Chemistry, and Advanced Chemistry.

- Microbiology.

- Advanced Chemistry.

- Advanced Chemistry.

- Advanced Chemistry.

- Advanced Chemistry.
The Department of Botany offers the Master of Science and Doctor of Philosophy degrees with concentrations in anatomy, microbiology, botany, physiology, genetics, geography, zoology, mycology, phycology, plant ecology, systematics, 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 portions of the Graduate Record Examination, at least three letters of recommendation or standard recommendation forms from academic or professional sources, and 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. 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 prerequisites 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 non-intensive course of study than the Ph.D. program. However, the applicant must be equally well prepared and display an aptitude and ability for advanced study. The M.S. includes thesis and non-thesis options.

Thesis Option

The thesis program is the normal route taken by botany students for the M.S. In accordance with the policies 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 an auxiliary step to studying for a Ph.D. degree).

1. Satisfactory preparation of a written proposal and an oral defense to the student's committee of a research proposal suitable for a thesis. This must be completed before enrollment in Botany 500.

2. Successful completion of 30 hours of graduate credit at least two-thirds of which must be at the 500 level or higher.

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


5. Presentation of a 30 minute departmental seminar.

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

Non-Thesis Option

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

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

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

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

THE DOCTORAL PROGRAM

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

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

1. Satisfactory presentation of a research problem by means of a written proposal and an oral defense to the student's committee. This must be completed before enrollment in Botany 600.

2. Satisfactory performance on a written comprehensive examination.

3. Presentation of one or more cognate areas outside of the department totaling 6 hours of graduate credit with at least a B average.

4. Satisfactory performance on an examination in one modern foreign language (see Graduate Coordinator) or an A or B in French 302 or German 302.

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 (3,3) Field experience and taxonomy of special plant groups. Topics vary: botany, lichenology, sodology, phycology, aquatic vascular plants, sphenophytes, woody plants, and botanical photography. May be repeated under different topic. Maximum 9 hrs.

403 Mechanisms of Plant Speciation (3) Processes of speciation and evolution; polyploidy, hybridization, allopatric speciation, quantum speciation. Prereq: Botany 412. 3 hrs. F,A

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 organs: media, preparation and maintenance of cultures. Prereq: Botany 210 or Botany 310 or Botany 321. 3 hrs. F,A

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

501 Mycology (4) Intensive study of fungi, all major classes, lecture laboratory and field information. Occasional field trips. Prereq: 310. 3 hrs and 1 lab. F,A

502 Registration for Use of Facilites (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 Non-Thesis Research (2) Library, field, or laboratory research under supervision of staff member. Not for thesis candidates. Maximum 4 hrs. E

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

507 Biological Illustration (3) Principles and applications (photography, drawing, graphics and video for recording and presentation) for research and publication of data in natural and animal sciences. Prereq: 310.

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

512 Taxonomy of Grasses and Grass-like Plants (3) Collection, identification, classification of grasses, sedges and rushes. Phylogeny of the grass subfamilies and tribes. Prereq: 330 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 and cladistics.


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
632 Ecosystems of the World (2) Characterization of world and regional ecosystems; special characteristics of ecosystem function.

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

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

Broadcasting
(College of Communications)

MAJOR DEGREES

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

Norman R. Swan, Head

Professors:

Holt, Darrel W. (Emeritus), Ph.D. .......... Northwestern
Howard, Herbert H., Ph.D. .......... Ohio
Swan, Norman R., Ph.D. .......... Southern Illinois

Associate Professors:

Moore, B.A., Ph.D. .......... Ohio
Ziegler, Dhyana, Ph.D. .......... Indiana

Adjunct Professor:

Nelson, Lindsey, 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/producers for television news program. Prereq: Consent of instructor. Prereq: 410. 1 hr. and 4 labs. F, A

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. 3/14 cameras, recorders, and editing system. Prereq: 320. 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 512, 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


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 retransfer credit for previous work experience. Prereq: Senior or graduate standing, completion of at least 15 hrs of broadcasting courses, GPA 3.0 or better, and consent of department head.

Business Administration
(College of Business Administration)

MAJOR DEGREES

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

The College of Business Administration offers two college-wide programs, the MBA and the Ph.D with a major in Business Administration. A dual degree program is available for the college's dual degree leading to the J.D.-MBA. To obtain application materials, write or call: Associate Dean for Academic Affairs, 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 West Virginia and Virginia; the MBA is available to residents of Arkansas, Louisiana, West Virginia, or 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 proper course sequencing. Requests for changes in concentration area must be submitted, with proper course sequencing. Requests for changes in concentration area must be approved by two faculty members and the department head in the student's area of concentration. For full-time students, the next two years of coursework are established by the degree program for part-time students 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 be complete.

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.

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 proper course sequencing. Requests for changes in concentration area must be approved by two faculty members and the department head in the student's area of concentration. For full-time students, the next two years of coursework are established by the degree program for part-time students 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 be complete. A completed file includes the Graduate School Application, transcripts of prior college work, the MBA program application, two completed applicant recommendation forms, and the Graduate Management Admission Test (GMAT) score report. The first items should reach The Graduate School Application Office 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 college and graduate studies, (2) scores on the GMAT and the Test of English as a Foreign Language (TOEFL) for those whose native language is not English, (3) work experience and other activities that demonstrate potential for leadership, and (4) recommendations from professors and work supervisors. The admission decision is based on all factors which make up the total application; therefore, there is no automatic cut-off for either grade point averages or GMAT scores.

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 another approved 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:

First semester: Business Administration 501, Accounting 501, Management 504, Economics 501, Management 504

Second semester: Business Administration 503, Accounting 503, Management/Logistics 505, Finance 501, Marketing 501

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 concentration area may be indicated on the MBA Program Application or this declaration may be deferred until after matriculation. In any event, selection must be made 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 concentration courses in the concentration/electives 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 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 those listed in the Graduate Catalog numbered below 500 may be included in this block only with written 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 8 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 Academic Affairs in the College of Business Administration. It should be submitted to the Graduate Office at least one full semester prior to the date the degree is conferred. (Admission to candidacy in the fall semester permits graduation in the following spring semester.)

To qualify for the degree, the student must achieve a B average (3.0) or above in MBA core courses required in his/her program, a B average or higher in courses comprising the concentration area, and a B average or higher in the overall program. 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 specifically designed courses which are interdisciplinary in nature. This concentration strives to build a strong academic foundation for both entrepreneurial and intrapreneurial activities. The new venture analysis and entrepreneurship concentration is offered to both the full-time and part-time student in recognition of the growing trend in American business today toward businesses involving 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.

Those 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 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 admission standards and Liberal Arts requirements. At the end of their second year, they have a conference with the Associate Dean for Academic Affairs and are advised of their prospects for formal admission. Students who are likely candidates are advised to take the College Board Advanced Placement 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 Doctor of Jurisprudence and the Master of Business Administration. The dual program saves the student approximately one semester over the time that would be required to earn both degrees independently.

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

Admission Requirements

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

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

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

Curriculum

A dual program candidate must satisfy the graduation requirements of each college.

Students withdrawing from the dual program before completion of both degrees will not receive credit toward graduation from either college in the courses comprising the dual program. Students withdrawing from the dual program in their third year of the business curriculum, 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 graduate courses offered in the College of Law, 3 hours of which will replace 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 a J.D. coursework while completing the first year of the business curriculum. During the first year in the J.D. program, students register through the College of Law. For any term in which students take MBA courses, even though they are also taking law courses, they must register through The Graduate School. The Graduate School registration form must be approved by the Associate Dean for Academic Affairs.

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

Approved Dual Credit

MBA courses to be counted toward the J.D. program must include 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 Academic Affairs.

The Doctoral Program

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

Admission Requirements

Students seeking the 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 the availability of vacancies in each department. The Graduate School requires the Graduate School Application, transcripts from all previous college work, and additional information from international students. The college requires the Ph.D. application, scores from the GMAT, and four written recommendations. All materials should be received by the College of Business Administration not later than March 1. Late applications are considered only if space is available.

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

Program of Study

The Ph.D. normally requires at least three years of intensive study and research beyond the Master's degree. Typically, the first two years of a student's program consist of coursework, written work, 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 Ph.D. 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 Academic Affairs 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
- Calculus
- 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 Academic Affairs. Specific majors may have prerequisites not listed above.

3. Basic Core: Economics 510 (or approved substitute) is required, except that Management 567 (or approved 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 one 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. See the appropriate functional areas, basic disciplines, concentration areas:

   - Accounting
   - Behavioral Science
   - Business Policy
   - Calculus
   - Computer Science
   - Economics
   - Finance
   - Legal Environment
   - Management
   - Marketing
   - Statistics

   All work in the above areas is subject to approval by the Graduate Council’s policies and procedures.

6. A minimum of 9 semester hours of graduate coursework is required in an area outside, but complementary to, the concentration. The student may choose the cognate from one of the following: one of the five concentration business areas listed above, economics, statistics, or a related area in another school or college of the University.

Comprehensive Examinations

Comprehensive written examinations over the concentration and cognate areas are required of each person seeking candidacy for the Ph.D. The concentration area examination is administered in two sessions of approximately four hours each and the cognate area examination in one session of approximately four hours. Written examinations may be supplemented with oral examinations. For a doctoral student having a cognate area in the College of Law, the results of only an oral examination may be deemed acceptable. Scheduling of comprehensive examinations is coordinated through the Office of Graduate Business Programs. Comprehensive examinations are generally offered during the fall and spring terms. Comprehensive examinations must be taken within five years of matriculation.

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

Doctoral Committee

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

GRADUATE COURSES

501-63 Integrative Management I, II, (1,1) Introductory integrative managerial policy and strategy for MBAs only. Use of tools of analysis, data, information, design, and remediation to identify, solve, and correct problems in and of organizations.

506 Management Information Systems (3) Analysis of organizational information needs, decision support systems, data base designs, data base software, computer utilization in data display, modeling, and strategies.

509 Managerial Policy and Strategy (3) Strategy and policy that affect character and success of total enterpr.

510 Economics, Marketing and Management of Service Organizations (3) Unique cost, pricing, marketing and management issues created by the inability of service organizations to inventory output for later resale. Modification of traditional business concepts for organizations that manage service capacity rather than producing inventory.

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

Chemical Engineering

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

MAJOR

DEGREES

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

John W. Prados, Head

Professors:

Bogue, Donald C., Ph.D. ................ Delaware
Byers, Charles H. (Adjunct), Ph.D. .... California
Clark, Edward S., Ph.D. ............... California
Cough, Robert M., Ph.D. ............... Tennessee
Crawford, Lloyd W. (UTSI), Ph.D. .... Cincinnati
Cuiberson, Oran L. (Emeritus), Ph.D. .... Texas
Donaldson, Terry L. (Adjunct), Ph.D. .... Pennsylvania
Doss, James W. (Adjunct), Ph.D. ...... Tennessee
Fellers, John F., Ph.D. ......... Akron
Frazier, George C., Jr. (Condra Prof.), D.Eng. Johns Hopkins
Holmes, John M. (Emeritus), Ph.D. .... Tennessee
Hsu, Hsien-Wen, Ph.D. ............... Wisconsin
Moore, Charles F., Ph.D. ............. Louisiana State
Perna, Joseph J., PE, Ph.D. ............ Northwestern
Phelps, Tommy J. (Adjunct), Ph.D. ..... Wisconsin
Prados, John W. (University Prof.), PE, Ph.D. Tennessee
Scott, Charles D. (Adjunct), Ph.D. ..... Tennessee
Thomas, Carl G., Ph.D. ............... Tennessee
Watson, Jack S., Ph.D. ............... Tennessee

Associate Professors:

Basaran, Osman A. (Adjunct), Ph.D. Minneapolis
Bienkowski, Paul R., Ph.D. .......... Purdue
Bruns, Duane D., Ph.D. ............... Houston
Cochran, Henry D. (Adjunct), Ph.D. MIT
Davidson, Brian H. (Adjunct), Ph.D. .. Cal Tech
Downs, James E. (Adjunct), Ph.D. ... Tennessee
Hansen, Marion G., Ph.D. ............ Wisconsin
Scott, Timothy C. (Adjunct), Ph.D. ... Wisconsin
Seeth, Atri G. (UTSI), Ph.D. ......... Northwestern
Vogel, Ernest F. (Adjunct), Ph.D. ...... Texas
Wang, Tzu-Wei, Ph.D. ............... MIT
Weber, Frederick E., Ph.D. .......... Minnesota

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

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 580).

3. The doctoral program:
   - **Graduate courses in chemical engineering**, amounting to approximately 24 semester hours, at least 9 of which must be in 600 series courses.
   - **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.

4. The comprehensive examination, consisting of a written part, the oral part. The written part covers thermodynamics, reactor analysis, and transport phenomena and separations.

5. **Active participation in graduate seminars** conducted by the department. Resident students must register for CHE 501 every semester offered.

### GRADUATE COURSES

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>401</td>
<td>Chemical Engineering Data Analysis</td>
<td>(Experi- mental data; identification of system extremes; statistical properties of chemical processes; statistical process control; optimization techniques)</td>
<td>Pre-req: CHE 501.</td>
</tr>
<tr>
<td>403</td>
<td>Introduction to Optimization</td>
<td>Principles and applications of optimization techniques; constrained and unconstrained optimization; linear programming, dynamic programming, and geometric programming. Pre-req: Mathematics 241.</td>
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<tr>
<td>440</td>
<td>Transport Phenomena</td>
<td>Momentum, heat and mass transfer processes, analogies, differential and macroscopic balances, applications involving molecular diffusion, simultaneous mass transfer and chemical reaction. Pre-req: 340.</td>
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<tr>
<td>485</td>
<td>Hydrocarbon Processing</td>
<td>Chemical and physical properties of selected petroleum and those processes utilized in conversion of raw material into various fuels and selected chemical feedstocks. Pre-req: Mass Transfer and Separation Processes. Organic Chemistry.</td>
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<tr>
<td>486</td>
<td>Coal Processing to Liquid Fuels</td>
<td>Characterization of various 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 hydrotreatment of coal; reactor design considerations; economic assessments. Pre-req: 485.</td>
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<tr>
<td>500</td>
<td>Thesis</td>
<td>Research under the direction of the student's faculty committee. These theses will be evaluated for credit by the departmental faculty.</td>
<td>May be repeated. S/NC only.</td>
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<tr>
<td>501</td>
<td>Graduate Seminar</td>
<td>Preparation for graduation. Pre-req: Admission to graduate program. May be repeated. S/NC only.</td>
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<tr>
<td>502</td>
<td>Registration for Use of Facilities</td>
<td>Required for the student of a master's degree registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only.</td>
<td>E.</td>
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<tr>
<td>505</td>
<td>Engineering Analysis</td>
<td>Formulation and solution of problems in chemical engineering and materials areas, ordinary and partial differential equations; types of ODE, PDE and solution techniques; transform methods; conformal mapping; variational methods; introduction to numerical methods. (Same as Materials Science Engineering 505.)</td>
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<tr>
<td>506</td>
<td>Approximate Methods in Chemical Engineering</td>
<td>Chemical engineering problems requiring approximate solution; introduction to some approximate methods. Pre-req: 505.</td>
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<tr>
<td>507</td>
<td>Application of Numerical Linear Algebra in Systems and Control Engineering</td>
<td>Fundamental concepts of linear algebra to problems in systems and control areas. Openings and physical interconnections of relevant concepts; least square problems, LU, QR, and SVD decompositions of matrix, eigenvalue problems and similarity transformations in solving difference and differential equations. Numerical computational aspects of various algorithms. Application of linear algebra concepts in optimization to linear programming. Computer projects. Pre-req: Graduate standing or consent of instructor. (Same as Electrical and Computer Engineering 507 and Mechanical Engineering 507.)</td>
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<tr>
<td>531</td>
<td>Advanced Chemical Engineering Thermodynamics</td>
<td>Phase equilibrium in ideal and nonideal solutions; composition relationship between phases, solution behavior and applications to macromolecules; introduction to microscopic approach to thermodynamics.</td>
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<tr>
<td>541</td>
<td>Fluid Mechanics and Polymer Processing</td>
<td>Designed for Materials Science and Engineering 541.</td>
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<tr>
<td>542</td>
<td>Diffusive and Stagewise Mass Transfer Operations</td>
<td>Analysis of mass transfer phenomena, coupled mass and heat transfer, reaction and transport in packed towers and agitated vessels, membrane separations. Equilibrium stage concept applied to mass transfer operation, emphasizing nonequilibrium and multimode systems.</td>
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<tr>
<td>551</td>
<td>Chemical Reaction Analysis</td>
<td>Rate models for heterogeneous reactions, properties of porous catalysts, catalyst deactivation, fluid-fluid and fluid-solid reactors.</td>
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<tr>
<td>575</td>
<td>Applied Microbiology and Bioengineering</td>
<td>Grossodeutre clinical course: course in microbiology, biotechnology, environmental engineering and biochemical engineering. Commercial processes, biodegradations/wastewater treatment, analysis of basic biochemical systems, biosensors, and immobilization methods. Fundamental laboratory techniques during 6-week laboratory period. (Same as Environmental Engineering 575 and Microbiology 575.)</td>
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<tr>
<td>576</td>
<td>Principles of Chemical Separations</td>
<td>Fundamental aspects of chemical and biochemical separations methods with emphasis on separations as unified field; several chemical separation techniques with applications from both chemical and biochemical fields; development of predictive mathematical models.</td>
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<tr>
<td>578</td>
<td>Environmental Engineering</td>
<td>Design and operation of bioreactors; development from basic principles. Model development and design examples from both chemical and biochemical fields; development of predictive mathematical models.</td>
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<tr>
<td>579</td>
<td>Chemical and Environmental Engineering</td>
<td>Discussion of different classes of models: structured, unstructured, discrete and continuous. Parameter estimation and model discrimination, methods for measurement and on-line parameter estimation, on-line and off-line control and stoichiometric balancing. Shuler's model, Herbert's model, stability, steady state analysis, dynamic, lag shift experiments, and design of bioreactors.</td>
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<tr>
<td>581</td>
<td>Industrial Waste Minimization</td>
<td>Principles and practical aspects of industrial waste minimization. Regulatory environment, waste minimization strategies, economic assessments, process safety, case study: analysis of alternative waste minimization management technologies.</td>
<td>Pre-req: Graduate standing in engineering or consent of instructor.</td>
</tr>
<tr>
<td>586</td>
<td>Measurement Science I</td>
<td>Designed for Materials Science and Engineering 586.</td>
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<tr>
<td>588</td>
<td>Measurement Science II</td>
<td>Designed for Materials Science and Engineering 588.</td>
<td></td>
</tr>
<tr>
<td>598</td>
<td>Chemical Engineering 588</td>
<td>Designed for Materials Science and Engineering 588.</td>
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</tbody>
</table>

82 Chemical Engineering
589 Measurement Science II (3) (Same as Nuclear 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.

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 proposal for new business venture. Case study with attention to markets, manufacturing needs, cost estimation, and management and financial planning. To support decision-making, management or by potential investors. Prereq: 525 or equivalent.

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


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


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

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

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

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**Chemistry**

(College of Liberal Arts)

**MAJOR DEGREES**

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

Gleb Mamantov, Head

Professors:

Baker, D. C., Ph.D. ................. Ohio State
Bloor, J. E., Ph.D. ................. Manchester
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
Kabalka, G. W., Ph.D. ............. Purdue
Kleinfein, D. C., Ph.D. ............ Princeton
Lietzke, M. H. (Emeritus), Ph.D. .... Wisconsin
Maior, W. F., Ph.D. ............... Tampere
Magid, 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
Schweitzer, George K. (Distinguished Prof.), Ph.D. ............... Illinois
Smith, W. T. (Emeritus), Ph.D. .... Ohio State
VanHool, W. A., Ph.D. ............. Johns Hopkins
Wehry, E. L., Ph.D. ............... Purdue
Williams, T. F. (Distinguished Prof.), Ph.D. ............... London
Wunderlich, B. (Distinguished Scientist), Ph.D. ............... Northwestern

Associate Professors:

Adcock, J. L., Ph.D. ................. Texas
Alexandrou, A. D., Ph.D. ......... California
Barnes, C. E., Ph.D. ............... Stanford
Bartmess, J. E., Ph.D. ............. Northwestern
Cook, K. D., Ph.D. ............... Wisconsin
Kovac, J. D., Ph.D. ............... Yale
Lane, C. A., Ph.D. ............... California
Schell, F. M., Ph.D. ............... Indiana
Sepaniak, M. J., Ph.D. ............ Iowa State
Woods, C., Ph.D. ............... NC State

Assistant Professors:

Feigerle, C. S., Ph.D. ............... Colorado
Shibata, J. H., Ph.D. ............... Washington

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**THE MASTER'S PROGRAM**

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

1. Research and a thesis to give 6 to 12 hours of graduate credit in Chemistry 500.
2. Participation in seminar (Chemistry 501) during the entire period of graduate study, including the presentation of at least one seminar. (No more than 2 hours may be applied to the course requirements.)
3. Prescribed remedial courses based on performance on entrance examinations. 4. Sufficient graduate coursework in chemistry (at the 400 level or above) and/or a related field to make an overall total of 30 hours, including one of the following sequences: 510-11-12, 530-31-32, 550-51-52, 570-71-72, 590-94-95. At least 14 hours of this graduate coursework must be at the 500 level or above.
5. A final oral examination.

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**THE DOCTORAL PROGRAM**

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

1. Research and a dissertation to give at least 24 hours of graduate credit in Chemistry 600. Registration must be continuous from the beginning of research.
2. Participation in seminar (Chemistry 501) during the entire period of graduate study, including the presentation of at least one seminar.
3. Prescribed remedial courses based on performance on entrance examinations.
4. Completion of the comprehensive examination series and defense of an original research proposal to give 2 hours of credit in Chemistry 605.
5. Demonstration of a reading knowledge of French, German, Russian, or an alternative approved by the Chemistry faculty.
6. Eighteen additional hours in courses at the 500 level or above including at least one course above 501 and one of the following sequences: 510-11-12, 530-31-32, 550-51-52, 53-54, 570-71-72-73, and 590-94-95.
7. A final oral examination.

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

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**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: 239. Prereq or coreq: 380 or 381. Sp

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


471-81 Biophysical Chemistry (3,3) (Same as Biochemistry 471-81).

473-83 Physical Chemistry (3,3) Students may not receive credit for both 473 and 473 nor for both 481 and 483. Prereq: 471-81. Properties of gaseous and condensed phases, thermodynamics, chemical equilibria, statistical mechanics, phase transitions, and statistical thermodynamics. Prereq or coreq: 481 or 483. F

479-89 Physical Chemistry Laboratory (2,2) Experiments on topics discussed in 471-81 or 473-83. Prereq or coreq: Corresponding courses 471 or 473 for 479 and 481 or 483 for 489. Lab. E

484 Advanced Physical Chemistry (3) Chemical dynamics, statistical thermodynamics, quantum mechanics of atomic and molecular systems, crystal structure and solid state. Prereq: 481 or 483. Sp
500 Thesis (1-15) P/NP only. E

501 Chemistry Seminar (1) Lectures and discussion on current research. May be repeated. Credit applies only to graduate students. Prereq: For some seminars requires consent. F, Sp

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

505 Special Problems (3) Specially assigned theoretical or experimental work on problems not covered in other courses. Prereq: Consent of department. May be repeated. Maximum credit 12 hrs. S/NC only. F, Sp

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

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

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

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

530 Chemical Bonding (3) Wave mechanical atom, group theory, quantum approach to molecular orbitals, valency, 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, Mossbauer, mass, and photoselection spectroscopies for characterization of inorganic compounds. Prereq: 530. F

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

550 Structure and Reactivity in Organic Chemistry (3) Structure and bonding in organic compounds; molecular orbital theory, stereochemistry, conformational analysis, the structure of molecules, substituent effects on acidity and reactivity; introduction to reaction mechanisms. Prereq: 560. 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) Organic structure elucidation using spectroscopic methods: nuclear magnetic resonance, infrared, ultraviolet and mass spectrometry. Prereq: 360 or equivalent. Sp

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

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

572 Thermodynamics and Statistical Mechanics (3) Microscopic and macroscopic 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 of 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: 571. 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 550-51-52 or consent of instructor. May be repeated. Maximum 12 hrs.


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

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

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## Child and Family Studies

(University of Michigan, College of Human Ecology)

### MAJORS

- **Child and Family Studies**
  - M.S. Human Ecology

### DEGREES

- **Ph.D.**

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### Faculty

- **Professors:**
  - Cunningham, Jo Lynn, Ph.D.
  - Fox, Greer L., Ph.D.
  - Nordquist, V. Mick, Ph.D.
  - Twardosz, Sandra, Ph.D.

- **Associate Professors:**
  - Allen, J., Ph.D.
  - Buehler, C., Ph.D.
  - Catron, C., Ed.D.
  - Smith, Delores, Ph.D.

- **Assistant Professors:**
  - Blinn, L., Ph.D.
  - Tegano, D., Ph.D.

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

Admission to the program is contingent upon faculty committee review. The program consists of either a master's or doctoral degree. The maximum number of hours of either upper division undergraduate or graduate social science must be completed.

### 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 administration, and child development. 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, 533, and 571. At least 6 hours in a cognate area outside the Department of Child and Family Studies is 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 an 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 of family studies. The strength of the doctoral program is based on three major components: the integration of child development and family studies within the context of human ecology and related areas, concentration in child development or family studies, and an emphasis on becoming proficient producers and consumers of research. A doctoral program that is concurrently specialized and integrative in nature reflects the complexity of the disciplinary subject matter, provides a broader context to formulate theoretical questions, and broadens the empirical literature for addressing these questions.

Requirements include:
1. Minimum 10 credits in child and family studies, required foundation courses: 510, 550, 570, 571.
2. Minimum 12 credits in 500- and 600-level courses in child development or family studies, at least 3 credits in 600-level courses (in addition to the required courses described in #1):
   a. Minimum 6 credits in a cognate area.
   b. Minimum 9 credits in graduate-level statistics: at least 3 of these credits in a more specialized area than a sequence of survey courses.
   c. Minimum 3 credits of specialized research methods.
3. Pre-doctoral research project approved by student’s committee.
5. Minimum 8 credits of electives.

GRADUATE COURSES

500 Thesis (1-15) P/NP only. E
502 Registration for Use of Facilities (1-15) Required for the student not only use registered during any semester when student uses University facilities and/or
**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 properties, evidential evidence, procedures to describe property, to create land division, and to prepare plots; laws of land surveying. Prereq: 210.

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

451 Highway Engineering (3) Design, construction, operation, and maintenance of highway facilities; application of various engineering principles and techniques to processes 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 interrelationship; traffic studies; basic considerations of traffic circulation and control, lighting, capacity analysis, roadway safety analysis and design. Prereq: 210, 251, 352.

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

461 Analysis of Framed Structures (3) Maximum stress due to moving loads; use of influence lines, lateral forces due to earthquake and wind; analysis of portals, 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 composite beams; consideration of members subjected to combined stresses; design of typical framed building connections. Prereq: 471.

474 Reinforced Concrete Design (3) Reinforced concrete 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 Geological Sciences 485.)

490 Water Resources Project Design (3) Coherent development of multipurpose reservoir and dam project; data acquisition: spillway and outlet works design; earthen 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 hydrologic and hydraulic principles to the design of storm sewers, urban drainage systems, culverts, and stream and floodplain management. Prereq: 471.
551 Traffic Engineering-Characteristics (3) Driver, vehicle-roadway system; traffic flow modeling; elements of transportation/highway safety. Prereq. Graduate standing.

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

553 Geometric Design and Layout of Roadways and Community Facilities (3) Urban geometry and functional design and rural and urban roads of all classes; subdivision layout; configuration of urban roads of all classes; techniques for access control; urban intersections; and parking. Prereq. 451 or consent of instructor.

554 Urban Transportation Planning (3) Transportation and economic design alternatives. Prereq. 551 and 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 fare determination and financing. Prereq. 554 or graduate standing.

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

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

558 Planning and Transportation (3) Preparation of proposals for transportation projects, traffic planning and forecasting, and economic evaluation. Prereq. Graduate standing. (Same as Planning 537.)


562 Analysis and Design of Plate Structures (3) Plate bending and buckling theory: analysis and design of bridge and building floors and structural plate components. Prereq. 451.


564 Finite Element Structural Analysis (3) Application of finite element method to structural analysis: plate stresses, plane strain, axisymmetric, and three-dimensional elements; use of typical computer programs. Prereq. 451.

565 Structural Dynamics (3) Analysis of free and forced vibrations, and transient response of structures having many degrees of freedom; elastoplastic behavior considered for concrete systems; earthquake design and response of structures. Prereq. 451.

566 Structural Reliability (3) Application of probability theory and statistics to evaluating reliability of structures; development of safety factors and probability based design codes.

571 Behavior of Steel Structures (3) Behavior of structural steel members due to static and fatigue loading; relation of steel design and current 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 connections; column bases and column splices. Prereq. 472.

573 Prestressed Concrete (3) Properties of prestressing materials; methods of prestressing; analysis and design of simple and continuous beams and slabs. Prereq. 471.

574 Behavior of Reinforced Concrete Members (3) Materials, cure, and weathering factors for reinforcing concrete beams; combined 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.

588 Measurement Science I (3) (Same as Nuclear Engineering 588, Chemical Engineering 588, Engineering Science and Mechanics 588, Electrical and Computer Engineering 588, Mechanical Engineering 588, and Aerospace Engineering 589.)

589 Measurement Science II (3) (Same as Nuclear Engineering 589, Chemical Engineering 589, Engineering Science and Mechanics 589, Electrical and Computer Engineering 589, Mechanical Engineering 589, and Aerospace Engineering 589.)

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

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

596 Special Readings (1-4) Readings related to current development in field. May be repeated. Prereq. 600.

600 Doctoral Research and Dissertation (3-15) Prereq. 599. E

537 Numerical Models for Geologic Materials (3) Numerical models to represent the stress/strain/volume relationships for soils, rock, and concrete; nonlinear elastic models; classical plasticity models; critical state and capping plasticity models; multiple surface models; determination of parameters from laboratory tests; numerical implementation. Prereq. 530 and Engineering Science and Mechanics 539.

539 Soil Dynamics (3) Behavior of soils and soil-structure systems under time dependent loading; wave propagation in elastic/plastic media; principles of seismic reflexion techniques; 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.


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

666 Advanced Structural Reliability (3) Monte Carlo methods; structural reliability; random process; 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.


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

GRADUATE COURSES

500 Thesis (1-15) 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.

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

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

520 Open Channel Hydraulics (3) Open channel flow principles, properties, and classifications; uniform and gradually varied flow theory and applications; open channel design; unsteady flow theory and analysis; discharge of open channel and tail water; flow measurement; microcomputer applications, featuring HEC-2 model. Prereq: Civil Engineering 390.

522 Floodplain and Urban Flood Management (3) Review of flooding mechanisms and floodplain systems; image enforcement; 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 development, development impact cost studies. Prereq: Civil Engineering 390 or consent of instructor for non-majors.

524 Sediment Transport (3) Sediment properties and measurements; principles of dynamics of suspended and bed sediment transport in erodible channels; erosion, transportation, and deposition of sediment by flowing water, erodible channel design; channel regime theory; common computer models. Prereq: Civil 350.


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

535 Ground Water Hydrology (3) Dynamics of flow and contaminant transport in porous media: hydrodynamics, dispersion, anisotropy, layered soils, unsaturated flow and groundwater contaminant transport phenomena. Analytical and numerical solution of flow and transport equations. Prereq: Hydrology or 485 or consent of instructor. (Same as Geosciences 535.)

540 Remote Sensing for Transportation and Facilities Siting (3) Principles of remote sensing; sources of data and data collection systems; photo interpretation; analog and digital techniques for analysis of aerial and terrestrial photos, radar and thermal imagery with application to condition assessment and computer-aided design and operations. Prereq: Consent of instructor.

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

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

552 Biological Treatment Theory (3) Theory and design analysis of biological processes occurring in 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 operation, 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 analysis; 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 emissions and particle air pollutants: Comprehensive design of specific devices and systems. Prereq: Consent.

572 Air Quality Dispersion Modeling (3) Diffusion in atmosphere and assessment 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 375 and Microbiology 575.)

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

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

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 to St. Venant equations of unsteady flow for complex channel situations; dam break modeling. Prereq: 520.

630 Advanced Stormwater Modeling (3) Advanced topics in stormwater modeling; stormwater quality modeling; advanced applications of available stormwater computer models. Prereq: Consent.

651 Industrial Waste Unit Operations and Processes (3) Theoretical 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/soils in environment. Methods of assessing risk posed by presence of those chemicals. Prereq: Consent.

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.

GRADUATE COURSES

401 Greek Poetry (3) Epic, lyric, drama. Authors vary. Prereq: 261.

402 Greek Prose (3) History, philosophy, oratory. Authors vary. Prereq: 262.

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: 251-32 or consent of instructor. May be repeated. Maximum 9 hrs.

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

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

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

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.
541-42 The Latin Epic: Lucretius, Vergil (3,3) Advanced study of epic masterpieces of Lucretius and Vergil both Georgics and Aeneid. May be repeated. Maximum 6 hrs. Letter grade or S/NC.

562 Problems in Old World Archaeology (3) Selected topics and research problems in European, Asian, and African prehistory. Prereq: Consent of instructor. May be advanced tutorial work in Greek and Roman authors in

561 Special Topics in Classical Civilization (1-3) Advanced tutorial work in Greek and Roman authors in

Associate Professors:
Taylor, Ronald E., Ph.D Illinois
Swan, Norman R., Ph.D Missouri
Singletary, Michael W., Ph.D. Southern Illinois
Leiter, B. Kelly (Emeritus), Illinois
Crook, James A., Ph.D Iowa State

Professors:
Communications, write to: Assistant Dean for Graduate

DEGREES

MAJOR

Communications M.S., Ph.D. Communications

Communications

Communications Building, The University of

The College of Communications offers the Master of Science 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, 425 Communications Building, The University of Tennessee, Knoxville, TN 37996-0347.

ADMISSION REQUIREMENTS

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

New students normally are admitted to the programs only at the beginning of fall semester. However, under special circumstances, a student may be admitted at the beginning of spring semester in a temporary non-degree status. Applications for fall admission must be received by May 1. Applications for financial aid are due by March 1.

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

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of those states to enroll in certain programs at UTC without on an in-state tuition basis. The M.S. program is available to residents of Louisiana (advertising) or Arkansas. 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 Resident 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 12 hours of graduate credit will be placed on probation. A student on probation will be dropped from the program unless he or her cumulative grade-point average is increased 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 media with an emphasis on communications management and a deeper understanding of the communication process and social role of the mass media. The program follows a broad-based multi-media approach while allowing the student to concentrate in one of four fields: advertising, broadcasting, journalism or public relations. Both thesis and non-thesis options are available.

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

Degree Requirements

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

1. Ten hours of core courses—Communications 510, 512, 540, and 550, 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, at least 6 hours at the 500 level or above. An internship, if needed, is included.

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

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

Additional hours may be required for those who do not have academic prerequisites, and an internship may be required for those who do not have professional experience in the field they wish to study. A course in communications law is a prerequisite.

A student’s internship experience requires approval by his/her advisor. Credit will be given through Advertising 598, Broadcasting 598, or Journalism 598 on the basis of 3 hours of credit for the equivalent of 15 weeks of full-time professional experience. This credit is to be included in the hour requirements for the M.S. program. Previous professional experience will be evaluated by the student’s committee.

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

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

THE DOCTORAL PROGRAM

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

The program is interdisciplinary, consisting of a required core curriculum and recommended courses outside the College in the related social and behavioral sciences. The program is flexible and will accommodate a wide variety of career goals in communications. New students may be admitted to the program at any time; however, core courses must be taken 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 completed in one year. 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.
Comparative and Experimental Medicine

The following courses are offered for students interested in various aspects of communication studies and research.

**510 Orientation to Doctoral Studies (1)** Degree and dissertation requirements. Committee formation and program planning. Overview of research methods and instruction on the use of communications research techniques for management. Gathering and analysis of data for assessing media stud
dies and message impacts. Prereq: Consent of instructor or admission to program. S

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

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

**550 Seminar in Media Economics and New Technology (3)** Analysis of the digital and print media, financial operations, industry structure. Prereq: Consent of instructor or admission to program. F

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

**610 Orientation to Doctoral Research (1)** Degree and dissertation requirements. Committee formation and program planning. Overview of research methods and instruction on the use of communications research techniques for management. Gathering and analysis of data for assessing media studies and message impacts. Prereq: Consent of instructor or admission to program. S

**620 Seminar in Mass Communications (3)** Role and scope of mass communications in society. Historical perspectives of curricular trends. Teaching methods and instructional objectives; classroom testing and measurement; design of professional curricula, research and extension; program evaluation; and contracts in research. Prereq: Consent of instructor or admission to program. S

**622 Quantitative Research (3)** Techniques for evaluation of research design and measurement. Survey, content analysis, and experimental techniques. Assessment of reliability and validity. Data analysis, hypotheses testing, and inference strategies. Prereq: Consent of instructor or admission to program. S

**632 Mass Communications History and Historiography (3)** Historical and qualitative. Prereq: Consent of instructor or admission to program. S

**640 Mass Communications Theory I (3)** Selected research hypotheses and theories in literature of mass communications theory. Prereq: Consent of instructor or admission to program. F

**641 Mass Communications Theory II (3)** Selected topics in theory. Critical evaluation of extant theory, derivation of hypotheses, and advanced theory construction. Prereq: Consent of instructor or admission to program. F

**652 Mass Communications Law and Legal Research (3)** Legis
dations under which mass media operate. Finding, interpreting and analyzing sources of legal information. Prereq: Consent of instructor or admission to program. F

**692 Advanced Topics in Communications Theory and Methodology (3)** Advanced study of communication issues, theories and methods. May use qualitative, quantitative, historical or legal approaches. May be repeated. Prereq: Consent of instructor or admission to program. F

**70 Comparative and Experimental Medicine (Office of the Vice Chancellor for Academic Affairs)**

**MAJOR DEGREES**

**Comparative and Experimental Medicine**

L. N. D. Potgieter, Director

Joint Graduate Coordinating Committee:

Fuhr, J. E., Ph.D., Medical Biology
Lawler, J. E., Ph.D., Psychology
Lozzo, C. M.D., Medical Biology
Potgieter, L. N. D., Ph.D., Veterinary Teaching Hospital
Sims, M. H., 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, hematology, infectious diseases, aberrant metabolism, oncology, and genetic disorders. The Ph.D. program is open to approved graduate students seeking training in this area and is especially useful for individuals with professional degrees. For the student with undergraduate biological science background, the Comparative and Experimental Medicine program provides an unusual opportunity to study disease processes common in humans and animals from a multidisciplinary perspective. The scope of this intercollegiate program, which pools faculty resources from both veterinary and human medicine, is broadened 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, Developmental and Genetic Center, Aberrant Metabolism Laboratory, Hematology and Oncology services, and departments of life sciences.

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 apply. In addition, all applicants must 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 must have a baccalaureate degree with coursework in chemistry through organic, mathematics through calculus, physics, and basic biology. More advanced study in biology such as biochemistry, mammalian
anatomy, histology, cell biology, or other appropriate biomedical courses from a recognized university is recommended.

Applicants for admission to the Master of Science degree program whose background include no formal training in the biomedical field beyond the baccalaureate degree will be required to score at least 1,000 on the quantitative and verbal portions of the Graduate Record Examination.

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, (e.g., M.D., D.D.S., D.V.M.).

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

Exceptional veterinary students at UT Knoxville may be enrolled in the Comparative and Experimental Medicine graduate programs but will be listed officially as veterinary students. Such students may take advantage of enlisting in graduate courses during summers and as elective courses in the veterinary program.

For additional information, write to the Office of Research and Graduate Programs, P.O. Box 1071, Knoxville, TN 37901-1071.

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.

Computer Science

(College of Liberal Arts)

MAJOR DEGREES

Computer Science M.S., Ph.D.

Jesse H. Poore, Head

Professors:

Ali, Moonis (UTSI), Ph.D. .............. Allgahr
Dongarra, Jack, Ph.D. .............. New Mexico
Gonzalez, R. C. (ECE), Ph.D. .............. Florida
Poore, J. H., Ph.D. .............. Georgia Tech
Sherman, Gordon R., Ph.D. .............. Purdue
Thomason, Michael G., Ph.D. .............. Duke

Associate Professors:

Case, Jeffrey D., Ph.D. .............. Illinois
Langston, Michael A., Ph.D. .............. Texas A&M
Leuze, Michael, Ph.D. .............. Purdue
MacLennan, Bruce J., Ph.D. .............. Purdue
Whitehead, Bruce (UTSI), Ph.D. .............. Michigan

Assistant Professors:

Blair, J. R. S., Ph.D. .............. Pittsburgh
Booth, Heather A., Ph.D. .............. Princeton
Lee, Seung-Chul (UTSI), Ph.D. .............. Florida
Mutchler, David, Ph.D. .............. Duke
Straight, David W., Ph.D. .............. Texas
Vander Zanden, Bradley, Ph.D. .............. Cornell
Vose, M. D., Ph.D. .............. Texas

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 cannot be counted toward the 30 semester hours, is available to students who need a stronger background in software; one course in programming in a modern recursive high-level language is the prerequisite to 511. Graduate courses outside the department are allowed but must be approved by the Graduate Committee before enrollment.

Thesis Option

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

Non-Thesis Option

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

Master's Minor in Computer Science

The graduate minor consists of 511 or its equivalent plus an additional 6 hours of computer science graduate level courses or above the 450 level.

THE DOCTORAL PROGRAM

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

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

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

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

Original research reported in a dissertation of high quality is emphasized. The minimum hour requirements are 24 hours of course 600 (Doctoral Research and Dissertation) and 24 hours of graduate courses beyond the equivalent of a Master's degree (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, techniques, hardware. 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 heuristics, 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 system tools 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. Applications in database and expert systems. Prereqs: 381 and 421.

424 Robotics Software (3) Software for robotic control. Prereq: Computer Organization, Data Structures, and Calculus. 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, tablets and chips, with goal of understanding techniques for designing computer systems for graphics capability. Prereq: Computer Organization and Data Structures. 3 hr lab required.

433 Computer Systems Architecture (3) Parallel processing, memory, I/O, pipelines, specialized architectures. Prereq: 331 and 360.

434 Networks and Communications (3) ISO open system interconnection protocols, study of several existing wide area networks, local area networks. Prereq: Systems Programming.

435 Microcomputer Systems (3) Disk operating systems, peripherals, local area networks and communication protocols. Introduction to multiprocessor microcomputer systems. Prereq: Systems Programming. 3 hr lab required.

436 Computer Systems Hardware Design (3) Computer systems hardware: bus structures, I/O devices, interrupt support hardware, direct memory access logic, timing budgets, and system considerations. Lab: construction and debugging of either or both of prototyped subsystems; system based on commercially available microcomputer component devices. Prereq: 435.
439 Microprogramming (3) Microprogramming concepts and techniques for control systems of large and small machines. Bit-slice architecture, sequencers. Prereq: Computer Organization and Data Structures. 3 hr lab required.

441 Science Information Systems (3) Design of scientific data banks, document repositories, information retrieval and electronic dissemination services. Control and dissemination of scientific information at national and international level. Prereq: 340.

442 Introduction to Database Management Systems (3) Organization, data definition, hierarchical, network, and relational models; relational calculus and algebra, data definition and manipulation languages; implementation and security considerations; performance, integrity, and reliability metrics; intelligent database systems. Prereq: 340 and 311.

443 Introduction to Information Storage and Retrieval (3) Information storage and retrieval, statistical, syntactic, and logical analysis of information content, evaluation of retrieval effectiveness. Prereq: 340.


451 Pattern Recognition and Analysis (3) Elements of syntactic pattern recognition, learning algorithms, decision theory, classification rules. Prereq: 111, 112 and 311. 3.3 hr lab required.

452 Image Processing and Analysis (3) Methods 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 ease of use of software in intended environment. Prereq: 111 and 112.

461 Introduction to Operating Systems (3) Concepts and features of operating systems in machines of different sizes, Memory, processor, device, and file management; Scheduling; resource allocation, contention. Concurrent processing. Prereq: 360.

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.


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 at information transmission 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/N only. E

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when fees for microcomputer use or special facilities and equipment are charged but the student has not formally expressed his desire to use such facility before degree is completed. May not be used toward degree requirements. May be repeated. S/N only. E

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: Discrete Structures and 511.

523 Machine Learning (3) Algorithms whereby computer exhibits aspects of learning or inference about their environment. Supervised and unsupervised methods; data-driven pattern analysis; explicit and implicit structure. Prereq: 521.

525 Software Engineering (3) Survey of key ideas in software engineering: formal methods, tools, testing, responsibility, structured design and development, metrics, management and history of the field.

532 Boolean Algebra, Logic Design and Microprocessors (3) Boolean algebra. Combinational and sequential logic devices. Microprocessors. Hardware laboratory. Prereq: One or more college mathematics beyond algebra and trigonometry.

535 Computer Architecture (3) Parallel processing computer methods, pipelining, vector processors, functional units, memory organization and control, data flow, reduced instruction sets, symbolic processors. Prereq: 511 and 532.


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 automatic 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: Digital Design and probability or statistics.

552 Image Analysis (3) Techniques of computer image processing and understanding. Prereq: 551.

562 Language Design (3) Description, structure, and design principles of high-level languages. Names, types; control and data structures; abstraction and modularity. Design project. Prereq: 511.

563 Operating Systems (3) Operating system design, alternative structures and features; utilization, memory, device and process allocation and management. Protection, time sharing, real-time systems. Memory management, dispatchers, interrupts. 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/N 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.

660 Advanced Topics in Software Systems (1-6) Prereq: Consent of instructor. May be repeated with consent of department.

670 Advanced Topics in Numerical Mathematics (1-6) Prereq: Consent of instructor. May be repeated with consent of department.

680 Advanced Topics in Theory and Foundations (1-6) Prereq: Consent of instructor. May be repeated with consent of department.

690 Advanced Topics in Computer Science (1-6) Prereq: Consent of instructor. May be repeated with consent of department.

Curriculum and Instruction (College of Education)

MAJOR DEGREES

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

J. Estill Alexander, Acting Head

Professors:

THE MASTER'S PROGRAM

The non-thesis requirements are Education 574 and 591, 6 hours; internship, 12 hours; specialty 503, 6 hours; and 12 hours of electives as approved by the student's committee, for a total of 36 hours. The thesis option requires 6 additional hours of Thesis 500 for a total of 42 hours.

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: educational 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 some 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. The Ed.S. program (concentration in reading education only) in Curriculum and Instruction 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.

GRADUATE COURSES

404 Problems in Improvement of Instruction (1-3) Special conferences, workshops, or in-service programs. May be repeated. Maximum 6 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 or background in teaching science and/or social studies. Prereq: Admission to teacher education. F,Sp

422 Elementary and Middle School Teaching Methods I (6) Methods and materials for teaching reading, language arts, mathematics, science and social studies. Uninstructor and Ununitary topics. Planning, daily planning, evaluation, etc., and language and concept development.

429 Language Arts/Reading Instruction in Elementary and Middle Schools (3) Language and language development as applied to teaching of oracy (listening-speaking) and aspects of literacy (reading process readiness and writing). Not open to students with recent course in courses in language arts. 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. E

434 Topics in Reading Education (1-6) 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) Procedures for helping children learn mathematics. Ununitary planning, daily planning, grouping, general factors related to classroom management. Not open to students with recent course in teaching of mathematics. 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) Techniques of teaching reading, language arts, mathematics; teaching simulation and directed observation in schools. Prereq: Admission to Teacher Education Program.

459 Teaching English in the Secondary School (3) Techniques of teaching reading, language, and literature. Prereq: Admission to Teacher Education Program.

460 Teaching Reading and Literature in the Secondary School (3) Approaches for teaching basic reading skills and ways of teaching literature. Sp

461 Developing Reading Skills in Content Fields (3) Techniques for teaching reading and study skills in content areas of school curriculum. Prereq: Admission to Teacher Education Program. E

475 Utilization of Instructional Media (3) Basic concepts of communication and instructional development for improving instruction through use of media. Prereq: Admission to Teacher Education Program. E

485 Teaching Mathematics, Grades 7-12 (3) Preparation of teaching plans, evaluation, materials for teaching mathematics, teaching simulation and directed observation in schools. Prereq: Admission to Teacher Education Program.

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

493 Teaching Science Grades 7-12 (3) Methods, materials, recent trends in science and environmental education programs for secondary schools. Prereq: Admission to teacher education. F


504 Studies and Theory in Language Development (3) Studies and theory of language development in children. Prereq: 1 elementary school language arts course or consent of instructor. F

515 Seminar (1-3) Curricula, instructional technology, elementary education, secondary education, or social science education.

practices for teaching young children; relationship of kin-
foundations as related to goals of students' programs. May be repeated. Maximum 6 hrs. S/N only. E

516 Seminar (1-3) Curriculum, instructional technology, elementary education, secondary education, or social foundations as related to goals of students' programs. May be repeated. Maximum 6 hrs. S/N only. E

517 Seminar (1-3) Curriculum, instructional technology, elementary education, secondary education, or social foundations as related to goals of students' programs. May be repeated. Maximum 6 hrs. S/N or letter grade. E

518 Educational Specialist Research and Thesis (2) May be repeated. Maximum 6 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. Trends in curriculum, development of concepts and generalizations, integration of social sciences. Prereq: Course in teaching of social studies or consent of instructor. Sp

522 Teaching Mathematics in Elementary and Middle Schools (3) Instructional strategies for helping elementary and secondary school children learn mathematics. Examination, development and use of materials for creating active learning environment. Prereq: 443 or equivalent or consent of instructor. F,Su

523 Diagnosis andCorrection of Children's Difficulties (3) Identification of problem areas in reading, spelling, arithmetic, writing, and nonverbal learning; help with learning disabilities in mathematics and procedures for helping classroom teacher correct difficulties. Prereq: 522 or equivalent instruction. F

524 Teaching for Creative Thinking and Expression (3) Creativity of teacher and development of student creativity. Development of creative potential across academic areas. Creative problem solving and methods for development of creative potential. Su

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,Su

527 Elementary School Curriculum (3) Examination, evaluation and application of curriculum designs in elementary school. Trends and issues which affect elementary school curricula. Creative problem solving and methods for development of creative potential. Su

528 Teaching Language Arts Elementary and Middle School (3) Recent trends and current materials and methods in teaching elementary language arts (except reading). Prereq: Course in language arts or consent of instructor. Sp

529 Practicum in Diagnosis and Remediation of Difficulties in Learning Mathematics (2) Assessment and remediation in learning experience with children having difficulties in learning elementary school mathematics. Prereq: 523 or consent of instructor. May be repeated. Maximum 4 hrs. Su

530 Teaching Reading in Elementary and Middle Schools (3) Trends in methods, materials, basic approaches, skill development and assessment procedures for teaching reading at elementary school level. Prereq: Course in teaching of reading or consent of instructor. F

531 Teaching Science in Elementary and Middle Schools (3) Recent trends, materials and content in teaching elementary science. Prereq: Course in teaching elementary science or consent of instructor. F

532 Instructional Research: Analysis and Application (3) A learning experience on research in instruction. Translation and application of research findings into instructional performance. Prereq: Consent of instructor. F,Su

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. Su

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. Testing theory and research; use of systematic evaluation approaches and applying it to improve program development and implementation. Prereq: Consent of instructor. E

536 Psychology of Reading (3) Reading act, relationship between learning theory and reading, role or reading in child's overall intellectual development. Affective and cultural factors. Prereq: 500-level course in reading education or consent of instructor. F

537 Diagnosis and Correction of Classroom Reading Problems (3) Procedures, methodologies and materials for diagnosing and correcting classroom reading problems. Prereq: Course in diagnosis and correction of classroom reading problems or consent of instructor. May be repeated. Maximum 4 hrs. F,Su

539 Practicum in Remediation of Reading Problems (2) Application of learning and teaching methodology in working with elementary and/or secondary school students, preparing case study reports, and conducting parent conferences. Prereq: Course in diagnosis and correction of reading problems or consent of instructor. May be repeated. Maximum 4 hrs. Sp

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

542 Development of Educational Thought (3) Historic and philosophic approaches to teaching and writing of influential educators. Plato, Quintilian, Comenius, Rousseau, Pestalozzi, Froebel, Dewey. Prereq: Graduate status and consent of instructor. Sp,Su

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 societal objectives, 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. Prereq: 543 or equivalent. F

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. E

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

550 Assessment andCorrection 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 Pracicum (2) Diagnosis and remediation of developmental and corrective reading needs. Prereq: Course in diagnosis and correction of reading problems or consent of instructor. May be repeated. Maximum 6 hrs. F

557 The Junior High and Middle School Curriculum (3) Curriculum and instructional design for junior high and middle school. Characteristics of students, curricu-
Gist, C. S., Ph.D., ORAU
Gittelman, John L., Ph.D., Zoology
Goss, L. Barry, Ph.D., Science Appl.
Greenburg, Neil, Ph.D., Zoology
Gross, L. J., Ph.D., Mathematics
Hallam, Thomas G., Ph.D., Mathematics
Hart, Carol P., Ph.D., Geography
Hay, R. L., Ph.D., Forestry, Wildlife & Fisheries
Herbes, S. E., Ph.D., ORNL
Hildesbrand, S. G., Ph.D., ORNL
Hilty, J. W., Ph.D., Entomology & Plant Pathology
Horn, Sally P., Ph.D., Geography
Houston, M., Ph.D., ORNL
Kimmel, B. L., Ph.D., ORNL
McCarthy, J. F., Ph.D., ORNL
Mc Cormick, J. Frank, Ph.D., Botany
McCracken, G. F., Ph.D., Zoology
Mckinney, M. L., Ph.D., Geology
McLaughlin, S. B., Ph.D., ORNL
Muhiolland, P. J., Ph.D., ORNL
Nordvin, Stephen C., Ph.D., CPSU
Norby, Richard, Ph.D., ORNL
O'Neil, R. V., Ph.D., ORNL
Pagni, R. M., Ph.D., Chemistry
Parker, Charles, Ph.D., ORNL
Pelton, Michael R., Ph.D., Forestry, Wildlife & Fisheries
Pimm, S. L., Ph.D., Zoology
Pleiss, C. D., Ph.D., Entomology & Plant Pathology
Port, W. P., Ph.D., ORNL
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
Sayer, Gary S., Ph.D., Microbiology
Scarbours, S. E., Ph.D., Forestry, Wildlife & Fisheries
Smith, W. O., Ph.D., Botany
Stacey, G., Ph.D., Microbiology
Stewart, A., Ph.D., ORNL
Stewart, R. J., Ph.D., Forestry, Wildlife & Fisheries
Turner, Monica G., Ph.D., ORNL
Van Hook, R. L., Ph.D., ORNL
VanWinkle, W. P., Ph.D., ORNL
Vaughn, G., Ph.D., Zoology
Walton, B. T., Ph.D., ORNL
Wehry, 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

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 biology 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 addressed to the Director, Graduate Program in Ecology, University of Tennessee, Knoxville, Tennessee 37966-1610.

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 annually by the Ecology Curriculum Committee. The remainder of a student's course program is determined in consultation with the graduate committee. A listing of approved campus-wide ecology offerings is provided to each student during orientation. A graduate minor in ecology is available on an individual basis.

THE DOCTORAL PROGRAM

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

ADVISORS

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

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The Ph.D. program in Ecology is available to residents of the states of Alabama, Georgia, Mississippi, Missouri, North Carolina, South Carolina, Tennessee, Virginia, and 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
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E
510 Special Problems in Ecology (1-3) Individual investigation in ecology. May be repeated with consent of instructor. Maximum 6 hrs.
520 Ecology for Planners and Engineers (3) Ecological principles and effects that human-caused changes have on living organisms. Lectures and field trips. Appropriate for students in Planning and Environmental Engineering.
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 557.)
552 Development Planning in the Third World (3) As Planning 552.
555 Environmental Planning (3) As Planning 555.
561 Environmental Toxicology (3) As Same as Biochemistry 561.
562 Techniques in Environmental Toxicology (1) As Same as Biochemistry 562.
573 Population Biology (3) As Same as Zoology 573 and Botany 573.
574 Communities and Ecosystems (3) Patterns underlying principles behind short and long term community and ecosystem organization, dynamics, energetics and nutrient cycling.
600 Doctoral Research and Dissertation (3-15) P/NP only. E
604 Current Topics in Environmental Toxicology (1) As 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 careers and career planning in applied ecology. Prereq: 573-74 or equivalent or consent of instructor. (Same as Botany 637.)

Economics

(Complete 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
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. 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. may be taken in fields other than economics. Students electing the non-thesis option are required to pass a final comprehensive examination.

The thesis option requires 30 hours of coursework at the 400 level or above, including at least 24 hours at the 500 level or above, 6 hours of which may be thesis hours. Of the remaining 18 hours at the 500 level or above, at least 15 hours must be in economics and must include 511, 512, 513, and 514. A maximum of 6 hours may be in an area other than economics.

THE DOCTORAL PROGRAM

Admission to the Ph.D. program is based on promise of outstanding scholarship as demonstrated by previous academic performance and by scores achieved on the general portion of the GRE. 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, 513, and 514 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, industrial organization, international economics, public 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 economics. Prereq: Intermediate Macroeconomics or consent of instructor.

415 History of Economics (3) Methods of study of doctrinal history. Origins and evolution of major doctrines: historical and theoretical development of key economists and their schools. 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. May be repeated when topic varies. Maximum 9 hrs.


462 Economics of Resources and Environmental Policy (3) Economic analysis of environmental policy and allocation of resources. Benefits and costs of development of natural resources and impacts of growth on environment. Major writing requirement. Prereq: 201.

471 Public Finance: Optimal Government Functions and Intergovernmental Relations (3) Analysis of individual and public consumption, external effects, public investment, social decision making. Prereq: 201.

472 Public Finance: Taxation and Intergovernmental Relations (3) Analysis of individual and public consumption, external effects, public investment, social decision making. Prereq: 201.


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 application of optimization techniques.

502 Registration for Use of Facilities (3-15) Required for student not otherwise registered during any semester when student uses University facilities and/or supplements required for major dissertation. May be used for student uses University facilities and/or supplements required for major dissertation. May be used for student uses University facilities and/or supplements required for major dissertation. May be used.

503 Business Conditions Analysis (3) Macroeconomic environment of firm. Determination of level of output, employment and prices for economy as a whole. Implications of aggregate fluctuations for individuals and 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 environments. For non-economics majors. Not available for students with credit for 511, 513 or equivalent.

511-12 Microeconomics Theory (3-3) Theory of consumer choice and demand. Theory of rent, theory of values, attributes of goods and implicit prices, market demand, labor supply, individual behavior under uncertainty, theory of firm, theory of production and cost, market structures, derived demand and factor pricing, introduction to welfare economics, market failure and theory of second best, and exchange.

513-14 Macroeconomic Theory (3-3) Determination of national income, prices, and employment. Results using Keynesian, non-market-clearing, monetarist, and rational expectations paradigms.

515 History of Economics (3) Purpose and methods of history of economics. Background for and origins, concerns, methods, development and conclusions of clas-
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; Human Performance and Sport Studies; 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 development
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. Sociocultural 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
2. Motor Behavior: Motor Control, Motor Learning
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


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

601 Trans-College Seminar (1) Introduction to Ph.D. program in Education; research requirements, meaning of scholarship in academic and issue 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
1. Educational Psychology
2. Educational Psychology and Guidance
3. Educational Psychology and Professional Education
4. Social Work

DEGREES
1. M.A.
2. M.S.
3. Ed.D.
4. Ph.D.

THE DOCTORAL PROGRAMS
Admission requirements include up-to-date scores from the GRE, the departmental admissions application form and letters of recommendation. All programs include thesis and non-thesis options. Hour requirements for a major in Educational Psychology, concentration in educational psychology, 36; concentration in community counseling, 60; and for a major in Guidance, 48. The programs in community counseling and in guidance each require supervised practicum and internship experiences working with clients. A final examination is required of all Master's degree students.

THE EDUCATIONAL SPECIALIST PROGRAM
Admission requirements include up-to-date scores from the GRE, the departmental admissions application form and letters of recommendation. 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 or counselor education, it is assumed that they have completed a Master's degree equivalent to the one offered at UT Knoxville. In this case, the minimum hours beyond the Master's required to complete the Ed.S. are: educational psychology, 24; school counseling, 22. The specialist programs require supervised practicum and internship experiences with students or clients, either in the public schools or in community human services agencies. A final examination is required of all specialist students.

THE DOCTORAL PROGRAMS

The Ph.D. with a major in Education includes concentrations and specializations as listed under Education. For students applying to the Ph.D. program concentration 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 Ph.D. with a concentration in either counselor education are accredited by the Council for Accreditation of Counseling and Related Educational 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 counseling and school counseling concentrations are accredited by the Council for Accreditation of Counseling and Related Educational Programs. The program in Educational Psychology has been recognized as a "Designated Program" by the American Association of State Psychology Boards and the Council for the National Register of Health Service Providers in Psychology.

The application deadline for admission varies by program area. February 1 is the deadline for all programs. Some programs also review applications May 1, August 1, and November 1. For information about the various programs of study, write to the departmental admissions secretary.

THE MASTER'S PROGRAMS

Admission requirements include up-to-date scores from the GRE, the departmental admissions application form and letters of recommendation. All programs include thesis and non-thesis options. Hour requirements for a major in Educational Psychology, concentration in educational psychology, 36; concentration in community counseling, 60; and for a major in Guidance, 48. The programs in community counseling and in guidance each require supervised practicum and internship experiences working with clients. A final examination is required of all Master's degree students.

THE DOCTORAL PROGRAMS

The Ph.D. with a major in Education includes concentrations and specializations as listed under Education. For students applying to the Ph.D. program concentration 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 Ph.D. with a concentration in either counselor education are accredited by the Council for Accreditation of Counseling and Related Educational 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 counseling and school counseling concentrations are accredited by the Council for Accreditation of Counseling and Related Educational Programs. The program in Educational Psychology has been recognized as a "Designated Program" by the American Association of State Psychology Boards and the Council for the National Register of Health Service Providers in Psychology.

The application deadline for admission varies by program area. February 1 is the deadline for all programs. Some programs also review applications May 1, August 1, and November 1. For information about the various programs of study, write to the departmental admissions secretary.

THE MASTER'S PROGRAMS

Admission requirements include up-to-date scores from the GRE, the departmental admissions application form and letters of recommendation. 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 or counselor education, it is assumed that they have completed a Master's degree equivalent to the one offered at UT Knoxville. In this case, the minimum hours beyond the Master's required to complete the Ed.S. are: educational psychology, 24; school counseling, 22. The specialist programs require supervised practicum and internship experiences with students or clients, either in the public schools or in community human services agencies. A final examination is required of all specialist students.
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 applicant's counseling work with a client.

The following minimum number of hours is required in each program concentration specializations:
counseling psychology - 98;
counselor education, Ph.D. - 98, Ed.D. - 79;
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 a requirement in all doctoral programs. Pre-dissertation research participation is a requirement 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 also require supervised practicum experience in classroom teaching. All doctoral students take written comprehensive examinations in the program concentration, supporting specializations, and cognate areas. The guidelines for each program concentration may be consulted for further requirements.

ACADEMIC COMMON MARKET

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

GRADUATE COURSES

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

410 Sex Role Development: Implications for Education and Counseling (3) Theories and research concerning development of patterns, sexual role, and its relevance in educational and counseling settings. F,Su

431 Personality and Mental Health (3) Various perspectives of mental health with application to education and other social institutions. F,Sp

432 The Disadvantaged Student: Psychoeducational Perspectives (3) Theory and research regarding etiology, psychosocial behavior and appropriate interventions. Sp

460 Self-Management in the Helping Professions (3) Applications of self-management strategies to career, social, emotional, and health domains for both helping professionals and their clients. Prereq: introductory course in psychology or consent of instructor. S/NC or letter grade. Sp;Su

493 Independent Study (1-15) Independent investigation of problems in educational and counseling psychology. May be repeated. Maximum 15 hrs. S/NC or letter grade. E

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

502 Registration for Use of Facilities (3-5) 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 (1-3) May be repeated. Maximum 12 hrs. S/NC only. E

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

510 Psychological Theories of Human Development Applied to Education (3) Theory and research on emotional, social, and intellectual development. Development of life span with applications to educational and therapeutic settings. F,Su

511 Cognitive Development: Implications for Education (3) Prerequisite: consent of instructor. E

515 Educational Applications of Behavioral Theories of Learning (3) Behavioral theories and research, conditioning, observational learning, and ethological learning as systems apply to student motivation, discrimination, and control. E

516 Educational Applications of Cognitive Learning Theories (3) Cognitive theory and research, social learning, attribution and information processing as systems apply to education. Prereq: 515 or consent of instructor. F

518 Educational Specialist Research and Thesis (1-9) May be repeated. Maximum 9 hrs. P/ NP only. E

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

521 Statistics and Research Design: Application (3) Data collection and analysis. Descriptive techniques, estimation, logic of hypothesis testing and selected parametric and nonparametric tests. F

525 Formal Measurement in Education and Counseling (3) Principles of test construction and research related to higher mental problem-solving. Prereq: 510 or consent of instructor. F

526 Internal Methods of Assessment (3) Development and use of alternative measures, checklists, observation, test scores and case reports in assessment and counseling of children and adults. Prereq: 525. Sp

540 Seminar in School Psychology (3) Essentials of theory and practice of school psychology as professional specialty. Consideration of history and current issues in school psychology. S/NC only. Sp

541 Psychoeducational Assessment (3) Direct, psychometric and naturalistic assessment methods in learning environments. Prereq: Admission to school psychology program or consent of instructor., and 525 or equivalent. May be repeated. Maximum 6 hrs. F,Sp

542 Practicum in Psychoeducational Assessment (3) Application of assessment skills to clients in learning environments. Coreq: 541 or consent of instructor. May be repeated. Maximum 6 hrs. S/NC only. F,Sp

545 Psychoeducational Consultation (3) Use of two and three-tier models of consultation in educational and therapeutic settings based on behavioral, ecological, social-learning and cognitive-behavioral theories. F

546 Practicum in Consultation (3) Application of consultation skills to educational settings. Coreq: 545. Sp

549 Internship in School Psychology (1-6) Supervised 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 Psychology 549). S/NC only. E

550 Development and Operation of Pupil Personnel Services (3) History, philosophy, trends, standards of preparation, certification, and role identity of counselors and other personnel service specialists. Program administration and organization. F,Su

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

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

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

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

555 Practicum in Counseling (3) Supervised practice and application of counseling skills with individuals. Prereq: Admission to program, 431, 525, 551 and consent of instructor. May be repeated. Maximum 9 hrs. E

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

556 Internship in School Counseling (1) Supervised postpracticum employment at departmentally approved site. Prereq: 550 and consent of instructor. May be repeated. Maximum 12 hrs. S/NC only. E

560 Models of Classroom Discipline (3) Applications of major models of discipline in development of constructive atmospheres for classroom learning. F,Sp

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

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

585 Seminar in Gerontology (1) (Same as Human Ecology 585, Nursing 585, Physical Education 585, Public Health 585, Psychology 585, Social Work 585, and Sociology 585.)

593 Independent Study (1-15) Independent investigation of problems in educational and counseling psychology. May be repeated. Maximum 15 hrs. S/NC or letter grade. E

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

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

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

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

635 Ethical, Legal, and Professional Issues in Psychology (3) Research, human services, teaching and public policy. Prereq: Admission to doctoral program in psychology, or consent of instructor. (Same as Psychology 635.)

649 Advanced Internship in School Psychology (1-9) Supervised experience as school psychologist in departmentally approved internship sites for doctoral level students. Prereq: Enrollment in doctoral level school psychology program and consent of instructor. May be repeated. Maximum 9 hrs. S/NC only. E

650 Development and Operation of Pupil Personnel Services (3) History, philosophy, trends, standards of preparation, certification, and role identity of counselors and other personnel service specialists. Program administration and organization. F,Su
Educational Leadership

(College of Education)

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
Harris, G. W., Jr., Ph.D. ................................. Michigan
Lovell, J. T. (Emeritus), Ed.D. ...................... Florida
McMinnis, 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
Trusty, Francis M. (Emeritus), Ed.D. ........... Stanford
Ubben, Gerald O., Ph.D. ................................. Minnesota
Venditti, Fred P. (Emeritus), Ed.D. ........... Northern Colorado

Associate Professors:

Askew, Jerry W. (Adjunct), Ph.D. .............. Ohio State
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

Assistant Professor:

Grubb, 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 administrative and supervisory functions such as student personnel administration, educational administration and supervision, educational administration, college student personnel administration, and college teaching.

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.

Students entering either of these options must complete the introductory core consisting of Educational Administration and Supervision 513, 515, 516, and 535 or a demonstrated proficiency in computer proficiency. The courses are prerequisites to other courses in the department.

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 36 hours, which includes 6 hours of practicum experience, is required in either option.

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.
548 Introductory Supervision and Personnel (3) Basic supervision and personnel concepts and related competencies; building (or micro-organizational) level; interviewing, personnel planning, collecting and maintaining employee records, 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 decision-making function through use of both quantitative and qualitative planning techniques. Prereq: 516; Consent of instructor. Prereq: Introductory M.S. core or consent of instructor. F, Su

554 School Law (3) Logical arrangement of case and statutory materials for public school administrators and teachers; problems concerning law and public education. Prereq: M.S. introductory core or consent of instructor. Sp, Su

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. E

562 Educational Leadership and District-Level (3) Role of central administrative team; relationships, behaviors, concepts and competencies for developing and maintaining effective school organization. At end of planned program study. 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. Stimulation 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 (1-3) 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 of programs, problems, programs, and trends of elementary schools and management skills of elementary school administrators. Prereq: Presently elementary school administrator or consent of instructor. May be repeated. S/NC or letter grade. F, Sp

596 Middle School Principals Seminar (1-3) For in-service training of middle school administrators. Development, programs, trends of middle schools and management skills of middle school administrators. Prereq: Presently middle school administrator or consent of instructor. May be repeated. S/NC or letter grade. F, Sp

597 Secondary Administrator Seminar (1-3) For in-service training of secondary school administrators. Development, programs, trends of secondary schools and management skills of secondary school administrators. Prereq: Presently secondary school administrator or consent of instructor. May be repeated. S/NC or letter grade. F, Sp

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

604 Seminar in Educational Administration and Supervision (1) Current educational issues, problems and trends of secondary and post-secondary schools and management skills of secondary school administrators. Prereq: Presently secondary school administrator or consent of instructor. May be repeated. S/NC or letter grade. F, Sp

610 Internship in Educational Administration (3) Opportunity for doctoral students and advanced graduates to gain experience in performance of critical tasks of educational administration under supervision of practicing educational administrator. 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, collected each semester and presented by specialist. 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) Statistical techniques and experimental research methods, parametric and non-parametric statistical techniques used in research in educational settings. F

615 Research Designs (3) Statistical methods through multiple variable techniques applied 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. 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.

629 Seminar in Politics of Education (3) Political theories and practices as they affect operation of public school systems and higher educational institutions. Inter-disciplinary discussion of policy issues related to political science, psychology and public administration as they affect education, nation and citizens. Prereq: 544 or consent of instructor. F

644 Educational Finance and Business Management (3) Contemporary educational finance and their influence upon education, nation and citizens. Exploration of the economic environment of public education. Prereq: 544 or consent of instructor. F

650 Educational Personnel Administration (3) Personnel administration functions for professional and supporting staff in institutional settings. Future employment opportunities, 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 methodology. Sophisticated planning/forecasting techniques. Prereq: 553 or consent of instructor. F, Su

655 State-Federal Relations in Education (3) Interrelationship of state and federal responsibilities and their influence upon education. Prereq for 655: Consent of instructor. F

656 Legal Foundations of Public Education (3) School law; constitutional powers and their relation 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

687 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
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

596 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 (1-8) 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: F

630 Special Topics (1-3) May be repeated. E

640 College and University Law (3) Legal precedent affecting organizations, administration, and finance of higher education. Academic freedom, faculty termination, religion, tort liability, administrative law, academic due process and affirmative action in employment. Sp

645 Curriculum and Instruction in Undergraduate Higher Education (3) Content and organization of institutional policies 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 higher education administration. Prereq: Consent of instructor. May be repeated. S/NC only. E

Electrical and Computer Engineering

(College of Engineering)

MAJOR DEGREES

Electrical Engineering M.S., Ph.D.

Joseph M. Googe, Head

Professors:

Alzoff, Igor, Ph.D. ............ Wisconsin
Baily, J. Milton, Ph.D. ............. Georgia Tech
Birdwell, J. Douglas, Ph.D. .............. MIT
Bishop, Aa, O., Jr., Ph.D. .............. Clemson
Blaoak, T. Vaughan, Ph.D. ............. Tennessee
Bodenheimer, Robert E., Ph.D. ......... Northwestern
Bose, Bimal K. (Condra Chair of Excellence), Ph.D. ......... Calcuta
Bouldin, Donald W., Ph.D. .......... Vanderbit
Cunningham, James W. (UTSI), Ph.D. ......... Tennessee
Gonzalez, Rafael C. (Distinguished Prof.), Ph.D. ......... Florida
Googe, Joseph M., PE, Ph.D. ......... Georgia Tech
Green, Walter L., Ph.D. ........... Texas A&M
Hoffman, Graham W., Ph.D. ......... Harvard
Hung, James C. (Distinguished Prof.), PE, Ph.D. ......... New York
Kennedy, Eldrige J., PE, Ph.D. ......... Tennessee
Lawler, Jack S., Ph.D. ............. Michigan State
Leffell, Will O. (Emeritus), M.S. ............. Tennessee
Naff, Herbert P., PE, Ph.D. ......... Auburn
Pace, Marshall O., PE, Ph.D. ......... Georgia Tech
Pierce, J. Frank (Distinguished Prof.), 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), PE, Ph.D. ......... Wisconsin

Associate Professors:

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
Wallar, J. Wayne, Ph.D. ......... Tennessee

Assistant Professor:

Abidi, M. A., Ph.D. .............. Tennessee
Brazakov, Dragana, Ph.D. .............. Florida
Crily, Paul B., Ph.D. ........... New Mexico State
Koch, Daniel, Ph.D. ........... Missouri (Rolla)
Smith, L. Montgomery (UTSI), Ph.D. ......... Tennessee

Electrical and Computer Engineering

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 the field of fusion energy. Students may have the opportunity to do their Master's thesis at the Fusion Energy Division of the Oak Ridge National Laboratory or at the Plasma Science laboratory, affiliated with the Electrical and Computer Engineering Department. A limited number of Graduate Research Assistantships are available at each location. Further information about this program is available from the department.

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 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 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 included:

1. Electrical and Computer Engineering 503 and 504.

2. Six semester hours of graduate credit in mathematics consisting of mathematics courses of 400 level or higher which have been approved by the E.C.E. Graduate Committee.

3. An additional 12 semester hours of 500-level work in electrical and computer engineering courses or 6 semester hours of 500-level work in one area of electrical and computer engineering courses and 6 semester hours of 500-level work in another area approved by the
prehensive examination must be passed and a sive oral examination will be a defense of a graduate student's major area, a 2-hour written examination is encouraged to participate in the department's graduate program. Departmental graduate programs are also available at the Space Institute, Tullahoma.

Gradual 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 undergraduate curriculum cannot be used in either the M.S. or Ph.D. programs. A 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 (3) Discrete-time signals and systems, sampling, discrete Fourier transforms, analog filter characteristics, non-recursive and recursive filter design, and CAD tools for filter design. Includes laboratory experiments and projects.


412 Linear Control System Design (3) Classical and modern techniques for design and compensation of linear feedback control systems. Prereq: Linear System Analysis.

413 Passive and Active Network Synthesis (3) Review of network analysis techniques, passive network driving point synthesis, transfer function synthesis, approximation theory, topics in active network synthesis. Prereq: 312.

414 System Modeling and Simulation (3) Structure and operation of electrical energy grid; load flow; economic loading; planning; control; reliability. Balanced and unbalanced systems; system protection; system stability. Prereq: Electric Energy System Components.


421 Microwave Circuits and Electronics (3) Scattered wave description of circuits: isolators and amplifiers, couplers and power dividers, circulators, phase shifters. Transistor and integrated circuit diodes, Schottky barriers, diode clamping, multiplication, and filtering. Included in active and passive digital circuit design: frequency and power supplies. Laboratory experiments. Prereq: 312.

422 Machines (4) Dynamic behavior of rotating machines; transfer functions for common modes of operation of d.c. machines; response to different waveforms in supply; governing equations for a.c. machines and their numerical solutions. Includes laboratory experiments and projects. Prereq: Electric Energy System Components.

430 Analog Signal Processing Electronics (4) Basic processing and fabrication of active and passive components for mixed-signal circuits; characteristics of bipolar, MOS and JFET transistors in typical analog and digital integrated circuit designs; standard digital logic circuits: TTL, ECL, Schottky, NMOS, CMOS, and GaAs gates and arrays; design concepts for op-amps, comparators, references, regulators, and other linear functions. Includes laboratory experiments and projects. Prereq: Electronic Circuits.

431 Digital and Analog Integrated Electronics (4) Basic processing and fabrication of active and passive components for mixed-signal circuits; characteristics of bipolar, MOS and JFET transistors in typical analog and digital integrated circuit designs; standard digital logic circuits: TTL, ECL, Schottky, NMOS, CMOS, and GaAs gates and arrays; design concepts for op-amps, comparators, references, regulators, and other linear functions. Includes laboratory experiments and projects. Prereq: Electronic Circuits.

432 Analog Signal Processing Electronics (4) Basic processing and fabrication of active and passive components for mixed-signal circuits; characteristics of bipolar, MOS and JFET transistors in typical analog and digital integrated circuit designs; standard digital logic circuits: TTL, ECL, Schottky, NMOS, CMOS, and GaAs gates and arrays; design concepts for op-amps, comparators, references, regulators, and other linear functions. Includes laboratory experiments and projects. Prereq: Electronic Circuits.

433 Electronic Amplifiers (4) Feedback amplifier principles; wideband linear amplifier design; radio frequency amplifiers; audio power amplifiers; transistors as amplifiers; active filters, low and phase detection, multiplexers, modulation and demodulation, sample and hold, and comparators. Includes laboratory experiments and projects. Prereq: Electronic Circuits.


442 antennas and Propagation (3) Linear antennas, arrays, other simple antennas. Antenna gain, impedance, communication link parameters. Waves propagation in earth bound free space, earth's troposphere and ionosphere. Reflections from earth; effects on link reliability. Prereq: Fields.

443 Analog and Digital Circuits and Electronics (3) Microcomputer systems; digital to analog conversion techniques; Quad and R-2R ladder network design; oscillator principles. Includes laboratory experiments and projects. Prereq: Communication Systems I.


451 Microprocessors in Computer Engineering (4) Principles of microcomputer systems; microcomputer architecture; microcontroller systems; interfacing and software design of microprocessor systems. Prereq: Introduction to Logic Design of Digital Systems.


453 Data Acquisition Systems (4) Digital-to-analog conversion techniques; quad and R-2R ladder networks; error analysis of A/D converters; sample hold circuits; analog-to-digital conversion techniques; open loop systems: direct and matrix converters; closed loop systems; dual slope and successive approximation; error analysis of A/D converters; accuracy, linearity, drift, dynamic range, frequency response, gain, grounds and shielding, automated testing of A/D and D/A converters; device service routines; signature analysis. Includes laboratory experiments and projects. Prereq: Introduction to Logic Design of Digital Systems.

with plasma arcs, and related topics. Prereq: 565 or consent of instructor.  
571 Pattern Recognition (3) Decision-theoretic and structural approaches to pattern recognition. Deterministic and statistical decision rules, feature extraction and representation, syntactic and semantic methods. Prereq: 471 or consent of instructor.  
573 Vision and Sensing for Robotics and Automation I (3) Acquisition, processing, integration, and interpretation of a wide range of vision and non-vision sensing modalities as applied to autonomous and teleoperated robotic systems. Prereq: Consent of instructor.  
574 Vision and Sensing for Robotics and Automation II (3) Aspects of robot programming and motion using various sensing modalities. Selected topics from current literature. Prereq: Consent of instructor.  
582 Quantum Electronics II (3) Laser modulation and stabilization techniques. Laser power, spectral content and noise considerations. Analysis of various specific lasers. Lasers in communication and instrumentation systems. Plasma emission spectroscopy, optical harmonic generation, holography, material working, and biological and medical uses. Prereq. 591.  
589 Measurement Science I (3) (Same as Nuclear Engineering 588, Chemical Engineering 588, Civil Engineering 588, Engineering Science and Mechanics 588, Mechanical Engineering 588, and Aerospace Engineering 588.)  
599 Measurement Science II (3) (Same as Nuclear Engineering 589, Chemical Engineering 589, Civil Engineering 589, Engineering Science and Mechanics 589, Mechanical Engineering 589, and Aerospace Engineering 589.)  
598 Graduate Seminar (1) Topics of interest discussed in weekly seminar. May be repeated.Maximum 6 hrs. S/NC or letter grade.  
599 Special Topics (1-3) May be repeated. Maximum 9 hrs.  
600 Doctoral Research and Dissertation (3-15) P/N P only.  
612 Advanced Systems Theory (3) Game theory, dual control problem, hierarchical systems, and information structures. Prereq: 611.  
615 Analysis of Nonlinear Networks and Systems (3) Systematic study of nonlinear electric circuits. Network elements and equation, linear systems, nonlinear O.D.E.'s, geometric analysis and numerical techniques. Prereq: Consent of instructor.  
616 Active Network Synthesis (3) Theory and design of active analog filters and practical RC realizations. Prereq: Consent of instructor.  
617 Special Topics in Systems Theory I (3) Topics of current interest to students and faculty: large scale systems, model order reduction, algebraic and geometric system theories, and advanced design methods. Prereq: 503 and consent of instructor.  
618 Special Topics in Systems Theory II (3) Topics of current interest to students and faculty: large scale systems, model order reduction, algebraic and geometric system theories, and advanced design methods. Prereq: 617.  
621 Modern Techniques for Electric Energy Systems I (3) Analysis of electric energy systems. Prereq: Consent of instructor.  
623 Advanced Power Electronics and Drives (3) Phase-controlled cycloconverters, transformer-fed ac drives, resonant converters, vector and scalar control of synchronous machines, static Kramer drives, static switching converters, VSCF generation, modern control theory in ac drives.  
631 Advanced Topics in Electronic Instrumentation I (3) Based on particular interests of students. Fundamental physical processes in instrumentation transducers: thermoelastic, magnetoelectric, electromechanical and quantum-mechanical devices. Prereq: 531-32 and consent of instructor.  
641 Electromagnetic Diffraction and Scattering (3) Diffraction of electromagnetic waves by spheres, corners and cylinders; ground wave propagation; modern approximate methods; creeping waves, leaky waves. Prereq: Consent of instructor.  
642 Asymptotic Techniques in Wave Propagation (3) Electromagnetic waves with spatial and temporal dispersion and with fluctuation. Geometric theory of diffraction for electromagnetic waves; supported by results from approximate treatments of geometrical optics and physical optics. Field and power flux scattering. Single scattering transport in tenuous particulate media; multiple scattering theory; coherence and mode-spread. Fluctuation due to turbulence; rough surface scattering. Prereq: Consent of instructor.  
643 Advanced Topics in Information Science I (3) Detonation theory: coherency, system identification. Signals with unknown parameters; optimal filter synthesis; adaptive systems; sequential detection; suboptimal detection. Prereq: 504 or consent of instructor.  
644 Advanced Topics in Information Science II (3) Structure of algebraic and probabilistic codes; linear codes, convolutional codes, error-correcting codes, decoding algorithms, system identification, stochastic, and hierarchical methods. Prereq: 843.  
645 Advanced Topics in Microwave Networks (3) Multiprotocol scattering and transfer representations. Narrow band and wide band synthesis of networks containing lumped and distributed components, interstage matching and response equalization. Low noise, low distortion and high power designs of amplifiers and oscillators. Prereq: Consent of instructor.  
646 Advanced Topics in Microwave Networks (3) Reciprocal and nonreciprocal devices, directional devices, high frequency switches and multiplexers, optimization in distortion control. Network analyzer measurement techniques and integration of measured data with design procedures. Prereq: Consent of instructor.  
651 Computer-Aided Design of VLSI Systems I (3) Fabrication of microelectronic devices: computer architecture design; algorithmic state machines; partitioning; structured design methodology. Prereq: 551-2 or consent of instructor.  
652 Computer-Aided Design of VLSI Systems II (3) Computer-aided design tools; design and implementation of full custom very large scale integrated (VLSI) circuits; design for testability; testing of fabricated chips. Prereq: 651.  
663 Advanced Plasma Physics I (3) Basic concepts of high temperature plasma physics. Magnetohydrodynamics and kinetic descriptions of plasma, plasma transport, plasma waves, equilibrium, and stability. Prereq: Physics 541-3, 451-2 or 563-4, or consent of instructor. (Same as Physics 563.)  
664 Advanced Plasma Physics II (3) Plasma heating and radiation phenomena. Advanced topics of current interest. Must be taken in sequence. Prereq: 663. (Same as Physics 564.)  
671 Image Processing and Robotics I (3) Three-dimensional scene modeling and recognition, multi-sensor systems. Prereq: 572 or 573 or consent of instructor.  
672 Image Processing and Robotics II (3) Stereovision, shape theory. Prereq: 671.  
673 Image Processing and Robotics III (3) Time-varying imagery, path planning and navigation. Prereq: 672.  
681-82 Quantum Electronics (3,3) Prereq: Consent of instructor.  
691 Advanced Graduate Seminar (1) Research in department. May be repeated. S/NC or letter grade.  
692 Special Topics (1-3) Advanced topics of current interest to Ph.D students in Electrical Engineering. May be repeated. Maximum 9 hrs.
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 The Graduate School application. The names and addresses of four references must be included with the departmental application.

The flexibility and interdisciplinary aspect of the graduate programs 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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Mathematics

Engineering courses* (Major concentration may include but is not restricted to courses offered by the Engineering Science and Mechanics Department.)

Related courses (May include additional courses in mathematics, computer science, or the physical and life sciences as well as engineering courses.)

Thesis

"Engineering courses under option II may include advanced laboratory work or special problem work; for example, Engineering Science and Mechanics 581 or analogous courses in other departments.

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 Ph.D. dissertation and course work taken at the first offering after the student has been admitted as a potential candidate for the Ph.D. dissertation. This examination is to be taken by students within 6 credit hours of their dissertation. The purpose of the qualifying examination is to:

(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.

After successfully passing the qualifying and comprehensive examinations, the student must present the Ph.D. dissertation research proposal to the student's advisory committee. If the proposal is approved and the student's dissertation research has been completed, the student's dissertation research committee review of the proposal will be completed 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 residents of some states to enroll in certain programs at UT Knoxville on a tuition basis. The Ph.D. program in Engineering Science is available to residents of the state of Florida. Additional information may be obtained from the Residency Assistant 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 advising committee. However, at least two-thirds of minimum required credit hours in a Master's degree program must be at or above the 500 level.

GRADUATE COURSES

421 Materials of Engineering (3) Mechanical properties of engineering materials; data collection and processing; testing and identification of independent properties.


431 Fundamentals of Vibrations (3) Free and forced vibrations of damped and undamped lumped parameter systems; energy methods; free vibration of continuous systems; central force motion; Lagrange's equations; stability; transfer functions. Prereq: Dynamics.

433 Dynamic Systems (3) Three dimensional dynamics of particles and rigid bodies; variable mass systems; central force motion; Lagrange's equations; stability; transfer functions. Prereq: Dynamics.

435 Engineering Acoustics (3) Concepts of acoustics, measures of sound and their units; noise generation and transmission, noise control principles and application, materials and procedures for noise abatement. Prereq: Introductory course in vibrations oroustics.

442 Fluid Mechanics II (3) Differential forms of basic laws; compressibility, laminar and turbulent 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 flow models. Prereq: 341, Mathematics 231.

461 Experimental Stress Analysis (3) Theory, techniques, and instrumentation of resistance strain gauges; theory and techniques of brittle coating methods; introduction to other strain measuring devices. Prereq: 321, Electrical and Computer Engineering 301. 2 hrs and 1 lab.

463 Photomechanics (3) Introduction to holography, photelastic coating method, Moire' method, interferometry, and holography. Prereq: 321, Physics 223. 2 hrs and 1 lab.

465 Dynamic Data Acquisition (3) Use and calibration of instrumentation for recording and analyzing dynamic events; Fourier analysis, transfer function analysis, digital signal processing, transduction, experimental pa
532 Vibrations (3) Vibrations of discrete and continuous systems; Modulation Analysis. Engineering applications. Prereq: Undergraduate vibrations course.


536 Advanced Engineering Acoustics (3) Introduction to wave phenomena; application of acoustic analysis; vibration of continuous systems, plane and spherical waves, transmission phenomenon, radiation and scattering; sound absorption, mechanism, microphones, ultrasonics, sonar transducers. Prereqs: 431 or 435.


542 Fluid Dynamics II (3) Development of basic concepts and governing equations for turbulence and turbulent field motion. Formulation for correlation function, energy, vorticity, eddies. Introduction to turbulent transport processes, free turbulence and turbulent closure; use of engineering turbulence closure models; examination of modern numerical and experimental methods. Prereq: 541.


553 Computational Solid Mechanics (3) Finite element analysis techniques in structural mechanics and elasticity, nonlinearities. Two and three-dimensional formulations; isoparametric elements, numerical quadrature. Equation solving: substructuring, skyline solvers, matrix iteration techniques. Applications in beams, plates and shells; use of representative computer programs in networked mini-computer work station environment. Coreqs: Graduate studies, MODA, computer management. Prereq: 551.

557 Computational Mechanics Seminar (1) Current developments in computational fluid/thermal/structural mechanics. For departmental thesis students only. May be repeated.

559 Computational Mechanics Laboratory (1) Introduction to networked computer engineering work station environment for graphics/engineering numerical analysis. Coreq: 551.

561 Photoelasticity (3) Polarized light; basic principles of photoelasticity; experimental techniques and equipment; numerical methods in 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; paraxial design methods; introduction to aberrations.

567 Optical Engineering Laboratory I (2) Laboratory in support of Optical Engineering I (566); Prereq or correq: 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.


576 Applied Artificial Intelligence (3) (Same as Nuclear Engineering 575.)

577 Expert Systems in Engineering (3) (Same as Nuclear Engineering 576.)

581 Special Topics in Engineering Mechanics (3) Mechanics problems related to recent developments and practice. Prereq: Consent of instructor. May be repeated with consent of department.

588 Measurement Science I (3) (Same as Nuclear Engineering 588.) Coreq: 529, Chemical Engineering 589, Aerospace Engineering 588, Mechanical Engineering 589.

589 Measurement Science II (3) (Same as Nuclear Engineering 589.) Chemical Engineering 589, Civil Engineering 589, Electrical and Computer Engineering 588, Aerospace Engineering 588, and Mechanical Engineering 589.

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

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 562.


624 Viscoelasticity (3) Viscoelastic constitutive relations; isothermal and boundary value problems; wave propagation in viscoelastic materials; stability problems; determination of viscoelastic properties. Prereq: 523 and 539 or Polymer Engineering 541.

625 Theory of Plasticity (3) Yield condition; strain hardening, general constitutive equations; plastic potential; uniqueness theorems; extremum and variational principles. Problems in perfectly plastic solids; finite plastic deformations; piecewise linear plasticity. Applications. Prereq: 523.


645 Theory of Turbulence (3) Mathematical descriptions of turbulence: isotropic turbulence, energy spectra, Kolmogoroff's hypothesis, large and small eddy structure for turbulent flows; turbulent diffusion by continuous movement; applications to turbulent jets, wakes, pipe flow, and boundary layers. Prereq: 542. (Same as Aerospace Engineering 645.)

651-52 Advanced Topics in Computational Fluid Dynamics (3.3) Approximation theory, analysis of accuracy, convergence, and stability for smooth and non-smooth solutions; shocks, artificial dissipation, two- and three-dimensional, compressible viscous and inviscid flows; potential, Euler and complete Navier-Stokes descriptions; mixed subsonic-supersonic flows. Algorithm concepts, finite difference, finite element, approximate factorization, flux vector splitting, finite volume, generalized coordinated and adaptive grids; steady flows including second-order turbulence closure. Thin layer and parabolic Navier-Stokes equations; multi-dimensional, turbulent and reacting flows. Computer project. Prereq: 552.

653-54 Advanced Topics in Computational Solid Mechanics (3,3) Fracture mechanics; singularity solutions; non-linear constitutive 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.

671 Advanced Topics in Applied Artificial Intelligence (3) (Same as Nuclear Engineering 671.)

681 Advanced Topics in Engineering Mechanics (3) Advanced topics in mechanics, group or individually. Prereq: Consent of instructor. May be repeated with consent of department.

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**English**

(Condition of Liberal Arts)

**MAJOR DEGREES**

Dorothy M. Scura, Head

Professors:

Bratton, Edward W., Ph.D. .......... Illinois
Carolll, D. Allen, Ph.D. .......... North Carolina
Cox, Don R., Ph.D. .......... Missouri
Drake, Robert Y., Jr., Ph.D. .......... Yale
Dykeman, Wilma (Adjunct), B.A., Northwestern
Emor, Allison R., Ph.D. .......... Indiana
Finnman, Richard J. (Hodges Chair of Excellence), Ph.D. .......... North Carolina
Fitzgerald, Mary (Adjunct), Ph.D. .......... Princeton
Goslee, Nancy M., Ph.D. .......... Yale
Heffernan, Thomas J., Ph.D. .......... Cambridge
Kelly, Richard M. (Lindsay Young Prof.), Ph.D. .......... Duke
Leggett, B. J. (Distinguished Prof.), Ph.D. .......... Florida

**Associate Professors**

Lofaro, Michael A., Ph.D. .......... Maryland
Maland, Charles J., Ph.D. .......... Michigan
Miller, R. Baxter, Ph.D. .......... Brown
Penner, A. Richard, Ph.D. .......... Colorado
Reese, Jack E., Ph.D. .......... Kentucky
Sanders, Norman J. (Lindsay Young Prof.), Ph.D. .......... Shakespeare Institute
Scriva, Dorothy M., Ph.D. .......... North Carolina
Shurr, William (Distinguished Prof.).
Ph.D. .......... North Carolina
Trahren, Joseph B., Jr., Ph.D. .......... Princeton
Wheeler, Theodora V., Ph.D. .......... North Carolina
White, Jon M. (Lindsay Young Prof.), M.A. .......... Cambridge

**Assistant Professors**

Dumas, Bethany K., Ph.D. .......... Arkansas
Goslee, David F., Ph.D. .......... Yale
Hutchinson, George, Ph.D. .......... Indiana
Kallet, Marilyn, Ph.D. .......... Rutgers
Keene, Michael, Ph.D. .......... Texas
Leki', Ilona, Ph.D. .......... Illinois
Robinson, Frank K., Ph.D. .......... Texas
Stillman, Robert, Ph.D. .......... Pennsylvania
Thomas, Joyce Carol, M.A. .......... Stanford

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**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.
4. Passing the Graduate Student Foreign Language Test (GSFLT) as currently administered through the English Department.

**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.

**Residence Requirement**: There is no residence requirement for the M.A., but students should attempt to pursue a full-time program whenever possible.

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**Writing Concentration**

The Master's program with writing concentration is intended for those students who plan to do free-lance writing, specialize in teaching writing courses at the college level, or work as professional writers in business or industry.

**Requirements**

The requirements for the writing concentration are the same as those for the thesis option above with the following exceptions:

**Coursework**: Writing students may substitute two 400-level writing courses for two 500-level courses. Students must take at least 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 novel, short fiction, or a creative work of non-fiction prose.

The nature and length of each project will be determined by the Director of Graduate Studies after consulting with the student and the project director. In addition to the director, two other English Department faculty members will supervise and approve the project; at least one should be from the literature faculty.

**Final Examination**: The reading list may be modified by the M.A. examining committee, meeting as a body with the student, to reflect the candidate's particular writing emphasis. However, most of the oral examination should focus upon the literature outlined in the original reading list.
THE DOCTORAL PROGRAM

Requirements
A student must successfully complete a program of study, normally six full semesters as outlined below, approved by the candidate's committee or the Director of Graduate Studies in English.

Coursework: At least 51 semester hours beyond the B.A. to include at least 21 semester hours at the 600 level; at least 15 semester hours at the 500 level or above (only 3 hours of 599 Independent Study may be applied toward the M.A. and 3 after the M.A.); a special three-hour course in teaching composition; and 12 additional hours at any level, including the 400 level. Up to 6 of these additional hours may be taken in some cognate field or fields such as history, philosophy, French. These courses must be drawn from those approved for graduate credit. All other coursework must be in the English department. In this coursework, students must normally maintain a 3.5 GPA.

Dissertation: Twenty-four semester hours of dissertation. These represent the research for and writing of the dissertation. The research and dissertation will be directed by a faculty member of the department and approved by a doctoral committee of three or four other faculty members.

Language Requirement: A language requirement met in one of the following ways:
1. Two languages approved by the Director of Graduate Studies in English. The requirement for each language may be fulfilled by (a) completion of French 302 or German 332 with a grade of B or better; (b) completion at UT 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; (c) passing of the regular Ph.D. foreign language examination as currently administered at UT Knoxville; or (d) passing the Graduate Student Foreign Language Test (GSFLT), or consent of instructor. 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 500 or 509 History of the English Language (offered in alternate years only). For the other 3 hours, the student may either complete the history of the language sequence or choose one other course in language taught in the Department of English at the 500 or 509 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. degree. 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, if required. (2) A comprehensive written examination which may be divided as the department directs; see the English Department graduate brochure. The comprehensive examination is given twice a year, normally in March and September. Before a student may take it, he/she must have completed all coursework required. A student must also have met all requirements for 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 5 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 Cressida in Middle English.
404 Shakespeare I: Early Plays (3) Shakespeare's dramatic achievement before 1601. Reading and discussion of selected plays from romantic comedies, including Two Noble Kinsmen, English histories, including Henry IV, and early tragedy, including Hamlet.
405 Shakespeare II: Later Plays (3) Shakespeare's dramatic achievement between 1601 and 1613. Reading and discussion of selected plays from great tragedies, including Othello; problem plays, including Measure for Measure; and dramatic romances, including Troilus and Cressida.
406 Renaissance Drama (3) English theatre between 1590 and 1640 through reading of representative plays by Shakespeare's contemporaries: Marlowe, Webster, Donne, and Jonson.
409 Spenser and His Contemporaries (3) Principal achievements in prose and poetry of the sixteenth century; Spenser, Wyatt, Marlowe, More, Sidney, and Bacon.
410 Milton, Donne and Their Contemporaries (3) Principal achievements in prose and poetry of the early seventeenth century: poetry of Milton, Donne, Marvell, and prose of Browne, Bacon, and Waller.
412 British Drama from 1600 to 1800 (3) Playwrights from Dryden and Wycherley to Goethe and Sheridan; formal developments: heroic play, cynical comedy, affective tragedy, and exemplary drama.
413 The Eighteenth-Century British Novel (3) Defoe to Austen.
414 Romantic Poetry and Prose I (3) Wordsworth, Coleridge, and Blake; readings from Lamb, De Quincey, and other prose writers.
415 Romantic Poetry and Prose II (3) Keats, Shelley and Byron; readings from Hazlitt, Peacock, and other prose writers.
416 Victorian Poetry and Prose I (3) Tennyson, Pre-Raphaelites, Carlyle, Newman, and Mill.
419 Victorian Poetry and Prose II (3) Browning, Arnold, Hopkins, Hardy, Ruskin, Darwin, and Wilde.
420 The Nineteenth-Century British Novel (3) Scott to Hardy.
421 Modern British Novel (3) Lawrence, Joyce, and Woolf.
422 Women Writers in England (3) Literary consciousness and works of British women writers in nineteenth and twentieth centuries. (Same as Women's Studies 5.)
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 novelists through Cooper and Hemmingway to present: Langston Hughes and Harlem Renaissance, Richard Wright and Gwendolyn Brooks, writing by black women, and international 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) One play, 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 achievement.
454 Twentieth-Century International Novel (3) Joyce, Camus, Kafka, Nabokov.
455 Persuasive Writing (3) Persuasive strategies in English writing. Practice in mastering effective logical and emotional appeals.
460 Technical Editing (3) Editing technical material for publication, Principles of style, format, graphics, layout, and communication management. Prereq: 460 or 469, or consent of instructor.
461 Advanced Technical and Professional Writing (3) For students planning careers in industry, education, and government who need technical writing skills. Writing of definitions, process descriptions, sets of instructions, descriptions of mechanisms, recommendation reports, abstracts, proposals, and major reports. Prereq: Junior standing in student's major or consent of instructor.
462 Writing for Publication (3) Principles and practices of writing for publication. Dissertation, essays, articles, and reports in science and technology. Prereq: 459 or consent of instructor.
463 Advanced Poetry Writing (3) Further development of skills acquired in basic writing poetry course. Prereq: 459 or 569, or consent of instructor.
464 Advanced Fiction Writing (3) Further development of skills acquired in basic writing fiction course. Prereq: 459 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 (1) Grammatical structures of English; particular
grammatical difficulties of non-native learners of English. Basic phonological structures of English. Teaching grammar and vocabulary to non-native speakers: contrastive analysis of English with other languages. Prereq: Second year of a foreign language. (Same as Linguistics 475.)

475 Teaching English as a Second or Foreign Language II (3) Second language acquisition theory: Issues in teaching four language skills to learners of English. Materials and methods of language teaching and testing; preparation of materials. Observations of and team teaching with experienced staff member. Prereq: English 474. (Same as Linguistics 475.)


481 Studies in Folklore (3) Topics vary. May be repeated with different topics. 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 procedures taught by professor. Topics vary. May be repeated. Maximum 6 hrs.

485 Special Topics in Language (3) May be repeated. Maximum 6 hrs with consent of department. (Same as Linguistics 485.)

486 Special Topics in Criticism (3) Content varies. Theoretical and practical approaches to British and American Literature. May be repeated with consent of department. Maximum 6 hrs.

489 Special Topics in Film (3) Content varies. Particular directors, film genres, national film 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/N only. E

505 Teaching Freshman Composition (3) Introduction to teaching Freshman English through study of various techniques and philosophies of composition. Required of all first-year teaching associates.

506 Introduction to Literary Research (3) Critical examination of aims of English studies, profession of English teacher, theory of literature, and methods of research: collection of, information, evaluation of material, and transmitting of results of scholarship.

507 Applied Criticism: The Rhetoric of Literary Forms (3) Study and application of ways in which major critics have approached literary forms: historical development of film; the "rhetoric" of film; critical approaches to film study: genre, auteur, formalism, and historical; critical analysis of individual films.

509 History of the English Language I (3) Phonological, morphological, and syntactic development of the English language: Old and Middle English. F, A

509 History of the English Language II (3) Phonological, morphological, and syntactic development of the English language with concentration on developments after 1500, especially in American English. Sp, A

513-14 Readings in Medieval Literature (3.3) Reading and analysis of selected masterpieces of Old and Middle English literature and their Continental sources in Modern English.

520-21 Readings and Analysis in Selected Areas of 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 period: Restoration, early 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.

550-51 Readings in American Literature from the Colonial Period to the Present (3.3) Content varies: genre, theme, literary movement, or other coherent emphasis.

552 Readings in Black American Literature (3) Content varies: genre, theme, literary movement, or other coherent emphasis.

560-61 Readings in Twentieth-Century Literature (3.3) Content varies: genre, theme, literary movement, or other coherent emphasis.

576 Introduction to Contemporary Criticism (3) Introductory survey of twentieth-century literary criticism from New Criticism to present. Prereq: Extensive background in reading and writing fiction.

581 Colloquium in Poetry Writing (3) Major poetic project or culmination of project begun in 463. Individual consultation with instructor supplements class analysis; readings in contemporary poetry and theory. Prereq: 465 or consent of instructor.

582 Special Topics in Writing (1-3) Topics vary. May be repeated. Maximum 6 hrs. Enrollment by consent of director of graduate studies only.

585 Issues in Invention, Style, and Audience (3) Theoretical and practical perspectives on contemporary research in rhetoric and composition. Required of all doctoral students planning comprehensive exam in Rhetoric and Composition.

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

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

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

590 Topics in Critical Theory (3) Topics vary.

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

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

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

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

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

610 Studies in Old English Language and Literature (3) Old English grammar with readings in prose and poetry.

611 Studies in Beowulf (3) Translation and critical study of Beowulf. Prereq: English 610 or consent of instructor.

620 Studies in Medieval English Literature (3) Seminar in literature and literary genres of Medieval English literature, read in Old and Middle English. Subject matter varies from year to year.

621 Studies in Chaucer (3) Seminar in text, interpretation, and criticism of Chaucer's writings. Prereq: Previous course in Chaucer.


640-41-42 Studies in Restoration and Eighteenth-Century Literature (3.3,3.3) Topics vary: Swift, satire, Restoration literature, Johnson and Boswell, Addison and Steele, restoration drama, Dryden.

650 Studies in English Romanticism (3) Seminar content varies: particular other coherent emphasis.

651-52 Studies in Victorian Literature (3.3) Seminar content varies: particular literary figure or figures, genre, theme, or other coherent focus.

660-61-62 Studies in American Literature (3.3,3.3) Southern literature before 1850, frontier, regionalism, women's literature, Irving, Cooper, Poe, Emerson, Thoreau, Hawthorne, Melville, Whitman, Dickinson, James, and Twain.

670-71-72 Studies in Twentieth-Century Literature (3.3,3.3) Seminar content varies: particular literary figure or figures, genre, theme, or other coherent focus.

680 Topics in English Language (3) May be repeated with consent of director of graduate studies. Maximum 9 hrs.

682 Studies in Rhetoric and Composition (3) Content varies. Advanced work in theory and/or history of rhetoric and composition. Issues in invention, textuality, literary, historiography, style and ethics.


686 Studies in Creative Writing (3) Content varies. Connection between theory and practice in writing.

688 Studies in Literary Criticism (3) Content varies. Advanced work in theory and history of literary criticism.

690 Special Topics (3) Content varies. History of ideas, bibliography, autobiography, extra-literary disciplines.

694 Studies in Film (3) Content varies. Advanced work in film history and analyses.

Entomology and Plant Pathology

(College of Agricultural Sciences and Natural Resources)

MAJOR

Entomology and Plant Pathology

DEGREE

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. Virginia
Johnson, Leander F. (Emeritus), Ph.D. Louisiana State
Lambdin, Paris L., Ph.D. VPI
Pless, Charles D., Ph.D. Clemson
Southards, Carroll J., Ph.D. NC State

Associate Professors:

Reddick, Bradford B., Ph.D. Clemson
Windham, Mark T., Ph.D. NC State

Assistant Professors:

Grant, Jerome F., Ph.D. Clemson
Gwinn, Kimberly D., 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.
Environmental Engineering

See Civil Engineering

Environmental Practice

(College of Veterinary Medicine)

MAJOR

VETERINARY MEDICINE

DEGREE

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:

Lottrop, C. D., D.V.M., Ph.D. ....... Tennessee
New, J. C., D. V. M. ...... Texas A&M
Rohrbach, B. W., V. M. D. .......... Johns Hopkins
Schroeder, E. G., D. V. M. ....... Michigan State
Schultz, T. W., Ph. D. ......... Tennessee

Assistant Professors:

Frazier, D., D.V.M., Ph. D. ......... NC State
Oroz, S. E., D.V.M., Ph.D. ....... Ohio State

Clinical Associate:

Farrar, P. L., D.V.M. ................ Missouri

Post-Doctoral Research Associate:

Alansari, H. M., Ph.D. ................ Kansas State
Chumley, P. R., D.V.M. ....... Ohio State
Kelch, W. J., D.V. M. ......... Michigan State
Mishu, L., D.V.M. ........ Texas A&M

See Veterinary Medicine for program description.
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, 522, 531, 532, 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. S.

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/N 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 Agricultural Sciences and Natural Resources)

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
Draughn, 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 State
Penfield, M. P., Ph.D. ............................ Tennessee

Associate Professors:

Christen, G. E., Ph.D. ................................. Missouri
Lovey, D. H., Ph.D. ................................. Kansas State
Mount, J. R., Ph.D. ................................. Ohio State
Riemann, M. J., Ph.D. ............................... Kansas State

Assistant Professor:

BiswaI, R. N., Ph.D. ................................. Massachusetts

The Department of Food Technology and Science offers the Master of Science and Doctor of Philosophy degrees. Students in the doctoral program may choose research in the concentration area of food products, food chemistry, food microbiology, or sensory evaluation of foods. Commodity interests (meats, dairy, fruits, vegetables, bakery products) can be emphasized in any of the areas by careful selection of courses and the research topic. Minors are available in cognate fields. For detailed information, contact the department head.

Graduate School rating forms of letters of recommendation of three people are required. Respondents should be familiar with the applicant's scholastic ability and professional potential.

THE MASTER'S PROGRAM

Applicants must have a B.S. in food technology, food science or a related scientific field.

Thesis Option

1. Prior to research for the thesis, the student must develop a detailed written research plan. Registration for 6 hours of 500 Thesis is required.

2. In addition to the thesis requirement, a minimum of 24 semester hours of graduate coursework is required. This work must be approved by the student's committee and a minimum of 14 hours must be courses numbered above 500. The committee may require additional coursework if the student's progress or background indicates such need.

3. All students are required to take 2 hours of 501 Seminar in their program and are expected to attend this course and participate in discussions during their Master's program. Completion of 510 or equivalent is also required.

4. An oral, final examination covering the thesis and coursework is required.

Non-Thesis Option

1. In lieu of a thesis, students are required to complete a problem in cooperation with their employer (company or governmental agency) and their faculty committee. Students working on a problem must register for 6 hours of 503.

2. In addition to the 24 hours of coursework for 503, a minimum of 24 semester hours of graduate coursework is required. This work must be approved by the student's committee and a minimum of 14 hours must be courses numbered above 500. The committee may require additional coursework if the student's progress or background indicates such need.

3. All students are required to take 2 hours of 501 Seminar in their program and are expected to attend this course and participate in discussions during their Master's program. Completion of 510 or equivalent is also required.

4. Students will be required to take a written comprehensive examination covering their coursework. In addition, an oral, final examination covering the problem and coursework is required. The oral examination will be held on the Knoxville campus.

THE DOCTORAL PROGRAM

1. Completion of a Master's degree in the field, or a closely related field, or passing a special qualifying examination is required for admission. Scores on the GRE aptitude test are also required.


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

4. At least 24 hours of coursework numbered above 500 are required exclusive of doctoral research and dissertation. At least 6 of the 24 hours must be courses numbered above 600.

5. A minimum of 6 hours of courses for graduate credit must be taken outside the Department of Food Technology and Science.
6. All candidates must complete 601 (2 hrs.) and are expected to attend 601 during their Ph.D. program.

7. Each candidate must pass both written and oral comprehensive examinations prior to admission to candidacy. Major professors will advise candidates on competencies expected. A final oral examination is required that includes a defense of the dissertation and subject matter that the student's committee considers appropriate.

GRADUATE COURSES

410 Food Chemistry I (3) Reactions of proteins, enzymes, and additives in foods. Physicochemical interactions of food materials. Prereq: Chemistry 110 or equiv. 2 hrs and 1 lab. F

411 Food Chemistry II (3) Reactions of inorganic compounds, carbohydrates, lipids and vitamins in foods. Prereq: Chemistry 110 or equiv. 2 hrs and 1 lab. Sp

420 Food Microbiology (2) Physical, chemical, and environmental factors moderating growth and survival of foodborne microorganisms, pathogenic and spoilage microorganisms affecting quality of foods and their control. Prereq: Microbiology 210. Coreq: 429. F


430 Sensory Evaluation of Food (3) Principles and methods of sensory evaluation of foods. Prereq: Basic statistics. 2 hrs and 1 lab. F

440 Preservation of Food (3) Prevention of deterioration and spoilage of foods. Methods of preservation. Prereq: Agricultural Engineering Technology 422. 2 hrs and 1 lab. Sp

451 Dairy Products II (3) Science and technology of production of dairy products. Chemical, physical, and microbiological changes that occur during manufacture. Prereq: Principles of Chemistry, Introduction to Organic and Biochemistry, General Microbiology. 2 hrs and 1 lab. F

460 Meat Products Technology (4) Processing methods for making cured, smoked, fresh, flaked and formed products. Effect of processing methods on product characteristics. Prereq: 360 or consent of instructor. 3 hrs and 1 lab. F

470 Food Crop Products (3) Foods products from plants. Types, manufacturing systems, quality attributes and utility. Prereq: 3 hrs biological science. 2 hrs and 1 lab. Sp

480 Cereal Science and Bakery Products (3) Chemistry and technology of processing cereal grains, interactions of ingredients during production and storage of baked products. Prereq: 410 or 411 or equivalent. 2 hrs and 1 lab. F, A

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

501 Seminar (1) Individual reports and discussion on topics from current literature. May be repeated. Maximum 3 hrs. F

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

503 Problems in Lieu of Thesis (2-3) May be repeated. S/N only. E

510 Instrumental Analysis of Food (3) Modern instrumental methods for control of food manufacturing processes. Prereq: 410-11. 2 hrs and 1 lab. F

511 Color and Flavor of Foods (3) Chemical basis, measurement of the reactions involved in color and flavor changes in foods. Manufacture and application of materials used to modify color and flavor. Prereq: 410-11. 2 hrs and 1 lab. F

520 Food and Industrial Fermentations (3) Microbiology, biochemistry and technology of food-related fermentations involving dairy products, meat, cereals, fruits and vegetables: Production of food ingredients and by-product utilization. Prereq: 420-29, 440. Biochemistry 410 or equivalent. 2 hrs and 1 lab. Sp

521 Advanced Food Microbiology (3) Microorganisms in foods, their identification, characterization and relationship to food processing. Isolation of microorganisms from foods and plant equipment. Prereq: 420-29. 1 hr and 2 labs. Sp

540 Food Product Development (3) Art, science and technology of developing and marketing new food products. Prereq: 440. 2 hrs and 1 lab. Sp

560 Advanced Meat Science (3) Physical and chemical changes that occur in conversion of muscle to meat; effect of postmortem treatments on meat quality, composition and palatability; packaging, preservation and quality control. Prereq: 460. 2 hrs and 1 lab. Sp

580 Oilseed Products (3) Chemistry and technology of foods and food ingredients produced from oilseeds. Prereq: 410-11 or equivalent. 2 hrs and 1 lab. Sp

590 Special Topics in Food Technology and Science (1-3) Critical reviews of current research and production concerns of food industry. May be repeated. Maximum 9 hrs. F, Sp

593 Directed Studies (1-3) Research on non-thesis topics chosen by student and major professor. Supervised experience in food industry or governmental laboratories. May be repeated. Maximum 6 hrs. E

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

601 Seminar (1) Reports and discussions on research in current literature. May be repeated. Maximum 3 hrs. F, Sp

620 Food Toxicology (2) Basic and applied concepts in food toxicology; toxicological aspects of processed foods. Mode of action, prevention and control of food toxicants in food supply. Prereq: 410-11, 521, or consent of instructor. Sp

640 Advanced Food Processing (3) Role of processing treatments in modification of food properties; food texture, structure, and energy; and relationship to food processing. Isolation of microorganisms affecting quality of foods and their control. Prereq: 440, 510, 511 or consent of instructor. Sp

Forestry, Wildlife and Fisheries

(College of Agricultural Sciences and Natural Resources)

MAJORS DEGREES

Forestry .............................................. M.S.

Wildlife and Fisheries Science .................. M.S.

George T. Weaver, Head

Professors:

Barrett, J. W. (Emeritus), Ph.D. ................. Syracuse

Buckner, E. R., Ph.D. ............................... NC State

Coom, H. A. (Emeritus), Ph.D. .................. Syracuse

Dimmock, R. W., Ph.D. ............................. Wyoming

Forber, D. C. (Adjunct), Ph.D. .................... Florida

Little, R. L., Ph.D. ................................. NC State

McGee, C. E. (Adjunct), D.F. ..................... Duke

Osternaal, M. D., Ph.D. ............................ Syracuse

Pelton, M. R., Ph.D. ................................. Georgia

Rigley, T. H. (Adjunct), Ph.D. ........................ VPI Schneider, G., Ph.D. .......................... Michigan State

Sharp, J. B., D.P.A. ................................. Harvard

Smallary, G. (Adjunct), Ph.D. .................. Tennessee

Strange, R. J., Ph.D. .............................. Oregon State

Stullman, D. A., Ph.D. ............................. Minnesota

Thor, E. (Emeritus), Ph.D. ........................ NC State

Weaver, G. T., Ph.D. ............................... Tennessee

Wilson, J. L., Ph.D. ................................. Tennessee

Woods, F. W. (Emeritus), Ph.D. ................ Tennessee

Associate Professors:

Dearden, B. L., Ph.D. .............................. Colorado State

Hay, R. L., Ph.D. ................................... Duke

Hopper, G. M., Ph.D. ............................. VPI

Nodvin, S. C. (Adjunct), Ph.D. .................. Cornell

Rennie, J. C., Ph.D. ................................. NC State

Scharbaum, S. E., Ph.D. ........................... Colorado State

Smith, K. G. (Adjunct), Ph.D. ...................... Ohio State

Smith, W. P. (Adjunct), Ph.D. ...................... Oregon State

Wells, G. R., D.F. ................................. Duke

Winstead, P. M., Ph.D. .............................. Iowa State

Assistant Professor:

King, M. M., Ph.D. ................................. Utah State

Graduate study leading to the Master of Science with majors in Forestry and in Wildlife and Fisheries Science is offered by the Department of Forestry, Wildlife and Fisheries. The Master of Business Administration, with a concentration in forest industries management, is available for qualified students. This degree-program is offered by the College of Business Administration with participation by the Department of Forestry, Wildlife and Fisheries. The Doctor of Philosophy with a specialization in forest biology, wildlife science, or fisheries science can be achieved through the University's intercollegiate graduate program in Ecology.

THE MASTER'S PROGRAMS

Both thesis and non-thesis options are available for the major in Forestry; a thesis is required in Wildlife and Fisheries Science. For admission, the student must have a Bachelor's degree from an accredited institution in forestry, wildlife, fisheries, or other natural resource area. Applicants must also have taken the general Graduate Record Examination (GRE). Graduate School rating forms or letters of recommendation from three individuals familiar with the applicant's academic ability are required. The department also has an application that must be submitted at the time of application to The Graduate School.

Thesis Option

1. Prior to research for the thesis, the student is required to develop a detailed written research proposal. Registration for 6 hours of Thesis (Forestry 500 or Wildlife and Fisheries Science 500) is required.

2. A graduate committee of no fewer than 3 faculty members must be selected by the second semester of residence. At least one member shall be from outside the department. In addition to the thesis requirement, a minimum of 24 hours of graduate coursework is required. This work must be approved by the student's committee and no more than 10 hours of the minimum 30 can be below the 500 level. The committee may require additional coursework if the student's progress or background indicates such need.

3. All students are required to include Forestry 512 or Wildlife and Fisheries 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.

41. Thirty-five hours of graduate coursework of which 23 must be at the 500 level or above is required.

42. A graduate committee of no fewer than 3 faculty members will be selected. At least one member shall be from outside the department. The committee will meet and schedule the student's program during the first semester in residence.

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

52. 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) Growth, reproduction, and physiology of trees; forest ecology; variability and taxonomy of forest trees. Prereq: Graduate standing in forestry or biological science, or consent of instructor. Sp.

520 Advanced Forest Tree Biology (3) Growth, reproduction, and physiology of trees; forest ecology; variability and taxonomy of forest trees. Prereq: Graduate standing in forestry or biological science, or consent of instructor. Sp.

530 Advanced Forest Resource Management (3) Analysis of forest management problems as exemplified in public agencies and private firms. Forest organization and computerized regulation systems; financial and operational reporting systems, log harvesting tools, as applied to forest resource management. Prereq: Senior-level forest management or consent of instructor. Sp.

540 Genetics in Forestry (3) Genetic improvement of forest trees. Prereq: 530. Growth, reproduction, and physiology of trees; forest ecology; variability and taxonomy of forest trees. Prereq: Graduate standing in forestry or biological science, or consent of instructor. Sp.

550 Recreation Planning for Forests and Associated Lands (3) Planning process for recreation development on forests and associated lands; analysis and critique of specific contemporary alternatives. Prereq: 321 or equivalent and 2 hrs in biological sciences. (Same as Botany 581.) Sp, A

555 Forest Recreation Research Methods (3) Evaluative research methodologies through readings and case studies; techniques of recreation resource monitoring and recreation research design; current research trends in wildlife recreation. Prereq: 321 or equivalent and 2 hrs in biological sciences. F, A

565 Industrial Forestry II (3) Economic structure of forest products industries. Analysis of forest industry structure and markets, domestic and foreign. Trends in markets and industrial structure: impacts on forest management. Prereq: Senior-level forest management or consent of instructor. F, 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 as planning tool and as results from conflict resolution. Linkage between policy development and execution, and structure and management of organizations. Prereq: Senior-level 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, regeneration and management; computer modeling of stand dynamics, structure, growth/yield. Prereq: Graduate silviculture course or consent of instructor. 2 hrs and 1 lab. Sp.

581 Cyclogenetics (3) Chromosome structure and behavior during meiotic and meiotic divisions in relation to structural changes, genetic controls, hybridization, speciation, and polyploidy. Laboratory: normal and aberrant meiotic systems and somatic chromosomes from plants and animals. Prereq: 90A and at least 6 additional hours in biological sciences. (Same as Botany 581.) Sp.

585 Advanced Forest Biometry (3) Application of sampling techniques to forest inventory, fixed and variable plot sampling; list sampling; forest regression estimators; multistage and multiphase sampling. Growth and yield predictors for even-aged and un-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. E

593 Independent Study in Forestry (1-4) May be repeated. Maximum 6 hrs. E

GRADUATE COURSES

416 Planning and Management of Forest, Wildlife and Fisheries Resources (3) Approaches to forest, wildlife, and fishery resource management through development of land management plans and analyzing case studies including conflict resolution. Applicable to majors in Forestry, Wildlife and Fisheries Science. Prereq: Senior standing 1 hr and 2 labs. Sp.

525 Management of Forest, Wildlife and Fisheries Resources (3) Current technologies and management strategies concerning wise use of forest, 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 and 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; techniques of wildlife damage control; marking techniques; fish culture systems; track and sign identification. Prereq: Forestry, Wildlife and Fisheries 317. 1 hr and 2 labs or field. One weekend field trip required. F

443 Fisheries Science (3) Quantification and management of freshwater fishery populations; population estimation, age and growth, biological assessment, and stocking. Prereq: Forestry, Wildlife and Fisheries 317 or Biology 291. 6 hrs of mathematics and 6 hrs of marine science required. F

444 Ecology and Management of Wild Mammals (3) Biological and ecological characteristics of game mammals and endangered mammals. Current principles and practices of wild mammal management. Prereq: 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 developments in wildlife and fisheries science. Required 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.

530 Wildlife Diseases (2) Necropsy of birds and mammals. Recognition of various diseases and methods of preparing pathological materials in field and lab. Investigative procedures concerning wildlife diseases. Prereq: 1 yr biology, 444 or 445, or consent of instructor. F

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 respiration 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.
555 Fish Culture (3) Principles, concepts and techniques of culturing economically important fish and shellfish species. Prereq: 443 or consent of instructor. 2 hrs. and 1 lab. Sp,A

560 Advanced Topics in Wildlife and Fisheries Science (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 DEGREES
Geography ........................................... M.S., Ph.D.

Sidney R. Jumper, Head

Professors:
Aiken, Charles S., Ph.D. .......... Georgia
Bell, 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
Ralston, B., Ph.D. .......... Northwestern
Schmudde, 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
Foresta, R., Ph.D. .......... Rutgers
Pulischer, L., Ph.D. .......... Southern Illinois
Rehder, J., 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-equipped 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 a broad foundation and understanding of the discipline; these should have been achieved in a comprehensive Master's program. Course requirements for the degree shall be determined by the student's faculty committee in accordance with specific interests and needs. The program must include 504, 515, 580, 12 hours of 600-level seminars, and (at each offering during residency) 501. A minimum of 12 hours must be earned in related fields outside the department. Competence in cartography and quantitative techniques is required. Additional tools, including languages, will be required as appropriate to the student's areas of research specialization. Examinations required for admission to candidacy include a written comprehensive; written examinations on two special fields; and an oral examination on the 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. 2 hrs. and 1 2-hr lab.

430 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 regional data. Prereq: Statistical Methods 115 or two semesters of calculus or consent of instructor.

421 Geography of Folk Societies (3) Geographical study of folk culture of traditional and modern material 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 political, economic, and social 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 341.

435 Biogeography (3) Changing distribution patterns of plants and animals on variety of spatial and temporal scales. Effects of continental drift, Pleistocene climatic changes, 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 geographical 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 internal morphology of cities. 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. (Same as Urban Studies 441.)

445 Geography of Resources (3) Study of factors related to variations in resource availability from time to time and place to place; energy and metallic resources. Prereq: 101-02 or 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 452.)

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

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 (2-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/ NC only. E

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 or letter grade.

506 Directed Readings (2-6) Readings on topics of interest as defined by individual students. Prereq: Written consent of instructor and department prior to registration. May be repeated with consent of instructor. Maximum 9 hrs. S/NC or letter grade.
509 Topics in Geography (2-3) Topics vary. Prereq: Consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs. S/NC or letter grade.

512 Topics in Cartography (3) Trends, concepts, problems and methods in cartography. Prereq: 411 and 412 or 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 geographical data. Prereq: 413 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

515 Topics in Quantitative Geography (3) Multivariate analysis applied to problems in geography; research problems utilizing appropriate computer programs; usefulness to geographic research of techniques developed by other disciplines. Prereq: 415 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

517 Geographic Information Management and Processing (3) Concepts and methods in management of geographic information. Database design, manipulation, sampling and analysis. Prereq: Consent of instructor.

519 Graduate Practicum in Cartography/Remote Sensing (2-6) Prereq: Written consent of department before registration. May be repeated with consent of instructor. Maximum 6 hrs.

521 Topics in Cultural Geography (3) Examination of trends, problems, and methods in cultural geography. Prereq: 421 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

524 Topics in Political Geography (3) Geographic 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 geographical land surface system in modern physical geography. Prereq: 433 or 434 and 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 recent advances in urban morphology; urban problems and urban spatial behavior. Prereq: 441 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

549 Topics in the Geography of Transportation (3) Examination of trends, problems, and methods in transportation geography and transportation networks. Prereq: 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 policies, politics, 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. S/NC or letter grade.

592 Off-Campus Study (1-15) See page 31. Prereq: Written consent of department prior to registration. S/NC or letter grade.

593 Independent Study (1-15) See page 31. Prereq: Written consent of department prior to registration. S/NC or letter grade.

599 Geographic Concept and Method (3) Traditional and modern geographic thought; readings on nature, scope, problems, and methods of geography. Prereq: Consent of instructor.

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

609 Seminar in Geography (3-3) 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: 443 or consent of instructor. May be repeated. Maximum 6 hrs.

649 Seminar in Geography of Transportation (3) Prereq: 549 or consent of instructor. May be repeated. Maximum 6 hrs.

663 Seminar in Geography of the American South (3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

673 Seminar in Geography of Latin American (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
Klepser, 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
Walls, 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. ................................ Pennsylvania
Dendy, Paul A., Ph.D. ..................................... Minnesota
Driese, Steven G., Ph.D. .................................... Wisconsin
Dunne, William M., Ph.D. .................................. Bristol
Labotka, Theodore C., Ph.D. .......................... Catech
Mckinney, Michael L., Ph.D. ............................. Yale
Williams, Richard T., II., Ph.D. .......................... W.V.

Assistant Professors:

Delcourt, Hazel R., Ph.D. ......................... Minnesota
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 undergraduate work, two rating forms or letters of recommendation, and GRE scores, including the subject exam in geology (or in another area if geology was not the area of previous undergraduate 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, stratigraphy, paleontology, structural geology, and field geology. One year each of coursework in calculus and chemistry and one year of coursework in biology, physics, or statistics are also required. Applicants lacking any of these may be admitted, but the deficiencies must be removed within the first year without graduate credit. Substitutions may also be allowed.

THE MASTER'S PROGRAM

The department offers the thesis option in the Master's program. Graduation requires successful oral defense of a written thesis and a minimum 3.0 GPA in all graduate coursework.

Course requirements are a minimum of 30 semester hours, including:

1. Six hours of Thesis 500.
2. Registration in 595 during the first two years in residence. Two hours may be counted toward the 30-hour minimum. This requirement may be waived in unusual circumstances.
3. Sixteen hours of graduate coursework, with at least 14 hours at the 500 or 600 level, including at least one course from each of the following groups:
   - Group I: 521, 525, 545, 546, 550, 595, 561.
   - Group II: 570, 571, 576, 577.
4. Eight hours of additional graduate coursework.

THE DOCTORAL PROGRAM

The Ph.D. option 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 candidate will be tested on his/her knowledge of the area concerning the proposed dissertation and of related fields. The candidate is expected to be conversant in a wide field of geological sciences.

A minimum of 24 hours of graded coursework is required in addition to the 24 hours of Dissertation 600. 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.
GRADUATE COURSES

410 Advanced Mineralogy (3) Crystal chemistry of rock-forming minerals. Interaction of electromagnetic radiation and crystalline solids. Optical properties of minerals, visible and infrared spectroscopy, and x-ray diffraction. Laboratory exercises emphasize thin section and x-ray diffractometer methods of mineralogy. Prereq: 310 or consent of instructor. 3 hrs and 1 lab.

420 Paleoecology (4) Principles of ecological analysis as applied to fossils and fossil assemblages: data collection and interpretation. Laboratory designed around preparation of scientific reports based on field and laboratory analysis. Writing emphasis course. 3 hrs and 1 lab.

421 Invertebrate Paleontology I (3) Survey of preservational processes and geologically important representatives: Protista, Porifera, Cnidaria, Bryozoa, and Brachiopoda. Functional morphology, skeletal structures, ecology, and stratigraphic distribution. Prereq: 320 or consent of instructor. 2 hrs and 1 2-hr lab.

422 Invertebrate Paleontology II (3) Survey of higher invertebrates: Annelida and other worms, Mollusca, Arthropoda, Echinodermata, Grapitoza, Conodonta, Chordata, and Cephalopoda. Functional morphology, skeletal structures, ecology, and stratigraphic distribution. Prereq: 320 or consent of instructor. 2 hrs and 1 2-hr lab.

425 Evolution and Geologic Record (3) Evolution of life viewed from fossil record. Extinction, macroevolution and microevolutionary rates. Prereq: 320 or 2 hrs and 1 seminar. 3 hrs and 1 lab.

426 Paleobotany and Palynology (3) Evolutionary history of terrestrial plant life through examination of fossil record of macrobotanical remains, spores, and pollen. Growth and development of angiosperms and gymnosperms; changes in floristic provinces through geologic time. Prereq: 102; Botany 310-20 or consent of instructor. (Same as Botany 426.) 3 hrs and 1 lab.

440 Field Geology (6) Summer field course for advanced undergraduate geology majors and first-year graduate students in geology. Taught off-campus at Geology Field Station and requires full time of student. Synthesis of major aspects of geological sciences in societal context. Field techniques demonstrated, practiced, and applied to solution of geological problems. Prereq: Completion of major core courses and consent of instructor. 6 hrs.


500 Process Geomorphology (3) Integrative approach to development of surface of earth based upon case histories, maps, remote sensing imagery. Prereq: 101-02. (Same as Geography 450.) 2 hrs and 1 2-hr lab.

505 Basic Environmental Geology (3) Applications of geological sciences toward comprehension of effects of geological processes on humans and effects of human activities on earth's environments. Prereq: 12 hrs of geology courses. 2 hrs and 1 3-hr lab or field period.

565 Aqueous Geochemistry (4) Introduction to and applications of equilibria between rocks, water, and surface environments; geochemistry of natural water, weathering reactions, and early sediment diagenesis. Prereq: Chemistry 120-30. 3 hrs and 1 lab or seminar.

566 Chemical Petrology (3) Application of thermodynamics to geologic problems; physical chemistry of condensed phases, solutions, thermodynamic stability, heterogeneous multicomponent phase equilibria, and conduction of heat through earth. Prereq: Chemistry 120-30, Mathematics 141-42. Recommended prereq: Physical Chemistry.

568 Geochronological Analysis (3) Collection and treatment of geochronometric data; radiometric, physical, and x-ray fluorescence, and atomic absorption spectrophotometry techniques. Prereq: 310 or consent of instructor. 3 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: 370 or equivalent, or consent of instructor. 3 hrs and 1 lab or seminar.

571 Regional Tectonics and Structural Geology (3) Major tectonics, crustal structure, and crustal 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 geologic structure and stratigraphy using seismic data. Effects of velocity anomalies, multiples and complex reflector geometry. Application to hydrocarbon exploration. Prereq: Stratigraphy and sedimentology, structural geology, and 470 or consent of instructor.


580 Ore Petrology (3) Detailed study of ore deposits. Petrology of ore-gangue assemblages. Prereq: 480 or consent of instructor. 2 hrs and 1 2-hr lab.

590 Special Problems in Geology (1-3) Directed study or special topics. Prereq: Consent of instructor. May be repeated. Maximum 10 hrs.

591 Foreign Study (1-15) See 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 regions of geologic interest, supplemented by field trip. Prereq: Consent of instructor. May be repeated. Maximum 8 hrs.

595 Selected Topics in Geography (1-3) Presentation of advanced, graduate research topics in field of geography. May be repeated each semester except summer for residents full-time graduate students. Maximum 6 hrs.

596 Doctoral Research and Dissertation (1-15) May be repeated with consent of department. Maximum 6 hrs.

597 Directed Study (1-15) See page 31.

598 Seminar in Petrology (1) May be repeated with consent of department. Maximum 6 hrs.

599 Seminar in Paleontology (1) May be repeated with consent of department. Maximum 6 hrs.

600 Seminar in Geochimistry (2) May be repeated with consent of department. Maximum 6 hrs.

601 Seminar in Geochemistry and Geophysics (1) May be repeated with consent of department. Maximum 6 hrs.

602 Seminar in Geophysics (1) May be repeated with consent of department. Maximum 6 hrs.

603 Seminar in Physical Geochemistry (2) May be repeated with consent of department. Maximum 6 hrs.

604 Seminar in Sedimentary Geology (2) May be repeated with consent of department. Maximum 6 hrs.

605 Seminar in Geomorphology and Quaternary Geology (2) May be repeated with consent of department. Maximum 6 hrs.

606 Seminar in Geochemistry (2) May be repeated with consent of department. Maximum 6 hrs.

607 Seminar in Geophysical Methods (2) May be repeated with consent of department. Maximum 6 hrs.

608 Seminar in Regional Geology (2) May be repeated with consent of department. Maximum 6 hrs.

609 Seminar in Remote Sensing (2) May be repeated with consent of department. Maximum 6 hrs.

610 Seminar in Geology (2) May be repeated with consent of department. Maximum 6 hrs.
Germanic and Slavic Languages

(College of Liberal Arts)

MAJORS DEGREES
German M.A.
Modern Foreign Languages Ph.D.

David E. Lee, Head

Professors:
Falen, James E., Ph.D. Pennsylvania
Osborne, J. C., Ph.D. Northwestern
Falen, James E., Ph.D. Pennsylvania
Fuller, H. W. (Emeritus), Ph.D. Wisconsin
Kratz, Henry, Ph.D. Ohio State
Osborne, J. C., Ph.D. Northwestern
Rice, Martin P., Ph.D. Vanderbilt
Ritenhoff, Ursula C., Ph.D. Connecticut

Associate Professors:
Hodges, Carolyn R., Ph.D. Chicago
Lauckner, Nancy A., Ph.D. Wisconsin
Lee, David E., Ph.D. Stanford
Mellor, C. J., Ph.D. Chicago

The Department of Germanic and Slavic Languages offers two advanced degrees: the Master of Arts in German and the Doctor of Philosophy in Modern Foreign Languages. Inquiries should be addressed to the head of the department.

THE MASTER’S PROGRAM

The department requires a minimum of 30 semester hours including 15 hours of coursework numbered 500 and above and 6 hours of Thesis 500.

THE DOCTORAL PROGRAM

The Ph.D. in Modern Foreign Languages is offered jointly by the Department of Germanic and Slavic Languages and the Department of Romance 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 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:
   - A minimum of 24 hours at the 500 level (exclusive of dissertation hours) including French 584 (3), German 560 (3), or Spanish 650 (3); French 512 (3), German 512 (3), or Spanish 512 (3); French 515-16 (2,2) or German 520 (3).
   - At least 12 hours at the 600 level (exclusive of dissertation hours).

2. Second Concentration: French, German, Italian, Russian, or Spanish (different from the first concentration). It consists of at least 18 hours 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 a third language, reading proficiency in 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.

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 oral examinations. Central emphasis is put on the doctoral dissertation as a final test of the candidate’s scholarly qualifications.

Graduate Teaching Assistants in the program should have the opportunity and will be strongly encouraged to instruct at least two foreign languages, subject to staffing needs.

Doctoral students are strongly encouraged to reside and study abroad and will be assisted in identifying potential sources of financial support (e.g. Fulbright, McClure, Rotary fellowships).

For additional courses, see 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 Office of Graduate Admissions and Records.

German

GRADUATE COURSES

331-32 Elements of German for Upper-Division and Graduate Students (3.3) Elements of a 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 knowledge of the language. No credit for students having completed 101-02 or 167. 332 may be repeated. Maximum 6 hrs. Undergraduate credit only.

411-12 Advanced Conversation and Composition (Prereq: 331-12 or equivalent or consent of department).

420 Selected Topics in German Literature from 1750 to the Present (Prereq: 6 hrs of 500-level courses (excluding 331-32 and courses in English translation) or equivalent).

421 German Lyric Poetry (Prereq: 6 hrs of 300-level courses (excluding 331-32 and courses in English translation) or equivalent).

422 German Drama (Prereq: 6 hrs of 300-level courses (excluding 331-32 and courses in English translation) or equivalent).

423 German Narrative Prose (Prereq: 6 hrs of 300-level courses (excluding 331-32 and courses in English translation) or equivalent).

424 German Literary Movements (Prereq: 6 hrs of 300-level courses (excluding 331-32 and courses in English translation) or equivalent).

425 Introduction to Descriptive Linguistics (Same as French 425, Spanish 425, Linguistics 425, and Russian 425.)

426 Methods of Historical Linguistics (3) Phonetics, distinctive feature analysis, sound change types, nature of sound change, principles of reconstruction, and fundamental assumptions about language change through time. Survey of non-phonological linguistic change, language families, Proto Indo-European, and other proto languages. Prereq: 6 hrs of upper division foreign language courses (excluding courses in translation or graduate reading courses). (Same as Russian 426, French 426, Spanish 426, and Linguistics 426.)

435 Structure of the German Language (3) Contrastive English-German segmental and suprasegmental phonemes, contrastive English-German linguistic structures, selected topics in advanced German grammar and syntactic analysis. Prereq: 6 hrs of upper division German language courses (excluding courses in translation and graduate reading courses). (Same as Linguistics 435.)

436 History of the German Language (3) Development of German language from Indo-European through Proto-Germanic, Old High German, Middle High German to New High German. Internal and external linguistic history of German speech. Prereq: 6 hrs of upper division German language courses (excluding courses in translation or graduate reading courses). (Same as Linguistics 436.)

485 Business German (3) Survey of German used in fields of business, government, administration, and economics. Prereq: 6 hrs of upper division German excluding courses in translation and graduate 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/WC only. E

510 German Phonetics and Advanced Grammar (3) Advanced work in phonetics, pronunciation, and selec-
Health, Leisure, and Safety

550 Studies in Russian Literature (3) Content varies. May be repeated. Maximum 9 hrs.

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

Health, Leisure, and Safety

(College of Education)

MAJORS

Health

Healthcare Delivery

Public Health: M.P.H.
Recreation and Leisure Studies: M.S.
Safety Education and Service: M.S., Ed.S.
School Health Education: M.S.
Health Education: Ed.D.

Professors:

Gorski, June, Dr.P.H. —— UCLA
Hamilton, Charles B., Dr.P.H. —— Oklahoma
Hayes, Gene E., Ph.D. —— North Texas State
Kirk, Robert H., H.S.D. —— Indiana
Neuens, James (Adjunct), Ph.D. —— Illinois
Wallace, Bill C., Ed.D. —— Northern Colorado

Associate Professors:

Haughton, Betsy (Adjunct), Ed.D. —— Columbia
Krick, Ken L., Re.D. —— Indiana
New, John C., Jr. (Adjunct), D.V.M. —— Texas A&M
Pursley, R. Jack, Ph.D. —— Iowa
Rockett, Ian R., Ph.D. —— Brown
Thompson, A. F., Ph.D. —— Michigan State

Research Associate Professor:

Putnam, Sandra L. (Adjunct), Ph.D. —— Brown

Assistant Professors:

Aldrich, Tim E. (Adjunct), Ph.D. —— Texas
Blackmon, James T., Ed.D. —— Tennessee
Blanton, Mary Dale, Re.D. —— Indiana
Ellison, Jack S., Ed.D. —— Tennessee
Levin, Barbara (Adjunct), M.D. —— California
Presley, Velma W., Ed.D. —— Tennessee
Zemel, Paula C., (Adjunct), Ph.D. —— Wayne State

Lecturer:

Duffy, Mary, M.D. —— Pennsylvania

The Department of Health, Leisure, and Safety offers graduate programs leading to the Master of Science, the Master of Public Health, the Specialist in Education, the Doctor of Education, and the Doctor of Philosophy with a major in Education. Inquiries should be directed to the department head.

520 Woks of Dostojevsky 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.

550 Studies in Russian Literature (3) Content varies. May be repeated. Maximum 9 hrs.

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

Health

Graduate programs are available leading to the Master of Science with a major in School Health Education (thesis and non-thesis options) and to the Doctor of Education with a major in Health Education.

The Master of Science, with thesis and non-thesis options, requires completion of 30 semester hours.

The Doctor of Philosophy with a major in Education offers a concentration in health education and choice of supporting specializations from public health or safety as listed under Education.

ACADEMIC COMMON MARKET

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

GRADUATE COURSES

400 Consumer Health (3) Survey of major consumer health care providers and health care services; selecting, purchasing, evaluating and financing medical and health care services/products. (Same as Public Health 400.) Sp

405 Alcoholism and Alcohol Education (3) Problems of alcoholism. Factors which make alcoholism serious health and safety problem. Various types of instructional/educational and intervention programs. F

406 Death, Dying and Bereavement (3) Aspects of dying, death and handling trauma of loss. Medical, financial, physical, legal and social implications of death. F Sp

420 Sex Education As It Relates to Human Sexuality (3) Exploration of science of human sexuality. Trends, issues, and content of sex education. E

425 Women's Health (3) Factors influencing women's health and women consumers in nation's health service delivery systems. Health problems/concerns of women and techniques for prevention, maintenance and/or correction. (Same as Women's Studies 425.) E

430 Suicide and Crisis Intervention (3) Factors which make suicide serious health problem. Assessment, intervention, and prevention techniques. Sp

435 Substance Use and Abuse (3) Drug and alcohol abuse problems and suspected causes; pharmacology of drugs and effects on society. Social/educational and intervention and education. Sp

465 Aging and Health (3) Aging process in health perspective as related to health promotion and wellness of aged. F Sp

500 Thesis (1-15) P/No P only. E

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

510 Trends and Issues in Health Education (3) Comprehensive study and analysis of history, philosophy, principles, problems and trends of and in health education. F

520 Sex Education and Human Sexuality (3) Advanced in-depth discussion of educational and health counseling, theory, techniques, materials used in school, community, or health care facility. Sp

530 Curriculum Development for Health Education Programs (3) Analysis of current health education cur-
ritica for elementary and secondary schools, community and health care settings. Sp

540 Evaluation In Health Education (3) Principles of evaluation in health and community programs in regard to health knowledge, attitudes, and behavior. Construction of instruments and criticism of existing instruments. Sp

550 Graduate Workshop (1-3) Specific health/wellness or health promotion issues. Special health problems in concentrated period of time. May be repeated. Maximum 12 hrs.

570 Special Topics (1-3) For graduate students, in-service teachers and other health professionals. Health/wellness or health promotion issues. May be repeated. Maximum 12 hrs.

590 Research Methods in Health (3) Basic research techniques in variety of health settings. Development of research skills and problem identification for research topic. (Same as Public Health 590.) F

593 Directed Independent Studies (1-3) Individual identification and study of health/wellness or health promotion problem/issue. Specific proposal to instructor before registration. May be repeated. Maximum 12 hrs. Sp

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

601 Internship/Research in Safety and Health (3-6) (Same as Safety 601.) Prereq: Consent of director. May be repeated. Maximum 12 hrs. Su

610 Critical Analysis of Writing and Research (3) Analysis of writing and research in health related areas. F

620 Advanced Research Techniques in Health (3) Advanced theory and techniques of research design and methodologies in health discipline. Prereq: 590. Sp

650 Health Aspects of Gerontology (3) Knowledge and understanding of biological, psychological and sociological aspects of aging as related to health and wellness of individual. (Same as Public Health 650.) Su

655 Seminar in Nation's Health (3) Comprehensive study of definition, determinants, resources and health status of nation. (Same as Public Health 655.) F

660 International Health (3) Study of quality of health, health promotion and health services in countries throughout world. (Same as Public Health 660.) Sp


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 the 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. No provisional students will be admitted. As a restricted program, no-degree admission requires departmental recommendation.

THE MASTER’S PROGRAM

The M.P.H. is a non-thesis program requiring completion of 36 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 an actual work setting. Students must complete all assigned prerequisite courses and 21 semester hours of the curriculum prior to enrollment. Minimum GPA of 3.0 prior to placement in the field.

As an alternative to field practice, preparation of a Master's essay may be utilized to fulfill the professional skills development component of the curriculum. Approval must be received from the Public Health Academic Program Committee and is contingent on consent of major advisor, formal written proposal by the student, and completion of an additional research methods course. Written guidelines stipulating expectations and eligibility criteria are available.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.P.H. program in Public Health is available to residents of the states of Arkansas, Florida, Kentucky, Louisiana, Mississippi, or Virginia. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.

COURSE REGISTRATION

Provisional graduate students are ineligible to enroll in 500-level public health courses. Non-degree students must obtain permission from departmental program head to register for 500-level public health courses. Prerequisite coursework assigned as a condition of admission to the M.P.H. program must be completed promptly, with a grade of B or better, typically within the first semester or two of enrollment in graduate studies.

GRADUATE COURSES

400 Consumer Health (3) (Same as Health 400.)

410 Health in the Work Environment (3) Fundamental activities in field of industrial health aimed at reducing health problems for employees. Workplace hazards and problems of concern to nurses, medical staff management, engineers and others in industrial health and safety fields. Prereq: Consent of instructor. May not be taken for credit by occupational health concentration majors. F

480 Special Topics (3) Prereq: Consent of instructor. May be repeated under different topictopic. Maximum 6 hrs. F

493 Directed Independent Study (1-3) Individual in-depth study of selected issues. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time. Credit may be counted toward degree requirements. May be repeated. Maximum 5 hrs. S/NC only. E

505 Continuing Education in Public Health (1-3) Selected learning activities and experiences in institutionalized 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 interaction with medicine and other academic and professional disciplines. Speakers both internal and external. May be repeated. Maximum 4 hrs. (Same as Norton 509. Prereq: M.P.H., Education 509 and Social Work 509.) S/NC only. F,Sp

510 Environmental and Occupational Health (2) Complexities of personal and ambient environment recognized to be important in health and health behaviors. Principles of occupational safety and health. Survey of contemporary issues and their implications for public health. F,Sp

511 Fundamentals of Industrial Hygiene (3) Occupational health theory, practice and regulations: recognition, evaluation and control of workplace hazards. Prereq: 2 yrs of chemistry and biology and consent of department. F

512 Industrial Hygiene Controls (4) Activities in comprehensive practice of industrial hygiene control: processes described and evaluated for effectiveness. F

513 Industrial Hygiene Instrumentation and Sampling (3) Instruments and methods for evaluating industrial environment for personal exposure to chemical and physical stressors affecting worker's health. Lecture, demonstration, and laboratory. Prereq: 511, MPH (OEHS) major, and consent of department. Sp

514 Industrial Toxicology and Occupational Exposures (3) Principles of industrial toxicology, basic toxic mechanisms, portal of entry, physiological and sociological responses. Occupational exposure assessment, physical factors and environmental conditions that influence exposure characterization, statistical assessment of sampling, and transport of contaminants into general environment. Prereq: 1 yr of general chemistry and 1 semester of human physiology. Sp

520 Public Health Policy and Administration (3) Administrative considerations of community-based health care programs and public health practice. Health policy formulation, implementation, evaluation and professional and public involvement in health, legal responsibilities, and managerial concepts/techniques/process. F,Su

521 Organization Theory and Health Care Delivery (3) Administrative and Organization theory related to health care facilities, operation, and management of community hospital. Case discussions and problem-solving exercises; managerial functions and skills. F

523 Management in Extended Care Settings (3) Management concepts and theoretical foundations essential to supervision and administration of domiciliary health care programs. Management and operation of health care programs for patients and families in alternative settings which provide activities of daily living and special psychosocial environmental needs. Programs for home health services, convalescent and intensive medical rehabilitation, nursing homes, congregate living centers and similar type programs. Prereq: 521 or consent of instructor. Sp

525 Financial Management of Health Programs (3) Financial management concepts and practices applied to health services programs. Fundamentals of budgeting, costing, financing, rate setting, financial reporting and control. Opportunities to apply techniques. Prereq: 520 or consent of instructor. Sp

530 Biostatistics (3) Application of descriptive and inferential statistical methods to health-related problems and programs. Microcomputer applications, use and interpretation of vital statistics and introductory research methodology. Prereq: Consent of instructor. Prereq: Introductory statistics or consent of instructor. F

540 Research Methods in Epidemiology (3) Basic measurement science of public health. Epidemiologic principles; application of discipline's research methods. Basic measures of risk, concepts of bias and causal reasoning. Study design, data collection and analytic approaches. Prereq: 530. F,Sp

542 Advanced Epidemiologic Methods (3) Both cohort and case-control comparison studies; conduct and interpretation of study, and general attention to calculation and formulation of professional literature, case histories, and clinical studies, with emphasis on epidemiologic approaches to prob...
Recreation and Leisure Studies

Graduate study in a major in Recreation and Leisure Studies leads to the Master of Science with thesis and non-thesis options. Preparation concentration requirements are available in therapeutic recreation, general recreation, and sport administration/management. The third concentration is an interdisciplinary program with the department of Human Performance and Sport Studies.

The M.S., with thesis and non-thesis options, requires completion of 32 semester hours.

The following retention policy applies to graduate students seeking the M.S. with a concentration in sport administration/management:

1. Graduate students are required to maintain an overall GPA of 3.0.
2. Any student who falls below this standard will be advised in writing by the department head of the need to discuss the matter with his/her advisor.
3. If a student's overall GPA remains below 3.0 for a second semester, the student will have his/her degree status revoked.

GRADUATE COURSES

410 Maintenance and Management of Recreation and Sports Related Facilities (3) Principles for operationalizing modern facility maintenance systems and management strategies. Cost tracking, inventory system, specialized maintenance techniques, safety guidelines, maintenance management systems and security. Prereq: 110, 310 or consent of instructor. F

430 Organization and Administration of Leisure Services (3) Principles of administration applied to provision of leisure services offered by public, private, and commercial enterprises. Organizational structures, 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 and commercial enterprises, organizational set-up and management of commercial goods and services offered in leisure market. Factors influencing business decisions, 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 of the applicant, developing positive attitudes toward leisure. Demonstrates how leisure contributes to one's mental and physical health. May be repeated. Maximum 6 hrs. E


Detailed study of theme, issue, or concern. Designed to meet needs of individual students. 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, leisure and society, determinants of leisure behavior, developmental features of leisure and recreation. Current trends, problems, laws, and social issues affecting leisure services. Prereq: 310 or consent of instructor. F

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; program planning, 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) Research methods in therapeutic recreation; introduction to and practice of various leisure facilitative 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 trends in practice of therapeutic recreation services. Prereq: Consent of instructor. F

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, accounting, and inventory control, commercial/public cooperative ventures and microcomputer applications. Prereq: 430 or consent of instructor. Sp

590 Practicum (1-6) Required of all graduate students. 100 clock hrs 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 issue under consideration or designed to meet needs of individual students. May be repeated. Maximum 6 hrs. E

592 Special Topics in Recreation & Leisure Studies (1-6) May be repeated. Maximum 6 hrs. E

Safety

Graduate programs are available leading to the Master of Science with a major in Safety Education and Service (thesis and non-thesis options) and to the Specialist in Education with a major in Safety Education and Service. The M.S., with thesis and non-thesis options, requires completion of 30 semester hours. The Specialist in Education (Ed.S.) requires 30 semester hours beyond the M.S. An internship and research of a significant safety problem are included as professional development activities.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S. and Ed.S. programs in Safety Education and Service are available to residents of the states of Alabama, Arkansas, Florida, or South Carolina. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.

GRADUATE COURSES

441 Driver and Traffic Safety Education (4) Preparation of traffic safety instructors for school, college, industry and commercial agencies. Students required to teach at least two non-drivers to drive. Valid driver's license required. 3 hrs and 2 labs. F, Sp

442 Advanced Driver & Traffic Safety Education (3) Development of competence in teaching of driver education through use of computer, simulation, multimedia, and multi-car driving range. Teaching skills and supervision, 2 hrs and 2 labs. F, Su

443 Sports & Recreational Safety (3) Accident prevention and injury control in sports activities; philosophy of sports safety; human environmental factors and interaction in sports injury and control; risk-taking and decision solution strategies; and contributions of sports medicine to safety. 3 hrs and 2 labs. E

450 General Safety (3) Principles, practices, and procedures in general safety. Safety problems in school, traffic, recreation, industry, home and other public areas. E

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

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

510 Perspectives and Trends in Leisure Studies and Services (3) Basic role of leisure delivery systems in today's society, leisure and society, determinants of leisure behavior, developmental features of leisure and recreation. Current trends, problems, laws, and social issues affecting leisure services. Prereq: 310 or consent of instructor. F

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; program planning, 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) Research methods in therapeutic recreation; introduction to and practice of various leisure facilitative 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 trends in practice of therapeutic recreation services. Prereq: Consent of instructor. F

540 Fiscal Policies for Recreation and Sports Related Organizations and Facilities (3) Application of
History

( College of Liberal Arts)

MAJOR DEGREES

History ........................................... M.A., Ph.D.

Russell Buhite, Head

Professors:


Associate Professors:


Assistant Professors:

Brummett, Pamlira R., Ph.D. ....... Chicago Diacon, Todd A., Ph.D. ....... Wisconsin Gavitt, Philip R., Ph.D. ....... Michigan Plummer, Betty L., Ph.D. ....... Maryland Wakeman, Rosemary, Ph.D. ....... California (Davis)

The Department of History offers graduate study leading to the Master of Arts and Doctor of Philosophy degrees. The M.A. program includes a thesis and non-thesis option and also offers a non-thesis public history concentration. The doctoral program has concentrations in American and European history with special focuses in the areas identified under group II doctoral fields.

Detailed information may be obtained from the Director of Graduate Studies in History who also advises all incoming students.

THE MASTER'S PROGRAM

Admission Requirements

1. Successful completion of a baccalaureate degree from an accredited institution. preferably with a major in history.

2. Acceptable scores on the Graduate Record Examination (general and subject).

General Requirements

Complete 510 and a 600-level research seminar normally during the fall and spring semesters of the first year in the graduate program. Complete 521 in preparation for the M.A. examination. As many as 9 related hours may be taken outside the department. As many as 9 graduate credits taken elsewhere may be applied toward the M.A. degree. Except by prior approval of the Director of Graduate Studies, a student's coursework must be at the 500 level or above.

Thesis Option

Twenty-four hours of coursework and 6 hours of Thesis 500 for a total of 30 hours are required. Thesis students are required to select one M.A. field and write a thesis. At the end of the program the thesis student will stand for a two-hour oral examination on both the thesis and the field.

Non-Thesis Option

A total of 30 hours of coursework is required. At least 6 hours must be completed in each of two M.A. fields. The comprehensive examination will be a two-hour written taken within one week of a one-hour oral examination with the single grade of pass/fail given at the conclusion of the oral examination. No examination is given on the secondary field.

M.A. Fields

United States (colossal to present) Premodern Europe Modern Europe Asia Latin America

Concentration in Public History

The public history program is a 37 hour non-thesis program that trains students in the field of American history and an aspect of public history such as historical editing and management of historical collections, presentation of historical subjects through non-traditional formats and preservation of historical sites.

The program consists of 19 hours within the history department (including 510, one research seminar, three readings courses, and 599) and an additional 18 hours (primarily outside the history department) selected by the student and the supervising professor from an approved list.

Requirements

1. Successful completion of the M.A. degree from an accredited institution.

2. Acceptable scores on the Graduate Record Examination (general and subject).

Residence and Coursework

Before being admitted to doctoral candidacy, a student must:

1. Complete History 510 at UT Knoxville. Students who completed a Master's thesis need complete only one research seminar but it must be completed at UT Knoxville.

2. Complete a 9 hours in each of two Group I doctoral fields. (The courses in the non-examined field must be graded A-F. There is no minimum hours requirement for Group II field. Courses taken to fulfill M.A. requirements may be counted toward this requirement.)

3. Complete 2 600-level research seminars.

4. Maintain a 3.0 overall grade-point average in graduate work completed. Complete 21 hours of graduate coursework graded A-F at UT Knoxville beyond that required for the M.A.

5. Except by prior approval of the Director of Graduate Studies, a student's coursework must be at the 500 level or above.

Language Requirements

Students must demonstrate competence in one foreign language through coursework or examination. The student's doctoral committee may specify any other languages or research tools, such as statistics, essential for the student's preparation. The foreign language requirement must be fulfilled before taking the comprehensive examination.

Comprehensive Examination

The comprehensive examination is to be taken no later than the semester following the term in which the student has completed the residence, coursework, and language requirements. A student stands examination in one field selected from Group I and one field selected from Group II below. Both parts are to be taken during the same semester. Each part consists of a 4-hour written taken within one week by a
2-hour oral examination. A grade of pass or fail is awarded at the conclusion of the oral examination. A student who fails the comprehensive examination (or any part) must repeat it no later than the following semester. A student who fails the same examination twice or who does not take the examination when required will be dropped from the graduate program. Upon completion of the dissertation, coursework, and language requirements and passing the comprehensive examination, a doctoral student may be admitted to candidacy.

**Doctoral Fields**

**Group I:**
- Premodern Europe
- Modern Europe
- United States (colonial to present)

**Group II:**
To be defined by the student’s doctoral committee from within one of the following fields:
- Political (U.S.)
- Socio-Economic
- Military/International Relations
- Regional/Local (U.S.)
- National/Regional (Non-U.S.)

**Dissertation and Defense**

Original research forms the basis for the dissertation. Doctoral candidates must register for a minimum of 3 hours of 600 Dissertation Research each semester and must complete 24 hours of dissertation credit. A final oral defense is given on the dissertation in its historical context. The program must be completed within eight years from admission as a potential candidate.

**GRADUATE COURSES**

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

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

**521 M.A. Readings** (3) Directed readings in preparation for M.A. examinations. Open only to Master’s candidates in history. May be repeated. Maximum 5 hrs. S/NC only. E


**532 Topics in Modern Europe (3)** Reading seminar: secondary sources on movements and trends that are multinational in focus. Focus varies. May be repeated. Maximum 15 hrs.

**533 Topics in European National History (3)** Reading seminar: secondary sources on intra-national topics, usually British, Russian, German or French. Focus varies. May be repeated. Maximum 15 hrs.

**541 Topics in Early American History (3)** Reading seminar: secondary sources on early North American history. Focus varies. May be repeated. Maximum 15 hrs.

**542 Topics in 19th- 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.

**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 multinational topics, comparatively structured. 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.

**559 Topics in Latin American 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.)

**571 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 (1-18)** See page 31.

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

**599 Historic Preservation Internship (4)** Practical experience in a historical agency, project site or near completion of graduate program. Written analysis of relationship between academic program and applied project.

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

**621 Directed Readings** (3) Directed readings to prepare candidate for doctoral comprehensive examination. May be repeated. Maximum 1 per doctoral field. S/NC only.


**632 Seminar in Modern European History (3)** Research seminar in primary sources culminating in scholarly paper in modern European history. Focus varies. May be repeated. Maximum 15 hrs.

**641 Seminar in Early American History (3)** Research seminar in primary sources culminating in scholarly paper in American history. Focus varies. May be repeated. Maximum 15 hrs.


**651 Seminar in Military and Foreign Relations History (3)** Research seminar in primary sources culminating in scholarly paper in military or foreign relations history. Focus varies. Not restricted by national grouping. May be repeated. Maximum 15 hrs.


**658 Seminar in United States Regional and Local History (3)** Research seminar in primary sources culminating in scholarly paper in regional and local history. Focus varies. May be repeated. Maximum 15 hrs.


**680 Seminar in History (3)** Research seminar in primary sources culminating in scholarly paper in aspect of history not covered in another 600-level seminar. Focus varies. May be repeated. Maximum 15 hrs.

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**Home Economics**

**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 the Graduate School application file, College of Human Ecology application, Graduate Record Examination (GRE) scores for the general section or Miller's Analogy Test (MAT) score, and three Graduate School Rating Forms completed by individuals who can attest to the potential for graduate education. Forms may be obtained from the Dean's Office, College of Human Ecology. The 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 6 hours in statistics and/or research methodology, 9 hours in program planning, implementation, and evaluation (may be selected from agricultural extension, home economics education, or other courses approved by committee), 3 hours in the integrative nature of home economics (HE 510), and 9 (thesis option) or 12 (non-thesis option) hours in the College of Human Ecology. At least one course is to be taken from each department in the College. The thesis option requires 6 hours of Thesis 500, and the non-thesis option requires a creative project (3 hours) and 3 hours of approved electives. An oral/written comprehen-
sive 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 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 Human 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/S/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. S
- **525 Home Economics Adult Education (3)** Development and administration of community-based home economics programs for adults. Prereq: Consent of instructor. S
- **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. S/U/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 Textiles, Retailing, and Interior Design. Concentration areas are child development, family studies, nutrition science, textile science, and consumer environments. A major challenge of the doctoral program in Human Ecology is to draw upon the basic research generated from the natural sciences, social sciences, humanities, and the arts, and to provide a holistic perspective that contributes to the improvements of individual and family well being. 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 the Graduate School application file, College of Human Ecology application, Graduate Record Examination (GRE) scores for the general section, and three Graduate School Rating Forms completed by individuals who can attest to the potential for graduate education. Forms may be obtained from the Dean's Office, College of Human Ecology.

**THE DOCTORAL PROGRAM**

The doctorate is a research degree granted only to individuals who demonstrate proficiency in conducting original research. Course requirements for the degree are determined by the student's faculty committee, based upon college and departmental requirements and student needs and interests. The Graduate School sets minimum requirements for the doctoral degree. Additionally, the college has requirements that include:

1. Selection of a concentration and fulfillment of the requirements as directed by the major professor and approved committee.
2. Minimum of 78 semester hours in courses beyond the baccalaureate degree (exclusive of Master's thesis), including College Professional Seminar in Human Ecology 610; minimum of 9 semester hours of 600-level coursework (not including dissertation); and 24 semester hours of dissertation.
3. Successful completion of written/oral comprehensive examinations as provided by each department's procedures and the student's doctoral committee.
4. Original research project, which culminates in a dissertation.
5. Defense of the dissertation. The doctoral committee shall determine whether a reading knowledge of a foreign language is required.
6. Six hours from RCS 511, 541, ID 510, 570.
7. Twenty-four hours of dissertation.
8. Electives for 34 hours approved by the committee. (Students must take at least 18 hours in one of three specialty areas: food-service and lodging administration, retail and consumer sciences or interior design; including a minimum of 9 hours required at the 600 level.)

**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)** Prerequisite: Approval of the Graduate Committee. Requires 90 semester hours in courses beyond the baccalaureate degree, including dissertation. E
- **501 Microcomputer Research Applications in Human Ecology (3)** Advanced microcomputer concepts and applications for research. Overview of statistical analysis software, computer graphics, computer-assisted design and national data base searches.
- **502 Registration for Use of Facilities (3-15)** Required by the student for 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 Integrative Nature of Home Economics (3)** History and philosophy of home economics. Analysis of current programs and future directions in field. Examination of research, integrative framework. F/A
- **515 Issues and Trends in Human Ecology (1-3)** Research and theory related to current issues. Prereq: Consent of instructor. E
- **520 Directed Study in Human Ecology (1-3)** Investigative topics. Prereq. At least 5 hours of graduate study in college including courses from at least two departments or consent of instructor. May be repeated. Maximum 6 hrs. E
- **525 Practicum in Home Economics (1-6)** Field-based experiences. Prereq: Consent of instructor. E
- **585 Seminar in Gerontology (1)** Scope of gerontology as discipline and as related to other academic and professional disciplines. Speakers both internal and external to UT. Prereq: Consent of instructor. May be repeated. Maximum 3 hrs. (Same as Educational and Counseling Psychology 585, Nursing 585, Physical Education 585, Public Health 585, Psychology 585, Social Work 585, and Sociology 585.) S/N/C only. E
- **510 Professional Seminar In Human Ecology (3)** Review of various approaches taken by different disciplines to study of ecology; ecological applications in human ecology; temporal and spatial properties of human ecosystems; model building/systems thinking and futures thinking in human ecology. Sp
Human Performance and Sport Studies

(College of Education)

MAJORS

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

Joan Paul, Head

Professors:

Capan, Edward K. (Emeritus), Ph.D. ............ Iowa
Howley, Edward T., Ph.D. ..................... Wisconsin
Kozar, Andrew J., Ph.D. ................. Michigan

Lay, Nancy E., Ph.D. ......................... Florida State
Liemohn, W. P., Ph.D. ..................... Iowa
Paul, Joan, Ed.D. ......................... Alabama

Phillips, Madge M. (Emeritus), Ph.D. ............. Iowa
Watson, Helen B. (Emeritus), Ph.D. ............ Michigan

Wright, C. A., Ph.D. .................................. Michigan

Associate Professors:

Beitel, Patricia A., Ed.D. .................. North Carolina (Greensboro)
Boroviak, Patricia C., M.S. .......... Tennessee
Croskey, R. J., M.F.A. ..................... Southern Methodist
DeSensi, J. T., Ed.D. ..................... North Carolina (Greensboro)
Jones, Ralph E., Ph.D. ..................... Toledo

Mead, B. J., Ph.D. ....................... Purdue
Morgan, W. J., Ph.D. ..................... Minnesota
Namey, Thomas, M.D. ................. Washington (St. Louis)

Assistant Professors:

Bassett, David R., Jr., Ph.D. .................. Wisconsin
Borovjak, Patricia C., M.S. ............... Tennessee
Kelley, D. R., Ed.D. ...................... Georgia State

Lewi, J. L., Ed.D. ....................... Tennessee
McCutchan, M. G. ......................... North Carolina (Greensboro)

Adjunct Faculty:

Acker, J. E., M.D. ...................... Tennessee
Buckles, Tina M., Ph.D. ................. Tennessee

O'Connell, D. G., Ph.D. .................. Toledo

THE MASTER'S PROGRAM

The Department offers the Master of Science with a major in Human Performance and Sport Studies with the following concentrations:

Exercise science (adapted physical education, exercise physiology/fitness)
Motor behavior
Pedagogy in physical education
Sociocultural foundations (history, philosophy, sociology)

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 Human Performance and Sport Studies is available with the following concentrations:

Exercise science (adapted physical education, exercise physiology/fitness)
Motor behavior
Sociocultural foundations (history, philosophy, sociology)

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 a degree in the Department of Human Performance and Sport Studies:

1. Graduate students are required to maintain an overall 3.0 GPA.
2. Any student who falls below this standard will be advised in writing by the department head of the need to discuss the matter with his/her advisor.
3. If a student's overall GPA remains below 3.0 for a second semester, the student will have his/her degree status revoked.

GRADUATE 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 Assistantship Coordinator, Department of Human Performance and Sport Studies, The University of Tennessee, Knoxville, TN 37996-2700.

Human Performance and Sport Studies

GRADUATE COURSES

405 Sociology of Sport (3) (Same as Sociology 405.)
411 Adapted Physical Education (3) Developmental disabilities, other physical/mental handicaps and variant/invariant characteristics of specific syndromes germane to motor development/programming for those with special education needs.
423 Readings in Physical Education (2) Review of current and classic literature in physical education.
460 Physiology of Exercise (3) Functions of body in muscular work: physiological aspects of fatigue, training and adaptation to environment. Prerequisite: 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) Culminating experience for non-thesis major. Research study suitable for publication, or program requiring special written work. Prerequisite: 532.
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E
509 Graduate Seminar in Public Health (1) (Same as Public Health 509, Nutrition 509, Nursing 509 and Social Work 509.)
511 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. Various conceptual, moral, aesthetic, and social-political issues.
515 Social Theories of Sport (3) Liberal, democratic and Marxist social theories of sport. (Same as Sociology 594.)
528 Motor Behavior: A Theoretical Perspective (3) Motor behavior from information processing perspective; overview of current research that supports theoretical bases. Prerequisite: Undergraduate course in general psychology or consent of instructor.
531 Biomechanics of Human Performance (3) Human movement: teaching, coaching and sports medicine. Prerequisite: 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 data collection processes. Prerequisite: Consent of instructor.
533 Psychology of Sport (3) Social psychological factors influencing human behavior in sport context; discussion of contemporary theory, research, and methodology. Prerequisite: General psychology course or consent of instructor.
534 Motor Behavior and Skill Acquisition (3) Topical exploration and application of principles of human movement behavior to acquisition and performance of skills with emphasis on motor development/motor learning.
535 Sport Administration (3) Development of knowledge and analytic skills desirable for middle and upper level managers/administrators in sport business/organization.
541 Special Topics (1-3) Advanced study in selected disciplinary or professional areas of physical education and/or sport. May be repeated.
542 Sociological Aspects of Sport and Physical Education (3) Social and cultural factors influencing sport and physical education. Pertinent issues and research applications. Prerequisite: 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 explanation 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 field work.
553 Advanced Adapted Physical Education (2) Curriculum development and teaching methodologies in programming for children with special educational needs. Prerequisite: 1 of corequisites. Corequisite: 554.
554 Advanced Adapted Physical Education Practicum (1) Curricula and methodologies implemented in lab in school for handicapped. Corequisite: 553.
555 Motor Assessment and Programming for the Child with Special Education Needs (3) Criterion and related to testing protocols which purport to get at basic of dysfunction; those which just measure symptoms of dysfunction; efficacy of remediation theories based or related to testing protocols. Prereq: 480. S/NC only.

565 Advanced Physiology of Exercise (3) Quantitative approach to current and classical questions in exercise physiology. Prereq: 480 and 563.


569 Fitness Testing, Programming, and Leadership for Diverse Populations (2) Clinical experience in selecting, administering, and evaluating exercise tolerance tests in diverse populations. Individual fitness programs for diverse populations. Practice in leading variety of activities aimed at improved fitness. Prereq: 480 and 414.415. Coreq: 585. (Same as Public Health 569.)


593 Directed Independent Studies (1-3) May be repeated. Prereq: 532 or consent of instructor. S/NC or letter grade.

600 Doctoral Research and Dissertation (3-15) P, N, P or NC only.

601 Research Seminar in Physical Education (1) Research topics in different aspects of physical education, sport, and human movement. May be repeated. S/NC only.

622 Directed Independent Research (3-6) Prereq: Doctoral student or consent of instructor. May be repeated. S/NC or letter grade.

633 Advanced Motor Behavior (1-3) In-depth analysis, synthesis, and discussion of contemporary theories and topics; research development and production: motor control learning, sport psychology, motor development.

681 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.

694 Research Participation in Applied Physiology (1-6) Participation in research with faculty member whose interests coincide with those of student. S/NC only.

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

Industrial and Organizational Psychology

(College of Business Administration and College of Liberal Arts)

MAJOR

Industrial and Organizational Psychology ........................................ M.S., Ph.D.

Michael C. Rush, Director

Committee:


For complete Faculty Listing, see Departments of Management and Psychology.

The Master's and doctoral programs are offered jointly by the Department of Psychology and the Department of Management. The program designed to prepare students for personnel, managerial, and organizational research; for university teaching; and for consulting relationships with industry. The program emphasizes a

scientist/practitioner model in applying and conducting research based on accepted theory, organizational behavior, psychology, management, and statistics. The programs are administered by a joint committee of the two departments, appointed by the practical appropriate. The Chancellor and Dean of The Graduate School on recommendations from the two department heads and the program director. It is intended that students entering the I/O Program will represent widely different undergraduate and graduate backgrounds including psychology, business administration, engineering, science, and liberal arts. The first-year program provides the opportunity to take courses that will assist the students in 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. Deadlines: New students are admitted in fall semester only, and applications must be received by the Graduate Admissions and Records Office by February 15.

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 (Industrial and Organizational Psychology) Exam 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

A thesis is required with 6 semester hours of Management or Psychology 500.

The Master's degree can be completed with a minimum of 33 semester hours in the major as follows:

Management 567, 568 or Psychology 517-18: Psychology 557, Statistics 537, 538.

Twelve hours of additional coursework to be selected primarily from the following with the approval of the student's advisor: Management 511, 522, 610; Management/psychology 625, 626, 627, 638; Psychology 505, 550, 610, 620, 621.

Electives: for an individual's plan of study, may be selected from graduate courses in psychology, social work, sociology, management, education, planning, etc. Students who wish to pursue special research interests
aside from their thesis may register for Management 550 (Maximum 6 hrs per term; courses may be repeated) or Management/Psychology 690.

An internship, practicum, or field experience is recommended. A student is expected to be in residence full time one year (two years recommended).

A Master's candidate must pass a final oral examination.

In addition to course requirements, a master's student must complete a comprehensive examination in general psychology within no more than two years by attaining a score of 630 (or 85th percentile) on the Subject GRE (Psychology-81).

An overall "B" average is required in the course sequence Management 567-68 or Psychology 517-18 to continue in the program beyond the first year.

THE DOCTORAL PROGRAM

Any student in the doctoral program may be required to prepare a Master's thesis by the Industrial and Organizational Psychology Committee. This policy will be implemented by the committee at such time as a review of the student's record suggests that additional data on the qualifications for pursuing a Ph.D. are required.

A dissertation is required with a minimum of 24 semester hours of Management or Psychology 600.

The doctoral degree can be completed with a minimum of 54 semester hours in the major as follows: Management 567-58 or Psychology 517-18, Psychology 557, Statistics 537-38.

A minimum of five doctoral seminars (15 hours) selected from: Management 610; Management/Psychology 625, 626, 627, 638; Psychology 620, 624. (Five doctoral seminars are viewed as the absolute minimum; more are recommended. Statistics 671 and Psychology 605 are also recommended.)

Electives, as approved for an individual's plan of study, may be selected from graduate courses in psychology, social work, sociology, management, education, planning, etc. Students who wish to pursue special research interests aside from their dissertation may register for Management 525, 526 (Maximum 6 hrs per term; courses may be repeated) or Management/Psychology 690.

An internship, practicum, or field experience is recommended. A student is expected to be in residence full time one year (two years recommended).

Doctoral candidates must pass a final oral examination on their dissertation research. In addition to course requirements, a doctoral student must attain a score of 650 (90th percentile) on the Subject GRE (Psychology-81) within two years of entry, successfully complete the qualifying examination covering scientific methodology before or during the third fall semester, and successfully complete the comprehensive examination in the areas of the student's major research and professional interests.

An overall B average is required in the course sequence Management 567-68 or Psychology 517-18 to continue in the program beyond the first year.

ACADEMIC COMMON MARKET

An agreement among Southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S. 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 Residency Assistant in the Office of Graduate Admissions and Records.

Industrial Engineering

(Chapter of Engineering)

MAJOR

DEGREE

Industrial Engineering .................................. M.S.

John N. Snider, Head

Professors:

Bontadelli, J. A., Ph.D. .......... Ohio State
Claycombe, W. W., Ph.D. ....... VPI
DePorter, Elden L., Ph.D. .......... VPI

Doulet, Dan C. (Emeritus), 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
Lovelace, Howard L. (Emeritus), PE, M.S. .......... NC State
Mitchell, James T. (UTSI), Ph.D. ...... Vanderbilt
Snider, John N., Ph.D. ............... Ohio State
Westbrook, Jerry D., PE, Ph.D. .......... VPI

Associate Professors:

Aikens, Charles H., Ph.D. ......... Tennessee
Hailey, M. L. (UTSI), Ph.D. .......... Texas Tech
Hungerford, J. C., Ph.D. .......... Ohio
Hutchinson, D. H., Ph.D. .......... Georgia Tech
Kirby, K. E., Ph.D. ............... Tennessee
Tippett, Donald T. (UTSI), Ph.D. ..... Texas A & M

Assistant Professors:

Goodman, Marvin K. (Emeritus), PE, M.S. .......... Tennessee
Jackson, D. F., M.S. .......... Tennessee

Lecturers:

Douglass, S., Ph.D. ............... Tennessee
Fortney, 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, 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

400 Manufacturing Materials/Processes (3) Characteristics of materials and processes used in modern manufacturing technologies. Prerequisites: 130, Engineering Science and Mechanics 321.

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. Prerequisites: 400.

402 Production System Planning and Control (3) Theory and application of forecasting systems, regresses and time series models, independent demand inventory models, development of safety stock. Coverage of all modules of Manufacturing Resource Planning (MRP) Systems: master production scheduling, resource requirement planning, bill of material and inventory file structures, material requirements planning, capacity planning, shop floor and purchase order control. Overview of just-in-time inventory concepts and MRP's role in manufacturing automation. Prerequisite: 301.

403 Production Facilities Design and Material Handling (3) Design of production facilities: plant layout, analysis and planning for overall moving, packaging and storage of materials. Office layout and service areas. Design of facilities for such diverse groups as hospitals, banking, industry. Prerequisite: 302, 401.

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.


411 Planning and Scheduling (3) Forecasting techniques and case studies in forecasting and planning. Performance measures for job shop and flow shop scheduling. Techniques for generating production schedules and comparison of different materials. Requirements planning and just-in-time philosophies. Prerequisite: 402.

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, quality improvement, sampling, single subject experimental designs, classical experimental design methods, and time series models of experimental validity and reliability concepts as related to
Studies. Certain courses within these programs are available for graduate credit as listed below. See the Undergraduate Catalog for program descriptions and directions.

**Afro-American Studies**

### GRADUATE COURSES

421 Comparative Studies in African and Afro-American Societies (3) Education, religion, and social stratification. Views Afro-Americans and Africans have of each other and concept of Pan-Africanism.

450 Issues and Topics in Afro-American Studies (3) Problems, topics, 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-eco-political factors in American society as related to Black women. (Same as Women's Studies 483.)

### 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.)


435 Structure of the German Language (3) (Same as German 435.)

436 History of the German Language (3) (Same as German 436.)

471 Sociolinguistics (3) (Same as English 471 and Sociology 471.)

472 American English (3) (Same as English 472.)

474 Teaching English as a Second or Foreign Language I (3) (Same as English 474.)

475 Teaching English as a Second or Foreign Language II (3) (Same as English 475.)

485 Special Topics in Language (3) (Same as English 485.)

559 Problems in Linguistics: Romance Languages (3) (Same as French 559 and Spanish 559.)

### Asian Studies

### GRADUATE COURSES

421 Readings in Islamic Literature (3) Prereq: Mastery of intermediate-level Arabic or consent of instructor. May be repeated. 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.)

421 Italian Literature and Cinema (3) (Same as Italian 421.)

489 Special Topics in Film (3) (Same as English 489.)

### Comparative Literature

### GRADUATE COURSES

401-02 Special Topics in Comparative Literature (3,3) Content varies. May be repeated. Maximum 9 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.

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.)

466 Rhetoric of the Women's Rights Movement (3) (Same as Speech 466.)

483 Afro-American Women in American Society (3) (Same as Afro-American Studies 483.)

### Urban Studies

### GRADUATE COURSES

401 The City in the U.S. (3) (Same as Planning 401.)

411 Urban Geography (3) (Same as Geography 411.)

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.)

466 Rhetoric of the Women's Rights Movement (3) (Same as Speech 466.)

483 Afro-American Women in American Society (3) (Same as Afro-American Studies 483.)

### Journalism

(Administration of Communications)

**MAJOR**

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**College of Communications**

### MAJOR

### DEGREES

**Communications**

M.S., Ph.D.

**James A. Crook, Director**

**Professors:**

- Adamson, June N., M.S. 
  - Tennessee
- Ashdown, Paul G., Ph.D. 
  - Bowling Green
- Brookes, J., Ph.D. 
  - Iowa State
- Everett, George A., Ph.D. 
  - Iowa
- Littmann, Mark, Ph.D. 
  - Northwestern
- Singletary, Michael W., Ph.D. 
  - Southern Illinois

**Associate Professors:**

- Bowles, Dorothy, Ph.D. 
  - Wisconsin
- Caudill, C. Edward, Ph.D. 
  - North Carolina
- Miller, M. Mark, Ph.D. 
  - Michigan State
- Morrow, Jerry L., Ph.D. 
  - Toledo
- Puett, Sammee Lynn, M.S. 
  - Tennessee

**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 (5) 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. 5p

412 Opinion Writing (3) Analysis of editorial positions, practices, and pages. Writing of editorials and columns for newspapers, magazines, and company publications. Rhetorical devices and use of logic. Prereq: Communications 200, or consent of instructor.

414 Magazine Article Writing (3) Techniques of writing in-depth articles of mass circulation and specialized magazines. Organizing and presenting material, problems in specialized areas: business, science, agriculture, humanities. Prereq: Communications 200, or consent of instructor.

416 Issues in Journalism (3) Topics vary. Prereq: of instructor. May be repeated. Maximum 6 hrs.

420 Print Media Management (3) Current business practice among print news media, especially newspapers. Problems in management and production and
outlook for new technologies. Prerequisites: 6 hours mathematics

430 Public Affairs Reporting (3) Reporting and writing about

425 Advanced Editing (3) Sensitivity to language and editing

460 Mass Communications History (3) Development of press and role of mass communications in American history.

470 Public Relations Campaigns (3) Research, planning and programming, communication and evaluation of public relations campaigns.

480 Journalism in the High School (3) Functions and methods of high school publications. Problems related to staff selection, content of publications, copy, layout, photography, printing, advertising, and business.

598 Internship (3) Professional work in journalism supervised by editor or manager with faculty approval.

Law
(College of Law)
MAJOR DEGREES

Law J.D., J.D.-M.B.A., J.D.-M.P.A.

Marilyn 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 Clercq, Frederic S., LL.B. Duke
Lloyd, Robert M., J.D. Michigan
Miller, Charles H. (Emeritus), J.D. Harvard
Overton, Elvin E. (Emeritus), S.J.D. Vanderbilt
Phillips, Jerry J., J.D. Yale
Picquet, Cheryn, M.S.L.S. Tennessee
Rivkin, Dean H., J.D. Vanderbilt
Seibert, John A., J.D. Michigan
Sewell, Toxey H. (Emeritus), LL.M. George Washington
Slobitski, John L., J.D. Michigan
Wirtz, Richard S., J.D. Stanford

Associate Professors:

Anderson, Gary L., LL.M. Harvard
Asley, Frances Lee, LL.M. Harvard
Beintema, William J., J.D. Miami
Best, Reba, M.L.S. Florida
Black, Jerry P., Jr., J.D. Vanderbilt
Dans, Thomas Y., J.D. Northwestern
Dessem, Lawrence, J.D. Harvard
Eisele, Thomas D., J.D. Harvard
Gray, Grayfred B., J.D. Vanderbilt
Jones, Jack D., J.D. Wyoming
Kovac, Susan D., J.D. Stanford
Morgan, Peter W., J.D. Virginia
Mutter, Carol A., J.D. Georgetown
Pierce, Carl A., J.D. Yale
Reynolds, Glenn H., J.D. Yale
Stark, Barbara, J.D. New York
Stein, Gregory M., J.D. Columbia
Thompson, James E., J.D. Florida

Assistant Professor:

Thorpe, Steven R., J.D. Mercer
Instructor:

Hoover, Mary Jo, J.D. Brooklyn
Moore, Jean, M.A.L.S. Michigan

The College of Law offers the Doctor of Jurisprudence degree program and a dual program with the College of Business Administration leading to the J.D. and the Master of Business Administration degree. In addition, graduate students may be eligible to take a limited number of law courses to count toward a graduate degree.
degree program, the J.D. and MBA degrees will be awarded upon completion of requirements of the dual degree program.

The College of Law will award a maximum of nine (9) semester hours toward the J.D. degree for acceptable performance in approved graduate courses offered in 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 approved 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 Law, 3 hours of which will replace Business Law 501, an MBA core requirement.

Exception while completing the first year core requirements of 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 calculation of the student's grade average or class standing in the college where such grades are so converted.

The College of Law will award a grade of Satisfactory for a graduate business course in which the student has earned a B grade or higher and a No Credit for any lower grade. The College of Business Administration will award a grade of Satisfactory for an approved course in which the student has earned a 2.3 grade or higher and a No Credit for any lower grade. Grades earned in courses of either college may be used on a regular graded basis for any appropriate purpose in the college offering the course. The official academic record of the student maintained by the Registrar of the University shall show the actual grade assigned by the instructor without conversion.

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 unless these courses are 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 conferred of both the Doctor of Jurisprudence and Master of Public Administration degrees. In this program, a student may earn the M.P.A. and J.D. degrees in about four years rather than the five years that otherwise would be required. Students pursuing the dual degree program are subject to all requirements to be enrolled in course-work or an internship for one summer term in addition to taking normal course loads for four academic years.

Admission

Applicants for the J.D.-M.P.A. program must make separate application to, and be independently accepted by, the College of Law for the J.D. degree and the Department of Political Science and The Graduate School for the M.P.A. degree. Applicants must also be accepted by the Dual Degree Committee. All applicants must submit a Law School Admission Test (LSAT) score. An applicant's LSAT score may be substituted for the Graduate Record Examination (GRE) score, which is normally required for admission to the M.P.A. program. Application may be made prior to or after matriculation in either the J.D. or the M.P.A. program, but application to the dual program must be made prior to entry into the last 15 hours required for the M.P.A. degree.

Curriculum

A dual degree candidate must satisfy the requirements for both the J.D. and the M.P.A. degrees, as well as the requirements for the dual program. The College of Law will award a maximum of 54 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 36 semester hours of credit toward the M.P.A. degree for successful completion of approved courses offered in the College of Law. All courses for which such cross-credit is awarded must be approved by the J.D.-M.P.A. coordinators in the College of Law and the Department of Political Science. All candidates for the dual degree must successfully complete Administrative Law (Law 821) and are encouraged to take Business Law 501, an MBA core requirement, prior to entry into the dual program (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 both programs concurrently. The approval of the J.D.-M.P.A. coordinators in both academic units. In the third and fourth years, students are strongly encouraged to take both law and political science courses each semester.

Dual degree students who withdraw from the program before completion of the requirements for both degrees will not receive credit toward either the J.D. or the M.P.A. degree for courses taken in the other program except as such courses qualify for credit without regard to the dual program.

Awarding of Grades

For grade recording purposes in the College of Law and the Department of Political Science, grades awarded in courses in the other unit will be converted to either Satisfactory or No Credit and will not be included in determining a student's GPA or class standing. The College of Law will award a grade of Satisfactory for an approved M.P.A. course in which the student earns a grade of B or higher and a grade of No Credit for any lower grade. The Political Science Department will award a grade of Satisfactory for an approved law course in which the student earns a grade of 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

Students pursuing a graduate degree in another college may, upon approval of the College of Law and the major chairperson, take up to 6 semester hours of law courses and receive credit toward the graduate degree. The graduate student must register for the law course during regular registration at the College of Law requesting an S/NC grade only. If a 2.0 or above is earned in a law course, an S will be recorded on the transcript. If a student earns below a 2.0, an NC will be recorded, and the course cannot be used toward meeting degree requirements. Grades for law courses will not be reflected in the cumulative average. Law courses may be taken for credit only by students enrolled in a graduate degree program. Different rules for student enrollment in the dual J.D.-MBA or J.D.-M.P.A. Programs. Grades must be earned according to the grading system of the respective college, e.g. numerical grades for law courses, letter grades for graduate courses in the other college. 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 course GPAs 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 I (3) Basic agreement process and legal protections afforded contracts; offer and acceptance, consideration and other bases for enforcing promises; the Statute of Frauds, unconscionability and other controls of promissory liability. Introduction to relevant portions of 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; severability and modification of contract and delegation. Considerable coverage of Article 2 of the Uniform Commercial Code with respect to remedies, anticipatory reputation, 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 imprisonment, infliction of emotional distress, conversion and trespass; privileges and defenses to intentional torts; negligence, including standard of care and proof of negligence; immunities and limitations on duties; cause in fact; and proximate cause.

808 Torts II (3) Defenses, including contributory negligence, assumption of risk, comparative negligence, and statutes of limitations; vicarious liability; strict liability; nuisance; products liability; settlement; problems of multiple defendants; damages; non-tort alternatives for recovery for personal injury; law reform; defamation, invasion of privacy, and wrongful legal proceedings; misrepresentation, injurious falsehood, misappropriation of
809 Criminal Law (3) Substantive aspects of criminal law; general principles applicable to all criminal conduct; specific analysis of particular crimes; defenses to crime.

810 Property (4) Introductory course treating issues of ownership, possession, and title in the areas of: landlord-tenant relations; estates in land and future interests; co-ownership, possession, and title in the areas of: landlord-tenant relations; estates in land and future interests; co-

811 Constitutional Law (3) Judicial review; limits on judicial power; national legislative power; regulation of commerce; power to tax and spend; other sources of national power; separation of powers; state taxation and regulation of commerce; intergovernmental immunities.

812 Evidence (4) Rules regulating introduction and exclusion of oral, written and demonstrative evidence at trial and other proceedings, including relevance, competency, impeachment, hearsay, privilege, expert testimony, authentication, and judicial notice.

814 Legal Profession (3) Legal, professional and ethical standards applicable to lawyers.

816 Computer-Assisted Legal Research (6) Introduction to the use of electronic data bases and retrieval systems, LEXIS and WESTLAW. Offered periodically throughout the year. May be taken beginning spring of first year. Prerequisites: completion of at least five credit units of Legal Process II. Must be completed satisfactorily prior to end of second year of law study. Prereq: Completion of first draft of appellate brief in 806. S/NC only.

816 Income Tax (4) What is income; whose income is it; what is a deduction; how credits are determined; creation of local boundaries; home rule; problems created by fragmentation of local government units; financing of local government units; impact of federal and state laws on local government finance and decision-making.

821 Administrative Law (5) 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; forms of government; creation of local boundaries; home rule; problems created by fragmentation of local government units; financing of local government units; impact of federal and state laws on local government finance and decision-making.

827 Business Associations (4) Legal problems associated with formation, operation, and dissolution of unincorporated businesses, partnerships, and limited partnerships; corporate law; and partnerships; corporate law; and corporate shareholders, directors, and officers; and other 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; analysis of major provisions of the federal securities acts and of the regulation of capital of new and growing enterprises; securities transactions by promoters, officers, directors and other insiders; regulation of publicly-held companies; litigation 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 other antitrust violations; their private and public consequences; federal and state legislation; private antitrust cases; and private treble damage suits.

835 Trade Regulation Seminar (2) Selected problems arising under the regulating competition and conduct of business enterprises.

837 Accounting for Lawyers (2) Basic accounting documents, problems, and techniques to enable law students to use and understand essential accounting information.

840 Commercial Law (4) Basic coverage of most significant provisions of Uniform Commercial Code: security interests (Art. 9 of U.C.C. and relevant Bankruptcy Code provisions); commercial paper, including checks, notes and other negotiable instruments; sales and leases (Arts. 2 and 4 of U.C.C.); sales of goods, including coverage of portions of Art. 2 of U.C.C. not covered in Contracts.


842 Debtor-Creditor Law (3) Enforcement of judgments; bankruptcy and its alternatives for business and consumer debtor; emphasis on Federal Bankruptcy Code.

846 Constitutional Law II (3) First Amendment rights to freedom of religion, expression, association and press; Fourteenth Amendment rights against discrimination as to race, sex, etc.; rights to franchise and apportionment; substantive and procedural due process; civil rights under federal law concerning post-Civil War Amend-

847 Civil Rights Actions (3) Litigation to vindicate constitutional rights in private actions against the government and its officials, as well as rights protected by other civil rights legislation: elements of cause of action under 42 U.S.C. sec. 1983; actions against federal government officials under the Bivens doctrine; institutional and individual immunities; relationship between state and federal courts in civil rights actions; and remedies for violations of constitutional and other civil rights.

849 Discrimination and the Law (3) Comparison of race, sex and other invidious discriminatory practices as they affect political participation, education, employment, housing and future interests; consent; issues in commercial financing, and other important issues not normally covered in Commercial Law. Prereq: 840.

851 Constitutional Law Seminar (2) Current constitutional law problems.

854 Criminal Procedure I (3) Police practices and constitutional rights; search and seizure; identification; interrogation and confessions; electronic eavesdropping; and right to counsel.

855 Criminal Procedure II (3) Pre- and post-trial procedures in a criminal case: bail; preliminary hearing; grand jury; prosecutorial discretion; discovery; speedy trial; plea bargaining; rights of defendant and grand jury; post-conviction relief. Federal Rules of Criminal Procedure.

857 Criminal Law Theory (3) Theoretical foundations of criminal law. Prereq: 809.

859 Criminal Law Seminar (2) Advanced problems in criminal law and administration of justice. Prereq: 809.

862 Family Law (3) Survey of laws affecting formal and informal family relationships: premarital disputes; ante-nuptial contracts; creation of common law and formal marriage; legal effects of marriage; support obligations within family; legal separation; contribution, division, alimony, and property settlements; child custody and child support; abortion, illegitimacy.

863 Children and the Law (3) Legal relationship between children and their parents and the state: parental prerogatives and children's rights; rights of illegitimates; adoption; temporary and permanent removal of children from their parents by the state; juvenile court procedures.

865 Environmental Law and Policy (3) Study, through methods of public policy analysis, of responses of legal systems to environmental problems: environmental legis-

866 Environmental Law and Policy (3) Study, through methods of public policy analysis, of responses of legal systems to environmental problems: environmental legis-

867 Environmental Law Seminar (2) Selected topics in environmental law.

869 Natural Resources Law (3) Nature of interests; conveyancing; royalties, grants and reservations, leases, and taxation of natural resources.

873 American Legal History (3) Selected topics in American legal history.

875 Empirical Studies of Legal Institutions (3) Social, economic and organizational factors that affect behavior of clients, lawyers, judges and other actors in legal institutions. Empirical studies of subjects, such as the structure and organization of bar; factors that affect filing, processing and disposition of claims in civil justice systems and factors that affect process of case dispositions in criminal prosecutions: plea bargaining process. Factors that sometimes cause "law in action" to operate differently than "law on the books."

879 Jurisprudence (3) Critical or comparative examination of legal theories, concepts, and problems; legal positivism; natural law theory; legal realism; idealism; historical jurisprudence, utilitarianism, Kantianism, sociological jurisprudence; policy science and critical studies.

879 Law and Economics (3) Relationship between legal and economic thought, use of economics in legal decision-making and legal criticism.

881 Law and Literature (3) Systematic study of literature and its application to legal thought and to accurate, fluent, and creative legal composition.

883 Law, Language, and Reality (3) Intermediate level jurisprudence course. Law as the methods to defend, direct, and administer human activity; exploration through methods of epistemology, of ethical values underlying normal legal reasoning and legal concepts.

886 Public International Law (2) Law-creating and legal processes and doctrines, principles and rules of law that regulate mutual behavior of states and other entities in international system.

887 International Business Transactions (3) Legal status of persons abroad; acquisition and use of property within a foreign country; doing business abroad as a foreign corporation; engaging in business within a foreign country; expropriation or amendment of contracts or concessions.

889 International Law Seminar (2) Current international law problems. Prereq: 886 or 887.

891 Comparative Law (3) Introduction to civil law systems of France and Germany, focusing on legal institutions, methodology, and aspects of law of obligations and commercial law.

895 Labor Relations Law (3) Political, social and economic influences in development of federal labor relations laws; employee rights of self-organization; union and employer unfair labor practices; strikes, lockouts, boycotts and collective bargaining agreements; and role of lawyers and arbitrators. Prereq: 895.

899 Labor Relations Seminar (2) Selected labor relations problems. Prereq: 895.

904 Civil Advocacy (6) Supervised fieldwork, requiring students to assume primary responsibility for representing clients with various civil legal problems. Exploration of theory, techniques and ethics of interviewing, counseling, planning, investigation and discovery, drafting, negotiation, litigation, and other professional tasks necessary to provide competent advocacy for clients. Interaction with judges in state and federal courts, or before state and federal administrative officers or judges. Prereq: 920 and third year standing.
906 Criminal Advocacy (6) Supervised fieldwork, re- quiring students to assume primary responsibility for defending clients accused of crime in Knox County. Exploration of theory, practice and ethics of interviewing, counsel and pretrial preparation, class notes, journal, and trial at preliminary hearings and misdemeanor trials. Prereq: 920 and third-year standing. Rec- quired of all students. 1 credit.

915 Conflict of Laws (3) Jurisdiction, foreign judg- ments, and conflict of laws. 1 credit.

916 Federal Courts (3) Jurisdiction of federal courts; conflicts between federal and state judicial systems. 1 credit.

918 Remedies (4) Judicial remedies: damages, restitution, and equitable relief; availability, limitations and measured remedies; remedies of others; comparison of contract, tort and property-related remedies. 1 credit.

920 Trial Practice (3) Litigation through simulation, trial problems and preparation: basic trial strategy; profes- sional responsibility; fact investigation and witness preparation; discovery and presentation of evidence; selection and instruction of jurors; opening and closing arguments. Written work: motions, interrogato- ries or memoranda. Prereq: 813.

921 Pre-Trial Litigation (3) Civil pre-trial process. Drafting of actual pre-trial documents in civil cases: complaint, motions, interrogatories, function, clause, motion to dismiss and for summary judgment, and various discovery papers. 1 credit.

923 Complex Litigation (3) Advanced civil procedure course concentrating on conditions that arise in litigation involving multiple claims and multiple parties: per- missive and compulsory joinder; intervention; disposi- tion of claims; consolidation of litigation; class discovery in large cases; judicial control of complex litigation; res judicata and collateral estoppel problems. 1 credit.

925 Appellate Practice Seminar (2) Federal and Ten- nessee Supreme Court procedure; rules of federal circuits; review of complete records of several United States Supreme Court cases and preparation of an appellate brief based on record of actual case. 1 credit.

927 Interviewing, Counseling and Negotiation (3) Development of conceptual and practical frameworks for understanding interviewing, counseling and negotiation, and lawyer's role in tasks. Readings of different meth- ods, strategies and perspectives from recent literature involving working skills. Simulations and videotape critiques, drafting of documents. Relevant ethical issues and limitations. Not open to studen- ts who have taken 904 or 906. 1 credit.

929 Teaching Clients the Law (3) Communication of law as basis for decision by persons other than lawyers. Development of precepts by: inculcation of a practical law course to high school or adult students and by writing research papers that synthesize Tennessee of federal law in plain language. 1 credit.

935 Gratuitous Transfers (4) Nature, creation, termina- tion, and modification of trusts; fiduciary administration, intestate succession; execution, revocation, probate and contest of wills; taxation of estates and gifts; taxation of future interests; construction of limitations; application of the rule against perpetuities. 1 credit.

937 Estate Planning Seminar (2) Problems of estate planning, relationship to estate planning of law and practice of fiduciary administration, insurance, property, wills, future interests, trusts, corporations, partnerships, and other disregarded entities; drafting of estate plans; and preparing documents for hypothetical clients. Prereq: 973. Prereq or coreq: 855.

950 Computers and Law (3) Impact of computers on law and practice of law: expert systems; legal skills required in building expert systems; common law office uses of computers; and computerized research. Prepa- ration to think effectively concerning use of computers. Prior computer experience not necessary. 1 credit.

953 Education Law (3) Compulsory attendance laws; governmental control over curriculum and extracur-ricular activities; academic freedom; privacy and discipline: process rights of students and teachers; religion in public schools, public aid to parochial schools; equality of educational opportunity. 1 credit.

956 Entertainment Law (3) Role of law and lawyer in entertainment industry. Course content varies. Music industry; music copyright laws; artist/musician relationship; record contract; negotiation and industry; labor unions; and performing right organizations. 1 credit.

959 Intellectual Property (3) Intellectual property and related interests under federal and state law; patents; trademarks; trade secrets; copyright; right of publicity; unfair competition. 1 credit.

962 Law and Medicine Seminar (2) Effects of legal rules on delivery and quality of medical care: nature of physician-patient relationship; unauthorized practice of medicine; medical education, licensing and special- ization; hospital staff privileges; medical malpractice liability; standard of care, proof, causation, defenses, and damages; protection of patient autonomy; consent, informed consent, consent and abortion, choice of treatment, and death and dying; control of communicable diseases; organ transplantation and medical resource allocation. 1 credit.

965 Law and Mentally Disabled Seminar (2) Psycho- logical/psychiatric principles and relationship to law; voluntary admission and civil commitment; right of mentally disabled; release and payment of; and mental health professional-patient relationship. 1 credit.

970 Income Tax II (3) Corporate reorganizations and distributions; transactions among corporations and shareholders. Prereq: 818.

971 Income Taxation of Entities (2) Federal income taxation of partnerships and shareholders, Subchapter S corporations and shareholders, and related topics. Prereq: 920. 1 credit.

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 and 935.

975 Tax Theory (3) Comparative study of methods and purposes of governmental revenue collection through examination of economic theory and various actual and proposed schemes of taxation. Prereq: 818.

980 Insurance (3) Types of insurance: life, property, health, accident and liability insurance; regulation of insurance industry; interpretation of insurance con- tracts; insurance regulatory requirements; conditions, warranties and representations; coverage and exclusions; duties of agents; excess liability; subrogation; and bad faith actions against insurers. Liability insurance defense: duty to defend, notice and cooperation issues, and conflicts of interest. 1 credit.

983 Products Liability (3) Scope of doctrine and the- ories of recovery; potential plaintiffs and defendants; statutory and contractual limitations on recovery; dam- ages; causation; and defenses. 1 credit.

985 Social Legislation (3) Systems other than tradi- tional tort remedies for compensating disabled persons and victims of accidents; Workers' Compensation: re- quirements for covered employer-employee relation- ship; injuries or occupational diseases arising out of and in the course of employment; nature of disability; medical and death benefits; and exclusiveness of compensation remedy against employer and co-employees. Social Security disability benefits; prerequisites for disability benefits; administrative process; rights to fair hearing; and counsel fees. 1 credit.

994 Independent Study (1-4) Independent study under direct supervision of faculty member. Proposals must be approved by supervising faculty member and by the Dean or the Dean's designee. Maximum of 1 credit each semester during last three semesters of study. Prereq: Second-year standing. 1 credit.

994 Independent Study (1-4) Independent study under direct supervision of faculty member. Proposals must be approved by supervising faculty member and by the Dean or the Dean's designee. Maximum of 1 credit each semester during last three semesters of study. Prereq: Second-year standing. 1 credit.

996 Law Review (1) Completion of a potentially publish- able casenote, comment, or other article for the Tennes- see Law Review. May be repeated: 1 credit. (Will not count toward total number of elective upper division courses taken S/N/C.)

997 Moot Court (1) Participation as member of faculty- supervised interscholastic moot court competition. May be repeated: 1 credit. (Will not count toward total number of elective upper division courses taken S/N/C.)

998 Planning and Drafting Project (1) Preparation and completion of planning and drafting project under faculty supervision in conjunction with substantive courses when such planning and drafting option is provided by course instructor. May be repeated.

Library and Information Science

(Office of the Vice Chancellor for Academic Affairs)

MAJOR

DEGREE

Library Science

M.S.L.S.

Glenn E. Estes, Director

Professors:

Estes, Glenn E., M.L.S............ Kent State Griffiths, Jose-Marie, Ph. D........ London (UK)

Mauldin, E. F. (Emeritus), M.S.L.S........ Illinois Purcell, Gary R., Ph. D........ Case Western Wilson, P. (Emeritus), Ph. D........ Michigan

Associate Professors:


Assistant Professors:

Palmquist, Ruth A., Ph. D............ Syracuse Pollard, Richard, Ph. D........... Brunei (UK)

The Graduate School of Library and Infor- mation 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:

To prepare students to understand the nature of information and the role of the library and other information agencies in the manage- ment 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.
4. To conduct basic and applied research which promotes the generation of new knowledge, services, and technology. The school will encourage:
1. Research which strengthens its instructional and public service programs.
2. The use of a variety of research methods.
3. Sharing the results of its research.
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. A personal data sheet and three recommendations (obtained from the Graduate School of Library and Information Science) should be returned to the director of the school. Foreign applicants are required to take the Test of English as a Foreign Language.

**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 33 hours must be taken in the Graduate School of Library and Information Science, allowing up to 6 hours outside the school with a maximum of 6 from outside the University. Upon completion of the program, all students are subject to a final examination. For students who elect the thesis option, the examination will be a defense of the thesis. Students who elect the non-thesis option will be given a written comprehensive examination.

**FINANCIAL ASSISTANCE OPPORTUNITIES**

Employment with The University of Tennessee Libraries may provide a work-study opportunity for selected students who wish to obtain experience in academic librarianship while pursuing the degree. Such students usually work at least 20 hours each week and thus may extend the period required for the degree. Similar opportunities exist with some other libraries and information agencies in the Knoxville area.

Other opportunities in a scientific-technical environment are available through subcontracts with Oak Ridge National Laboratory and the Department of Energy.

A limited number of graduate teaching assistantships are available through the school. Assistantships of this type carry a waiver of tuition and fees as well as a stipend and require that recipients work 10 hours per week in the school.

For application forms and information about financial aid and other information about the M.S.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.

**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.L.S. program 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
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/NCG only. E
510 Information Professionals and Their Organization (3) Variety and prospects of information professionals; professional organizations; achievements, responsibilities, goals, and issues. E,Su,A
520 Technical Services I (3) Technical services principles and techniques: acquisitions, basic manual and automated cataloging, structure and use of library catalogs, basic subject organization and indexing. E,Su,A
521 Technical Services II (3) Library of Congress subject organization and description, automated cataloging and cataloging of serials and more difficult materials. Prereq: 520. Sp
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, anthropol- ogy; sources and services in business, education, and law. Prereq: 530. Sp
532 Sources and Services in Science and Technology (3) Information sources in engineering, physical and life sciences. Prereq: 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. Prereq: 530. Su
540 Research Methods in Library and Information Science (3) Research methods applicable to librarianship and information management. Progression and conduct of empirical research; analysis of published research. Prereq: 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. Prereq: Admission to program or consent of instructor. E,Su,A
551 School Libraries and Media Centers (3) Planning, implementing and evaluating school library programs. Curricular involvement, role of technology, relationships with district and state services. Prereq: 550 and 560 and consent of instructor. 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 marketing analysis for 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 other agencies. Curricular involvement, role of technology, community analysis; policy statements; collection evaluation, and preparation of buying lists. Prereq: 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 collection: selection, acquisition, bibliographic control, storage, maintenance, and public service. Prereq: 560 or consent of instructor. Sp
563 Nonbook Materials (3) Collection, acquisition, mediographic representation, storage, utilization, and programming; microformats, 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)
572 Resources for Young Adults (3) Critical survey of books and related materials for young adults, personal, vocational and recreational needs and interests. Evaluation, selection, and utilization for school and public libraries. Sp
573 Services for Children and Young Adults (3) Philosophy and objectives of public and school library serv-
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) Identifies attributes of information; information theory, relevance, use and user studies, bibliometrics, and major components of information retrieval system design. Relates selected research findings 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, Sp, A

582 Automation (3) Computer concepts and their applications to basic library and information center operation. 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. Su

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. Prereq: 582 or consent of instructor. Sp

590 Problems in Library and Information Science (3-6) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

591 Supervised Readings in Library and Information Science (3-6) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

592 Seminar in Library and Information Science (3) Prereq: Consent of instructor. May be repeated with consent of advisor. Maximum 6 hrs. E

593 Independent Study (3) Prereq: Consent of advisor. Maximum 6 hrs. E

599 Practicum (3) Opportunity to translate theory into practice under guidance of qualified information professionals. Prereq: Completion of core courses relevant to student's practicum design. Written consent of advisor and practicum coordinator. May be repeated with consent of advisor and practicum coordinator. E

Life Sciences

(Office of the Vice Chancellor for Academic Affairs)

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
Buchanan, Gordon M., Ethology
Conger, B. V., Plant Physiology and Genetics
Dougal, D. K., Biotechnology
Farkas, W. R., Environmental Toxicology
Vaughan, Gerald, Physiology

The programs leading to the M.S. and Ph.D. degrees in Life Sciences are interdepartmental and intercollegiate programs which augment the programs of individual departments.

The Life Sciences Council supports studies and research in the following concentrations: physiology; biotechnology (M.S. only); cellular, molecular and developmental biology; environmental toxicology; ethnology; and plant physiology and genetics. Students interested in any of these areas should contact either the chair of Life Sciences or the director of the area of interest. Each program is overseen by a committee and may have unique admission and graduation requirements.

ADMISSION REQUIREMENTS

1. A Bachelor's degree with a major in a biological, behavioral, or physical science. 2. GRE (general) scores. 3. Three letters of recommendation. 4. Coursework including a year of calculus (differential and integral), one year of chemistry, and a year of physics. Specific course deficiencies may be corrected during the first year.

DEGREE REQUIREMENTS

The Master's degree requires a minimum of 30 semester hours of study approved by the student's committee, a thesis, and an oral examination. Within the biotechnology program only, a non-thesis M.S. option is available. Students choosing this option are expected to complete: (1) two summers' co-op experience in an appropriate industry. An evaluation by supervisor and a written report are required (529, Biotechnology Practicum Cooperative Experience, maximum 4 hrs.); (2) A written report in the form of a scientific paper in an area of specialization chosen by the student and advisor. The minimum requirements for the doctoral degree include at least 6 hours above the 600 level, 24 semester hours of course 600, a pattern of courses approved by the student's committee, a comprehensive examination, a doctoral dissertation, and a defense of dissertation. Individual programs may have additional requirements.

CONCENTRATIONS

Biotechnology

The biotechnology program will prepare students to participate in the wide variety of opportunities presented by the use of living cells and their components for the production of useful materials. This will be achieved at the M.S. level by a prescribed course of study of the biology and biochemistry of cells and molecules; by formal study of cells and of engineering aspects of biotechnology; and by the development of special expertise in areas such as animal embryo manipulation, automated chemical synthesis of macromolecules, bioprocess engineering, 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 includes research in structural or functional aspects of cells or subcellular components, or the interactions between cells.

Required courses are Life Sciences 511, 512, 531, and 532.

Environmental Toxicology

The toxicology program provides intensive training in basic toxicological principles and techniques. Courses and research expose trainees to mechanisms of intended and unintended interactions between living systems and potentially toxic agents from the point of view of biochemistry, physiology, ecology, public health, environmental law and regulation, pest management, pollution control and repair, and testing and residue analysis of toxicants. Required courses are Biochemistry 561, 562, 604; and Life Sciences 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.

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 the areas of cellular, comparative, developmental, exercise, muscle, neuro-physiology, regulatory, or reproductive. Required courses are Zoology 520, 521, Human Anatomy, Comparative Vertebrate Biology, 420; Biochemistry 410; four 600-level semesters; and a statistics sequence.

Plant Physiology and Genetics

This program provides the opportunity for intensive training and research experience in areas transcending the usual boundaries of botany, biochemistry, and agricultural plant sciences. It devotes itself to seeking solutions of problems concerning the interactions of physiology and genetics in applied and fundamental aspects of plant science.

Required courses are Life Sciences 510; Botany 521, 522; Biochemistry 511, 512; Plant and Soil Science 471 or Zoology 560; Plant and Soil Science 551, Microbiology 410.

GRADUATE COURSES

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

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E
509 Biotechnology Seminar (1-2) Topics of impor-
tance to biotechnology. May be repeated. Maximum 6 hrs.
510 Special Topics in Life Sciences (1-3) Specia-
lizations in biotechnology: cellular, molecular, and develop-
mental biology; environmental toxicology; ethology; plant,
physiology and genetics; and physiology. May be repeated.
Maximum 9 hrs.
511 Advanced Cellular Biology (3) Cell structures and
functions at molecular and supramolecular level. Mem-
brane structure, function, and biogenesis; cellular com-
munication; receptors and membrane flow; growth regu-
lation and oncogenes; plant cell structure and function;
contradiction and mobility; mitosis and meiosis; blood and
immune cells.
512 Advanced Molecular Biology (4) (Same as Bio-
chemistry 512.)
525 Research Practicum in Life Sciences (1-3) Indi-
vidual sections for each of biotechnology; cellular, mo-
lecular and developmental biology; environmental tox-
ology; ethology; plant physiology and genetics; and
physiology. May be repeated. Maximum 6 hrs.
529 Biotechnology Practicum Co-operative Ex-
perience (2) Work experience in commercial or-
ganization for students undertaking non-thesis option of
biotechnology concentration. Evaluation by supervisor and
written report by student. May be repeated. Maxi-
mum 4 hrs.
531 Biotechnology Laboratory (3) Growth of microor-
ganisms, analysis of extracellular and intracellular com-
pounds.
532 Biotechnology Laboratory (3) Pilot scale yeast
cultivation, enzyme isolation, purification and charac-
terization. Application of purified enzymes to food pro-
duction fermentations and fermentation process control
600 Doctoral Research and Dissertation (3-15) P/NP
only. E
610 Advanced Topics in Life Sciences (1-3) Topics
vary. May be repeated. Maximum 6 hrs.

Logistics
See Marketing, Logistics and Transportation

Management
(College of Business Administration)

MAJOR DEGREES
Business Administration MBA, Ph.D.

Oscar Fowler, Head

Professors:
Boling, Ronald W. (Emeritus), Ph.D. .... Stanford
Dewhurst, H. Dudley, Ph.D. ............ Texas
James, Lawrence R., Ph.D. ............. Utah
Keally, A. H. (Emeritus), MBA ......... Pennsylvania
Larsen, John M., Jr. (Emeritus), Ph.D. .... Purdue
Neel, C. Warren, Ph.D. ............... Alabama
Reed, S. Kyle (Emeritus), Ph.D. ....... Edinburgh
Reese, Don (Emeritus), Ph.D. ......... Iowa
Stahl, Michael J., Ph.D. ............. Rensselaer
Vance, S. C. (Emeritus) (W.B. Stokely Prof.). Ph.D. .... Pennsylvania
Wagoner, George A. (Emeritus), M.S. .... Indiana
Whitlock, G. H. (Emeritus) (Distinguished Prof.), Ph.D. .... Tennessee

Associate Professors:
Dobbins, Gregory H., Ph.D. .......... VPI

Fowler, Oscar S., Ph.D. .............. Georgia
Gilbert, Kenneth C., Ph.D. .......... Tennesse
Ladd, Robert T., Ph.D. .............. Georgia
Maddox, Robert C., Ph.D. .......... Texas
Miller, Alex, Ph.D. .................. Washington
Rush, Michael C., Ph.D. ............ Akron
Russell, Joyce E. A., Ph.D. .......... Akron

Assistant Professors:
Bowers, Melissa R., Ph.D. .......... Clemson
Fryxell, Gerald E., Ph.D. .......... Indiana
Judge, William Q., Ph.D. .......... North Carolina
Kaplan, Lori A., Ph.D. ............... Michigan
Noon, Charles E., Ph.D. .......... Michigan

BUSINESS ADMINISTRATION CONCENTRATIONS
For complete listing of MBA and Ph.D. program requirements, see Business Admin-
istration.

MBA Concentrations: Management, Forest
Industries Management.

Minimum course requirements for manage-
ment--Three courses from the following: 511, 513, 521, 522, 531, 541, 542, 551, 571, 593, Business Administration 510, 599. Se-
lection must be approved by the Management Department MBA advisor. For forest industries
management -- 511, 513; Forestry 560, 565.

Ph.D. Concentration: Management.

Minimum course requirements are for
operations management -- 541 and 542; two
semesters of 640 (may be repeated for credit);
one additional semester of approved doctoral
seminar work. For strategic management -- 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) Inte-
gration of individual and group differences, organization
theory as basis for motivation, leadership, human re-
source planning, and career implications with strategy,
planning, and decision making.

505 Operations and Logistics Management (3) Con-
cepts and techniques for managing operations and dis-
tribution systems. (Same as Logistics and Transporta-
tion 505.)

511 Organizational Theory: Integrated Structure and
Behavior (3) Cases, group projects, discussion; organ-
izational theories: organizational effectiveness; context-
ual factors of organizations; environment, size, technol-
ogy; organizational structure configurations, organiza-
tion design; social influences on organizational effective-
ness: 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
case histories. Coreq: Business Administration 509.

521 Personnel Administration (3) Personnel functions
and human resources management. Community rela-
tions, recruiting, selection, training, performance evalu-
ation, 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 ad-
ministration. (Same as Economics 562.)

526-28 Industrial and Organizational Psychology (3-
1-1) Readings in industrial and organizational psychol-
ology. Available only by prearrangement with supervising
faculty member. May be repeated. Maximum 6 hrs. S/NC
or letter grade.

531 Management of Technology-Based Organiza-
tions (3) Role of technology and innovation in formu-
lation and implementation of strategy. Management of
research and development function and coordination
with other functions. Management of scientists and
engineers.

541 Operations Management I (3) Techniques appli-
cable to design of systems in operations function.

542 Operations Management II (3) Operations plan-
ning 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 Psy-
chology (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. Consists of four
courses, students must complete three for all mini-
neral and non-industrial organizational psychol-
ogy program students. (Same as Psychology 517-18.)

571 International Management (3) Analysis of environ-
ment of international business firms and impact of inter-
national and external factors on managerial decisions.

593 Directed Independent Study (1-3) Topic of mutual
interest. Available only by prearrangement with sup-
ervising 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 re-
search. Research proposal.

610 Seminar in Advanced Organization Theory (3)
Analysis of functioning of complex organizations. Classi-
cal and open systems models, organization growth and
change, organizational effectiveness and design of com-
plex organizations.

611 Seminar in Strategic Management (3) Analysis of
issues associated with psychology of organizational
leadership and work motivation. Prereq: 567, 568, consent of in-
structor. May be repeated. (Same as Psychology 625.)

626 Seminar in Industrial Psychology (3) In-depth
analysis of current issues and problems: performance
appraisal/criterion development, and training and devel-
oment. Prereq: 567, 568, consent of instructor. May be
repeated. (Same as Psychology 626.)

627 Seminar in Applied Industrial Psychology (3) In-
depth analysis of current issues, concepts, and issues
associated with psychology of organizational leadership
and work motivation. Prereq: 567, 568, consent of in-
structor. May be repeated. (Same as Psychology 627.)

638 Current Topics in Industrial/Organizational Psy-
chology (3) In-depth analysis of various topics: organiza-
tional change and development, psychology and problems of intergroup behavior. Prereq:
567, 568, consent of instructor. May be repeated. (Same as Psychology 638.)

640 Seminar in Operations Management (3) Re-
search and development of operations management meth-
ods to operations management problems. May be
repeated.

590 Field Work in Industrial and Organizational Psy-
chology (1-12) Supervised field practice in industrial
and organizational psychology. 1 hr per 30 hrs of prac-
tice. May be repeated. Maximum 12 hrs. (Same as Psychology 590.)
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 use;
2. to provide sufficient advanced study in a supporting area to qualify the graduate for a joint faculty position in the supporting area and management science. The candidate may choose from the business functional areas (accounting, finance, marketing, management, and transportation and logistics) or other disciplines, (e.g., computer science, forestry, ecology, and public administration);
3. to develop in the student, through coursework in the supporting area, the ability to enhance potential career opportunities in management, research, or teaching.

Admission Requirements
The doctoral 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>
<th>Management Science 531, 532, 533, 534</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>3</td>
<td>Statistics 563</td>
</tr>
<tr>
<td></td>
<td>Applied specialization area</td>
<td>(approved by advisor)</td>
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<tr>
<td></td>
<td>Statistics elective—500 level or above (approved by advisor)</td>
<td>6</td>
</tr>
</tbody>
</table>

Mathematics—400 level or above (approved by advisor)
Electives selected from mathematics, statistics, computer science, and/or management science area

A thesis option is available to qualified students which substitutes 6 hours of thesis credit for the following 8 hours of course work: Management Science 534, 3 hours in the applied concentration area and 3 hours of electives in any area. The Management Science Committee will work closely with the student in tailoring a program to his/her needs. The committee must approve a tentative overall program during the student's first semester and must approve all courses on a semester-by-semester basis.

Recognizing the diverse backgrounds and needs of Management Science M.S. students, the Management Science Committee is prepared to waive some of the above requirements on an individual basis. For example, an undergraduate mathematics major with a strong background may be allowed to take 6 additional hours of electives in place of the mathematics requirements. On the other hand, a student lacking experience in rigorous senior-level mathematics courses will be asked to take such courses to fulfill the 6-hour mathematics requirement. The total course load will remain 38 hours for all non-thesis students and 36 hours for all thesis students; however, the number of hours of electives can be reasonably expected to vary between 6 and 12 as a function of prior background.

Acknowledged

The student completes at least 48 semester hours of coursework in the major field of specialization. The program includes approximately 16 to 20 semester hours of coursework in the applied area.

Qualifying Examinations
The student must demonstrate mastery of probability theory and statistical inference, Statistics 563, 564, by passing a written qualifying examination. Mastery of 12 to 14 semester hours in mathematics coursework must be demonstrated by passing a written qualifying examination. Topics normally include numerical analysis, either Mathematics 471, 472, 543, and 571, or 571-572, and real analysis, Mathematics 445-448. 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.

Comprehensive Examination
Prior to admission to candidacy for the degree, and normally after completion of the second year of the program, the student must pass a written comprehensive examination covering the theory of deterministic and stochastic management science models. Topics included in this examination are determined on an individual basis. Students will be expected to demonstrate an integrative ability that goes beyond simple mastery of course content.

Research and Dissertation
The student must complete 24 semester hours of Management Science 600: Doctoral Research and Dissertation, through which he/she is expected to make a significant contribution to the science. A final oral examination is conducted over the dissertation and such other segments of the program that the faculty committee deems appropriate. This effort, which is beyond the minimum 48 hours of coursework, normally is completed in the third year of the program.

ACADEMIC STANDARDS

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

PREREQUISITES FOR MANAGEMENT SCIENCE COURSES

The Management Science Program is interdisciplinary and students in other degree programs are encouraged to enroll in man-

681 Special Topics (3) Prereq: 531, 532 and consent of instructor. May be repeated. Maximum 9 hrs.

691-92 Management Science Seminar (1,1) Subjects selected from current literature. S/N only.

Marketing, Logistics and Transportation

(Majors of Business Administration)

MAJOR DEGREES

Business Administration .......... MBA, Ph.D.

David J. Barnaby, Head

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

Schumann, D. W., Ph.D. ............... Missouri

Assistant Professors:

Dabhokar, P. A., Ph.D. ............... Georgia State

Cardial, S. F., Ph.D. ................. Houston

Song, X. M., Ph.D. .................... Virginia

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, 505, 593, 599, Logistics and Transportation 507, Business Administration 510, 599.

Ph.D. Concentration: Marketing.

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. Prereq: 531, 532.

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

503 Buyer Behavior—Analysis for Marketing (3) Consumer behavior concepts and processes developed and applied to market analysis and design, and control of marketing programs. Social psychology and demographic factors that affect consumer product, brand and patronage decisions. Prereq: 501.

504 Analyzing Market Opportunity for Marketing Decisions (3) Major determinants of opportunity in markets, framework for finding markets and analyzing them for opportunity, application of market opportunity analyses to marketing strategy decisions. Prereq: 501.

505 Marketing Research and Information Planning (3) Design of a rigorous marketing study from inception to implementation of results by recognizing key decision points and critically evaluating merit of research project. Prereq: 501.

506 Marketing Strategy (3) Integration of concepts and analytical skills from each component area of marketing to formulate cohesive, well-organized marketing program. Prereq: 501.

550 Market Opportunity Analysis for New Ventures (3) Concepts for understanding coverage of new venture MOA and various information sources and procedures; identify and analyze sales opportunities in markets for new product or service. Prereq: Consent of instructor.

593 Independent Study (3) Directed research and study. Prereq: MBA Core and consent of instructor. May be repeated. Maximum 6 hrs.

599 Special Topics Seminar (3) Topics vary: nonbusiness marketing applications, macroenvironmental issues, market segmentation, international marketing, services marketing, marketing channels, and related issues. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

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

501 Marketing Theory (3) Nature and scope of marketing, decision theory of marketing, and theory testing important to marketing research.

502 Research Methods I (3) Research process: problem formulation, research and experimental design, measurement and implementation of results. Design: experimental design, survey research, and measurement.

503 Marketing Thought (3) Marketing literature across number of research areas. Evaluate individual works, determine state of research in each area, and identify areas that merit further study.

604 Seminar in Buyer Behavior Research (3) Behavioral study of people in their roles as buyers and users of goods and services both individual and group processes.

605 Research Methods II (3) Analytical approach to marketing decisions and role of quantitative methods. Models and model building in marketing consideration of decision theory, linear programming, simulation and other mathematical representations of marketing phenomena.

606 Special Topics (3) Topics vary: marketing strategy, advanced consumer behavior, influence and persuasion theory and strategy, pricing issues, international marketing issues, and nonprofit organization marketing issues.

Logistics and Transportation

Professors:

Davis, F. W., Jr., Ph.D. .......... Michigan State

Dier, Gary N., DBA ............... Indiana

Frye, J. L. (Emeritus), Ph.D. ..... Florida

Hendrix, F. L. (Emeritus), Ph.D. .. North Carolina

Langley, C. J., Jr., Ph.D. .......... Penn State
Mundy, Ray A., Ph.D. ............... Penn State
Patton, E. P., Ph.D. ............... North Carolina

Associate Professor:

Foggin, J. H., DBA ............... Indiana

BUSINESS ADMINISTRATION

CONCENTRATIONS

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

MAJOR CONCENTRATION: Logistics and Transportation

Minimum course requirements are 501, 508, and one course from the following: 504, 506, 507, 593, and 599.

Ph.D. CONCENTRATION: Logistics and Transportation

Minimum course requirements are 12 hours to include 601, 602, 603.

GRADUATE COURSES

501 Survey of Logistics and Transportation (3) U.S. logistics and transportation: physical, economic, social, and political environment; financing, managing, maintaining, and enhancing U.S. transport infrastructure.

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

504 Freight Carrier Systems and Management (3) Analysis of freight carrier management's efforts to provide services demanded by consumers in logistics and transportation marketplace.

505 Operations and Logistics Management (3) (Same as Management 505.)

506 Logistics Systems Management (3) Development of strategy for management of logistics systems, Executive level integration of logistics operations with marketing, production, and other decision areas. Practical applications through case approach and simulation games.

507 International Logistics and Transportation (3) Logistics strategy in the multi-national firm: materials management, international sources and distribution, and imported/exports carrier management and operations and comparative national transport systems analysis.

508 Executive-in-Residence Seminar in Logistics and Transportation (3) Capstone, integrative case course in logistics and transportation strategy: participation in Executive-in-Residence program that provides student interaction with top-level logistics and transportation executives.

509 Independent Study (3-6) Directed research and study. Prereq: Consent of instructor. May be repeated. S/NC only.

599 SPECIAL TOPICS IN LOGISTICS AND TRANSPORTATION (3-6) Seminar designed to study specific current problem areas in logistics and transportation. Topic announced prior to offering. Prereq: Consent of instructor. May be repeated.

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

601 Seminar in Logistics and Transportation Models (3) Analysis of contemporary models and methodologies in logistics and transportation research, topical coverage at discretion of instructor.

602 Seminar in Macrotransportation Systems (3) Contemporary national logistics and transportation systems, governmental policies in logistics and transportation sector, and current literature and research in field.

603 Research Methodology in Logistics and Transportation (3) Fundamental research process in areas of logistics and transportation, history and development of body of knowledge, and contemporary research methodology to develop student dissertation topics.

Materials Science and Engineering

(College of Engineering)

MAJORS

Majors

Metallurgical Engineering ............... M.S., Ph.D.
Polymer Engineering ............... M.S., Ph.D.

Joseph E. Spruiell, Head

Professors:

Ashbee, K. H. G. (Racheff Chair of Excellence), Ph.D. ....................... Birmingham (UK)
Bogue, Donald C., Ph.D. ............... Delaware
Borie, Bernard S., Ph.D. ............... MIT
Brooks, C. R., Ph.D. ............... Tennessee
Buchanan, Raymond A., Ph.D. ............... Vanderbilt
Clark, Erk Engd S., Ph.D. ............... California

Canonicco, D. A., Ph.D. ............... Lehigh
Fellers, J. F., Ph.D. ............... Akron
Lin, J. S., Ph.D. ............... Indiana
Lowndes, Douglas H., Ph.D. ............... Colorado
Lundin, Carl D., Ph.D. ............... Rensselaer
Mchargua, C. J., Ph.D. ............... Kentucky
Oliver, Ben F., Ph.D. ............... Penn State
Pedraza, A. J., Ph.D. ............... National (Argentina)
Phillips, Paul J., Ph.D. ............... Liverpool (UK)
Spruiell, 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

Graduate programs are offered leading to the degrees of Master of Science and Doctor of Philosophy in Metallurgical Engineering or Polymer Engineering. Both the metallurgical and polymer programs are flexible and interdisciplinary in nature. Students may be admitted from a wide range of disciplines; 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 concentration or special programs compatible with their backgrounds and goals.

Areas of concentration within the metallurgical engineering program include physical metallurgy; materials processing; welding; solving problems; and materials joining; corrosion; fracture behavior; failure analysis; and chemical 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 DOCTORAL PROGRAM

Thesis Option

A total of 30 semester hours is required for the M.S. degree in either Metallurgical Engineering or Polymer Engineering. Additional requirements include:

1. A major consisting of 12 to 18 semester hours of graduate courses in metallurgical engineering or polymer engineering. The polymer engineering major must include 540, 541, 542, 546, 549, 550 and 572 unless similar material has been covered in prior coursework.
2. Additional courses amounting to 6 to 12 hours total in any approved engineering, chemistry, mathematics, physics, or other related fields.
3. Master's thesis, 500 totaling 6 to 12 hours. All resident students are required to register for and participate in the graduate seminar in metallurgical engineering or polymer engineering, as appropriate, during each semester in which it is offered. Credits for the seminar do not count towards satisfying the coursework requirements.

Non-Thesis Option

Under certain conditions, a candidate may apply for a non-thesis option. To be eligible, the candidate must show evidence of significant professional experience after the baccalaureate degree; at least five years of industrial experience or research publications would be examples of such evidence. A departmental faculty committee will meet and examine 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 performance in an oral examination to be conducted by the faculty committee and covering the review paper and other areas of metallurgical or polymer engineering.

THE DOCTORAL PROGRAM

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

Department requirements consist of the satisfactory completion of:

1. Graduate courses in materials science and engineering amounting to approximately 24 semester hours, at least 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 certain states to enroll in graduate 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

405 Structural Characterization of Materials (4) Ray radiation and fluorescent X-ray diffraction and transmission electron microscopy; microanalytical techniques.

421 Mechanical Behavior of Materials II (3) Description of stress and strain; linear elastic constitutive equations, stress concentration factors, yield criteria; brittle fracture, crazing; plastic strain constitutive equations, forming operations and limit criteria. Prereq: Mechanical Behavior of Materials, Mechanics of Materials I, sophomore mathematics.

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. Sp

425 Metallurgical Applications in Manufacturing and Processing (3) Fabrication methods, standards and specifications, metallurgical and mechanical processes for finished and semi-finished products; casting, forming, joining, heat treatment, powder metallurgy, corrosion control. Prereq: 251.

426 Materials Joining (3) Processes for joining metals, polymers and ceramics: mechanical, adhesive, fusion-solidification/crystallization; surface characteristics necessary for joining and chemical bonding; thermal effects on structure and properties of joints; design of joints. Prereq: Introduction to Materials Science and Engineering.

443 Polymer Processing (3) Rheological measurements; flow through tubes and slits, end effects and extrude swell; selected application, screw extrusion, injection molding, synthetic fibers; spinning methods, spinning properties; structure, development. Prereq: 425.

444 Plastics Fabrication and Design (3) Lectures, laboratories and field trips; unit operations of plastics fabrication; plastics classification; design and selection criteria; processing techniques; characterization laboratory. Sp


472 Fundamental Principles of Composite Materials (3) Establishment of physical principles basic to design, manufacture and application of fiber reinforced polymers, metals and ceramics. Prereq: 302 or equivalent.

474 Biomaterials (3) Metals, polymers and ceramics used in orthopedic, cardiovascular, and dental surgical implant devices; corrosion and degradation problems; material properties of primary importance; tissue response to material. Prereq: 201. Recommended for engineering science and mechanics majors.

475 Fracture-Safe Design (3) (Same as Engineering Science and Mechanics 423.)

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

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

503 Graduate Seminar in Metallurgical Engineering (1) Prereq: Admission to graduate program. May be repeated. S/NC only. E

504 Graduate Seminar in Polymer Engineering (1) Prereq: Admission to graduate program. May be repeated. S/NC only. E

505 Engineering Analysis (3) (Same as Chemical Engineering 506.)

522 Defects in Crystals (3) Analytical and experimental analysis of defect interactions in solids. Prereq: 421 or consent of instructor.

523 Plastic Deformation of Metals (3) Geometry and mechanisms of single crystal plastic deformation; slip, twinning, and cleavage; work hardening, effect of temperature, loading rate effects; effect of ordering and solid solution alloying, polycrystalline behavior in terms of single crystal deformation mechanisms; texture formation. Prereq: 301, 320 or consent of instructor.

524 Metallurgical Thermodynamics (3) Applications of chemical thermodynamics to metallurgical problems: refining, melting, casting, heat treatment, alloy systems. Prereq: 570 or equivalent.

525-26 Welding Metallurgy (3,3) Welding processes; physical metallurgy of welding; phase transformations; heat flow; residual stresses, properties of hot cracking, cold cracking and porosity formation; applications to process utilization.

529 Diffusion in Solids (3) Phenomenology and atomic mechanisms of diffusion in solid state. Solution and applications of diffusion equations; random walk problem and mechanisms of diffusion; diffusion in dilute and concentrated alloys; Kirkendall effect; high diffusivity of defects.

530 Phase Transformations in Metallic Materials (3) Thermodynamics of phase equilibrium, theory of nucleation in solids; kinetics and morphology of diffusion controlled growth; kinetics of interface controlled phase transformations; crystallography and kinetics of martensitic transformations.

531 Advanced Corrosion (3) Analytical study of corrosion processes in terms of polarization measurements and Pourbaix diagram. Influence of environmental and mechanical factors contributing to pitting, crevice, fretting, wear, fatigue and stress corrosion. Prereq: 470 or consent of instructor.


540 Basic Polymer Chemistry (3) Synthesis, reactions and degradation of polymers, molecular characterization; solution methods and spectroscopy. Prereq: Semester of organic chemistry and thermodynamics.

541 Fluid Mechanics and Polymer Processing (3) Farvader-Stokes equations and illustrative problems; applications in chemical engineering and polymer engineering; description of fluid mechanics; multiphase systems. Basic concepts in rheology; applications in polymer processing; screw extrusion, fiber spinning, injection molding, coating. Prereq: 444. E

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, solute-solvent interactions, treatment of chromatographic viscosity, light scattering and osmotic pressure. Prereq: Undergraduate physical chemistry.

545 Physical Characterization of Polymers (3) Brief

fringence theory; small angle X-ray and light scattering, spheeritic and fibrillar structures; introduction to electron microscopy.

546 Mechanical Properties of Solid Polymers (3) Typical mechanical properties: hooker and rubber elasticity; plastic deformation; fracture; linear viscoelasticity; dynamic mechanical behavior and testing; loss annihilation, transformation to mechanical properties of polymeric composites.

549-50 Laboratory Methods in Polymer Engineering (1,1) Basic experimental techniques and instrumentation associated with characterization, x-ray and light scattering, calorimetry, mechanical behavior; testing 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; powder consolidation; drying, firing, sintering techniques, mechanisms and kinetics. Prereq: 360 or equivalent.

551 Inorganic Glass Forming Systems (3) Physical and chemical nature of inorganic glasses; structural theories of glass formation; major glass forming systems; silica, oxide glasses, glasses, water glasses, and chalcosilicate glasses. Prereq: 360, Chemistry 371.

570 Chemical Thermodynamics (3) Enthalpy and entropy of mixing; Gibbs function and chemical potential; measurements of heat of reaction, heat of formation, heat of solution; heat capacity of liquids, gases and solids; calculation of phase diagrams. Prereq: 303 or equivalent.

571 Electron Microscopy (3) Operation of electron microscopes; kinetic energy 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 determination of structures; powder and single crystal x-ray techniques; introduction to crystal structure determination; characterization of solid solution; application to inorganic, metallic and polymer structures.

573 Biomaterials Analysis and Development (3) Physical property limitations of current surgical implant materials and methods of improvement; resistance to corrosion and 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. Force analysis of defect 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 (3-15) P/NP only. E

621-22 Theoretical Metallurgy (3,3) Topics in solid state physics as applied to metallurgy; introduction to quantum theory, specific heats, electron theory of solids, electrical and thermal conductivity, magnetic properties, theories of alloy formation. Prereq: Consent of instructor.

623-24 Solidification and Crystal Growth (3,3) Theories of solidification, fluid flow effects, magneto-hydraulics of incompressible fluids, growth stability theory, thermodynamic applications, rapid solidification theory, metastability. Prereq: Consent of instructor.

641 Advanced Rheology and Viscoelasticity Theory (3) Continuum mechanics, formulation of viscoelastic theories for describing linear viscoelastic materials. Application to polymer processing problems. Recommended for MS candidates working in rheological areas.

642 Advanced Topics in Polymer Processing (3) Application of theories of rheological behavior and of
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 topic for that student by the Graduate 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 examinations.

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., in f. and g., nor in i. and j. toward the required three passes. At least one exam must be chosen from a. through e.
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 three times, but no one failing four exams, counting possible repetitions, will be permitted to take another round of examinations.

2. Ecology, covering material selected from nine hours of coursework outside of mathematics at the 500 level or above.
1. The courses submitted for examination must be approved by the student’s doctoral committee and the departmental Graduate Committee. The exam is to be prepared, administered, and graded by instructors of the courses involved, along with at least one member of the mathematics ecology section. The student must obtain written agreement to participate in the examination from instructors of these courses and from at least one member of the mathematics ecology section before submitting materials to the committees for approval.
2. Students may take the written examination at most twice.

GRADUATE COURSES

400 History of Mathematics (3) Development of major ideas and techniques 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 of elementary mathematics. Does not satisfy the major requirements for a B.S. or M.S. in mathematics. Prereq: 141 plus 1 semester of discrete mathematics. Prereq: 221 or 504.

404 Applied Vector Calculus (3) Topics from multivariable 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 equation models of biological systems. Prereq: 141-42 or 151-52.


421 Combinatorics (3) Introduction to problems of construction and enumeration for discrete 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 parameter Markov chains; their applications. Kolmogorov differential equations; Brownian motion process as limit of random walks. Prereq: 323.

425 Statistics (3) Derivation of standard statistical distributions: t, F, X^2, independence of random variables; construction of confidence intervals, point and interval estimation. Bayesian estimates; statistical hypothesis, 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 fluid flow. Prereq: 443.

445-46 Advanced Calculus II (3,3) Theory of sequences, series, and functions of one and several variables; integrations of functions of one or more variables. Prereq: 341 or consent of instructor.

447-48 Honors: Advanced Calculus II (3,3) Honors version of 445-46. 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.


455-56 Abstract Algebra I (3,3) Algebraic structures: groups, rings, fields, vector spaces and linear transformations. Prereq: 351 or consent of instructor.

457-58 Honors: Abstract Algebra II (3,3) Honors version of 455-56. Prereq: 351 or consent of instructor.

460 Geometry (3) Axiomatic and historical development of neutral, Euclidean, and hyperbolic geometry. Geometric 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 of metric spaces, homeomorphisms, continuity and topological invariants. Prereq: 341 or consent of instructor.


490 Readings in Mathematics (1-3) Open to superior students with consent of department head. Independent study in a selected area, faculty guidance. Prereq: Consent of instructor. Meets occasionally. Prereq: consent of faculty mentor to supervise independent work. May be repeated. Maximum 9 hrs.

499 Seminar in Mathematics (1-3) Topics vary. Requires enrollment in-class examination by students. Credit hours announced for each seminar. Prereq: Consent of instructor. May be repeated. Maximum 5 hrs.

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

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

503 MBA Calculus (3) Review of derivatives and antiderivatives; exponential functions, functions of two variables, partial differentiation. Credit available only to satisfy MBA core requirements. Prereq: 121.

504 Discrete Mathematics for Teachers (3) Mathematical logic and methods of argument, sets, functions and relations, combinatorics. Normally first graduate course for students seeking M.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. E

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. E

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. E


509 Seminar for Teachers (3) For students in Master of Mathematics program and for students in graduate programs in College of Education. May not apply toward M.S. degree in mathematics. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.


513-14 Mathematical Principles of Fluid Mechanics (3,3) Equations of motion, incompressible and compressible potential flow, shock waves, viscous flows, Navier-Stokes equations. Prereq: 431, 433, and 445-44 or 404, or consent of instructor.

517 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 (3,3) Application of finite differences, generating functions and recurrence relations to enumeration problems. Coding theory, experimental design, graph theory, or decision theory.

523-24 Probability (3,3) Pertains largely from measure theory, stochastic processes, Markov chains, and probability spaces. Kolmogorov’s existence theorem; series of independent
random variables and laws of large numbers; general theory of distributions of random vectors and their character- istic functions; weak convergence concept, weak convergence and Levy's continuity theorem in Euclide- an spaces; infinitely divisible distributions and central limit problem; general concept and properties of condi- tion of prediction and Loève's continuation theorem in Euclide- an spaces; uniformly minimum variance unbiased esti- mates, asymptotic efficiency and optimality; the con- dence procedures and hypothesis testing; optimal tests and confidence intervals, the Neyman-Pearson lemma; uniformly most powerful tests; general linear models, estimation and tests in linear models; non-parametric models, rank methods for comparison, linear regression and independence, robust tests; topics from decision theory. Prereq: 445-46. Recommended prereq: 425.

527 Stochastic Modeling (3) Models in probability applied to real world situations; queuing theory; branch- ing processes, Monte Carlo simulation. Prereq: 445-46 or consent of instructor.


534 Calculus of Variations (3) Necessary conditions for extrema, Euler's equation, broken extremals, Weier- strass-Erdmann conditions. Sufficient conditions for extrema, Legendre's and Jacobi's conditions, conjugate points, Multiple integrals. Prereq: 431.


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. Maxim- um 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 instruc- tor.

553 Linear Programming (3) Theory and applications. Prereq: Consent of instructor or 450 and programming ability.


555-56 Number Theory (3,3) Introduction to algebraic number theory. Prereq: 455-56 or consent of instructor.

561 Seminar in Algebra (1-3) Prereq: Consent of instruc- tor. May be repeated. Maximum 12 hrs.


575 Matrix Theory and Techniques in Numerical Analysis (3) Advanced topics in study of iterative and direct methods for large systems of linear equations: sparse matrix analysis, relationship to modern computer architectures. Prereq: 453, 471-72, or consent of instruc- tor. May be repeated. Maximum 8 hrs. (Same as Computer Science 575.)

579 Seminar in Numerical Mathematics (1-3) May be repeated. Maximum 12 hrs.

581-82 Mathematical Ecology (3,3) Deterministic and stochastic models of populations, communities, and ecosystems. Prereq: 431, 453 or consent of instructor.

583 Mathematical Evolutionary Theory (3) Population genetics and evolutionary theory. Prereq: 431, 453 or consent of instructor.

584 Mathematical Systems Theory (3) Analytic ap- proach to discrete and continuous dynamical control systems; optimal control. Applications to ecology. Prereq: 431, 453, 445-46 or consent of instructor.

585 Optimal Control Theory (3) Deterministic optimal control, infinite dimensional dynamics, optimal control and engineering control problems. intro- duction to stochastic control. Prereq: 431, 445-46 or consent of instructor.

589 Seminar in Mathematical Ecology (1-3) May be repeated. Maximum 12 hrs.

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

598 Graduate Reading in Mathematics (1-3) Inde- pendent study with faculty guidance. Prereq: Graduate standing and consent of instructor. May be repeated. Maximum 6 hrs.

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

617-18 Lie Algebras in Mechanics and Physics (3,3) Analytical tools of mechanics and physics arising from differential manifolds, tensors, Lie derivatives, Lie groups, differential forms, Lie algebras, applications to Hamiltonian mechanics, adiabatic and barotropic fluids and plasmas, numerical methods in continuum mechan- ics. Prereq: 431, 453, 547, 571-72. (Same as Physics 617-18.)

619 Seminar in Applied Mathematics (1-3) May be repeated. Maximum 12 hrs.

623-24 Advanced Probability (3,3) Selected topics in modern algebra or number theory. Prereq: 461-42 and 543. May be repeated with consent of department. Maximum 12 hrs.

631-32 Advanced Ordinary Differential Equations (3,3) Theory of ordinary differential equations from ad- vanced viewpoint. Topics from current literature. Subject matter varies according to interests and preparations of students. Prereq: 531-32 or consent of instructor. May be repeated with consent of department. Maximum 12 hrs.

639-36 Advanced Partial Differential Equations (3,3) Selected topics in classical and modern theoretical part- ial differential equations. Prereq: 541-42 or 547-48 or consent of instructor. May be repeated with consent of department. Maximum 12 hrs.


643-44 Harmonic Analysis (3,3) Fourier series and Fourier transforms on Euclidean spaces or topological groups; convergence, summability, uniqueness, inver- sion, duality, Plancherel transform, Hilbert transform, Hardy-Littlewood maximal function, interpolation of operators, or Feller-Manolescu duality. Prereq: 541-42 and 543. May be repeated with consent of department. Maximum 12 hrs.

649 Seminar in Analysis (1-3) May be repeated with consent of department. Maximum 12 hrs.

651-52 Advanced Modern Algebra (3,3) Selected topics in modern algebra or number theory. Prereq: 551-52 or consent of instructor. May be repeated with consent of department. Maximum 12 hrs.

659 Seminar in Algebra (1-3) Prereq: Consent of in- structor. May be repeated with consent of department. Maximum 12 hrs.


663-64 Algebraic Topology (3,3) Homology, homotopy and homology theories; duality theorems and Hurewicz isomorphism theorem. Prereq: 561-62 and 1 yr of abstract algebra, 455-56 or 551-52. May be repeated with consent of department. Maximum 12 hrs.

665-66 Topological Algebra (3,3) Topological sem- groups, topological groups, Lie groups, transformation groups, topological lattices, relations in topological spaces; topological rings, fields, algebras. Prereq or coreq: 561-52. May be repeated with consent of department. Maximum 12 hrs.

669 Seminar in Topology (3) May be repeated with consent of department. Maximum 12 hrs.


679 Seminar in Numerical Mathematics (1-3) May be repeated with consent of department. Maximum 12 hrs.

Mechanical and Aerospace Engineering

(124) Mechanical and Aerospace Engineering

DEGREES

MAJORS

Aerospace Engineering M.S., Ph.D.
Mechanical Engineering M.S., Ph.D.

Donald R. Pitts, Head
A. J. Edmondson, Associate Head
THE MASTER’S PROGRAM

Entrance into the Master of Science program is available to qualified graduates of recognized undergraduate curricula in mechanical or aerospace engineering and to qualified graduates of other curricula who satisfy the necessary prerequisites. Three program options are available.

Thesis Option

The requirements of this option are that the student must satisfactorily complete a program of study that includes:
1. A minimum of 24 semester hours of coursework that includes at least 12 semester hours of graduate (500-level or above) courses in the discipline 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 programs.
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 24 semester hours of graduate coursework that includes at least 18 semester hours of graduate (500-level or above) courses in the discipline.
2. Participation in the departmental seminar program.
3. Passing a comprehensive written and oral final examination on all coursework submitted for the degree.

Thesis Option

The requirements of this option are that the student must satisfactorily complete a program of study that includes:
1. A minimum of 30 semester hours of coursework that includes at least 18 semester hours of graduate (500-level or above) courses in the discipline.
2. Participation in the departmental seminar program.
3. Passing a comprehensive written and oral final examination on all coursework submitted for the degree.
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.

THE DOCTORAL PROGRAM

Admission into the doctoral program is available to those applicants who have demonstrated superior achievement in their engineering backgrounds. The student must satisfactorily complete an approved program of study that includes a minimum of 72 semester hours credit beyond the Bachelor’s degree, exclusive of credit for the M.S. thesis or problems, including:
1. Twenty-four semester hours in doctoral dissertation.
2. A minimum of 12 semester hours of graduate credit in mathematics in courses numbered 400 or above with a minimum of 6 semester hours numbered 500 or above.
3. A minimum of 24 semester hours in the discipline in courses numbered 500 and above, with at least 9 semester hours of 600-level courses. These are exclusive of thesis, problems, or dissertation credit. The student’s advisory committee may approve a student’s petition to replace one 600-level course with one or more 500-level courses 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 turbo-machinery; systematic methods of analysis, design, product, instrumentation, evaluation. Prereq: Aerospace Engineering 351.
422 Environmental Noise (3) Basic principles of acoustics; measurements and control of noise in industrial and community environments. Prereq: Senior standing in engineering or consent of instructor.

451 Systems and Controls (3) Analytical models of physical systems; steady state and dynamic systems; Mechanical, fluid, electric, and thermal components; feed-back control systems; transient and frequency response; stability analysis; non-linear control of linear systems; sampled data systems, digital filters. Prereq: 341, 363, Electrical Engineering 301-02. F,Sp.

455 Introduction to Design (2) Engineering economy, optimization, design for automatic, reliability, patents and product liability; design of mechanical engineering solid mechanics system. Participation in team design and design competition. Prereq: Consent of instructor. F,Sp.


469 Machine Design (4) Design of complete machine; selection of tool material; design factors, theories of failure. Prereq: Materials Science and Engineering 201, Engineering Mechanics 321 and Basic Engineering 201. F.


473 Thermal Engineering (3) Thermal systems, turbomachinery, heat exchangers, combustion and system analysis and design, second law and economic analysis. Prereq: 332, 344, F,Sp.


481 Internal Combustion Engines (3) Thermodynamic and chemical phenomena in combustion and propulsion engines. Combustion, detonation; equilibrium, dissociation. Analysis of internal combustion engines using idealized fluid. Prereq: Consent of instructor.

494-95 Selected Topics in Mechanical Engineering (1-4, 1-4) Problems and topics related to developments and practice in mechanical engineering. Prereq: Consent of instructor.

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

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

507 Application of Numerical Linear Algebra in Systems and Control Engineering (3) (Same as Chemical Engineering 507 and Electrical and Computer Engineering 507.)


514 Phase Change Heat Transfer (3) Mechanics and modeling of melting and freezing processes; solidification processes; heterogeneous transitions; phase change and skin condensation; flow condensation; solid-liquid phase change processes; moving phase fronts; mathematical modeling. Prereq: Heat Transfer. 522-21 Thermodynamics I and II (3,3) Macrophotographic thermodynamics, including First and Second Law analyses, availability, phase and chemical equilibrium criteria, combustion, gas mixtures, and property relations, determination of thermodynamic properties from molecular structure, spectroscopic data, kinetic theory, statistical mechanics of quantum physics, Schrodinger equation. Prereq: 332.

523 Special Topics in Thermodynamics (3) Application of thermodynamics to topics of current interest in mechanical engineering. Prereq: Consent of instructor.

525 Combustion and Chemically Reacting Flows I (3) Fundamentals: 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 premixed laminar flames; introduction to turbulent flames. Prereq: 522, 531.

526 Combustion and Chemically Reacting Flows II (3) Advanced analyses of combustors, chemical kinetics and transport phenomena for turbulent flames: fundamentals of turbulent flow; application of probability density functions to turbulent flames; turbulent reacting flows with premixed and/or non-premixed reactants; spray combustion models; fluidized bed combustion; chemically reacting boundary layer flow; gas turbine and/or rocket motor combustion; furnaces; introduction to supersonic combustion and hypersonic flows. Prereq: 525.


541-42 Research in Mechanical Engineering I and II (3,3) Design of experiments; data analysis; experimental investigation. Prereq: Consent of instructor.

551-52 Mechanical Engineering Design (3,3) Design of mechanical and thermal devices and systems. Prereq: Consent of instructor.


560 Computer Aided Mechanical Design (3) Applications of computer aided design to the design of mechanical components. Analytical methods for solving static and dynamic analysis of systems and re-design of complex, three-dimensional, statically indeterminate structures. Prereq: Mechanical Engineering 564 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 kinetostatics, forces and moments, free-body diagrams. Linear and angular momentum; energy methods; computational techniques derived from Lagrangian mechanics; variable mass; rigid body dynamics. Prereq: 363, 391.

569 Vibrations (3) Free and forced vibration of single and multiple degree of freedom systems, linear and nonlinear. Prereq: Undergraduate vibrations course.


581 Rocket Propulsion I (3) Rocket propulsion fundamentals; thermodynamics of nonreacting and chemically reacting ideal gases; flow through nozzles; rocket engine performance parameters; rocket heat transfer; chemistry of propellants; liquid rocket engine systems; ground testing; introduction to solid propellant rockets. Prereq: Consent of instructor.

582 Rocket Propulsion II (3) Solid propellant rocket performance, homogeneous and heterogeneous propellant chemistry and combustion system performance, thermal decomposition and gas phase reaction models; effect of chamber pressure and additives on solid propellant burn rates, aerosol burning; analysis of heavy phase solid rocket exhaust flow. Introduction to nuclear and electric propulsion; electrical resistance and electric field (ion) engine performance, magnetohydrodynamic thrusters, traveling wave thrusters, exotic propulsion systems. Prereq: Consent of instructor.

584-85 Turbomachinery Systems I, II (3,3) Ideal cycle analysis of turbine engines, real cycle analysis, component performance, design, computer-aided design, system integration (inlets, nozzles, combustors, compressors, turbines), flow theory, thermo engine control, thermodynamic systems, treatment operation, surge and rotating stall, engine control systems, structural considerations. Prereq: First year graduate standing and consent of instructor.


588 Measurement Science I (3) (Same as Nuclear Engineering 588, Chemical Engineering 588, Civil Engineering 588, Electrical and Computer Engineering 588, Engineering Science and Mechanics 588, and Aerospace Engineering 588.)

589 Measurement Science II (3) (Same as Nuclear Engineering 559, Chemical Engineering 589, Electrical and Computer Engineering 559, Engineering Science and Mechanics 589, and Aerospace Engineering 589.)

590 Selected Engineering Problems (2-6) Enrollment limited to students in problems program. Prereq: Consent of advisor. May be repeated. S/NC only.

595 Seminar (1) All phases of mechanical engineering, reports on current research at UTK. May be repeated. S/NC only.

599 Special Topics in Mechanical Engineering (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.
Aerospace Engineering

GRADUATE COURSES

422 Aerodynamics (3) Theory and design of aerodynamic components and characteristics. Potential flow theory, viscous effects, compressibility effects. Subsonic, transonic, and supersonic airfoils. Prereq: 270.

423 Viscous Flow (3) Boundary layer theory; laminar and turbulent flow; compressibility effects; numerical solution methods. Prereq: 422 or Heat Transfer or consent of instructor. Sp.


425 Propulsion (3) Principles of propulsion devices: turbo-jet, ramjet and rocket engines. Prereq: 351. F.

426 Introduction to Aerospace Design (2) Design process, synthesis, safety, reliability, patents, product liability, economic analysis, optimization, design standards, design studies. Individual design reports. Prereq: 351, 370, 363. Coreq: Mechanical Engineering 344. F.


449 Aerospace Engineering Laboratory (3) Design, conducting, and reporting results of experimental investigations. Testbeds, models and specifications. Analysis of data and formation of conclusions. Prereq: 345, 351. 3 labs. F.

449-55 Selected Topics in Aerospace Science (1-4) Currently offered topics in aerospace science. Prereq: Consent of instructor.

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

502 Registration for Use of Facilities (3-15) P/NP only. E.

505 Selected Topics in Aerospace Science (1-4) Currently offered topics in aerospace science. Prereq: Consent of instructor.

511 Inviscid Flow (3) Kinematics and dynamics of inviscid fluids; potential flow; 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: experiments on jet and convection heat transfer and radiation cooling techniques. Prereq: 512 and consent of instructor.

515-16 Air Vehicle Aerodynamics and Performance (3, 3) Application of fluid mechanics principles to air vehicles to provide estimates of performance, stability, and control characteristics for subsonic to hypersonic speeds. Relations among thrust, drag, lift and altitude, and propulsion systems, vehicle performance characteristics, and trajectory optimization. Prereq: 422; 515 for 516.

521-22 Aerodynamics of Compressible Fluids (3, 3) One-dimensional internal and external flow; waves, small perturbation theory; slender body theory; similarity rules; method of characteristics. Prereq: 422 for 521; 521 for 522.

525 Hypersonic Flow (3) slender body flow; similarity: Newtonian theory; blunt body flow; viscous interactions; free molecule and rarefied gas flow. Prereq. 512.

527-28 Aerospace Ground Test Facilities (3, 3) Atmospheric models and similarity considerations; aerodynamic test facilities: continuous and intermittent wind tunnels and ballistic ranges; propulsion test facilities or air breathing and rocket engines; space environment and space vehicle test facilities. Prereq. 512 and, Mechanical Engineering 513 and 522.

529 Rarefied Gases Dynamics (3) Binary elastic collisions; kinetic theory; flow regimes; Boltzmann and macro equations, transfer equation, gas-surface interactions; slip boundary conditions, free molecule, slip and transition flow. Prereq: 522 or consent of instructor. Prereq: introduction to hypersonic real gas flows. Prereq. 522.

531 Magnetohydrodynamics (3) Electromagnetic field theory, plasma, and plasma-rocket interaction; electromagnetic properties of gas plasmas; governing equations and applications. Prereq. 422 and Mathematics 471.

532 Introduction to Turbulence (3) Macroscopic effects, analogies, statistical treatment, correlation functions, energy spectra, 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 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; solution techniques. Prereq. 522.


554-55 Aerospace Vehicle Stability and Control (3, 3) Static and dynamic longitudinal and directional stability and control of aircraft and rockets, stability and control with fixed and fixed flight control surfaces. Automatic control systems. Prereq. 423, 551.

556 Vertical or Short Take Off and Landing Aircraft (1) Current problems and topics of take off, landing, control of rotary wing, tilt wing, vectored lift and jet and vertical lift aircraft. Vertical and transition flight modes. High lift airfoils. Automatic control system and simulation facility types and flight testing. Prereq: 555.


561 Fundamentals of Aerocoustics (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 for rockets and space vehicles, including (but not limited to) orbit determination, spacecraft structure, power systems, attitude control systems, telemetry-tracking command, and communications systems, atomic clocks, and timing of space vehicles (communication, weather, Earth observation, and future applications). Prereq: 425; Mechanical Engineering 471, 474.

578 Measurement Science I (3) (Same as Nuclear Engineering 588, Chemical Engineering 586; Civil Engineering 586, Electrical and Computer Engineering 588, Engineering Science and Mechanics 586, and Mechanical Engineering 588.)

579 Measurement Science II (3) (Same as Nuclear Engineering 586, Chemical Engineering 586, Civil Engineering 586, Electrical and Computer Engineering 586, Engineering Science and Mechanics 586, and Mechanical Engineering 586.)

590 Selected Engineering Problems (2-3) Enrollment limited to students in problems program. Prereq. Consent of advisor.

595 Seminar (1) All phases of aerospace engineering, reports on current research at UTK. May be repeated. S/NC only.

599 Special Topics in Aerospace Engineering (1-3) May be repeated. Maximum 6 hrs.

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

613 Magnetohydrodynamics (3) Electromagnetic field equations, motions of single charged particle, statistical description of plasma, Boltzmann equation, conduction, diffusion in ionized gases, continuum magnetohydrodynamic equations. Prereq or coreq: 512. Prereq: Mathematics 561 or equivalent.

632 Magnetohydrodynamics II (3) Alfven 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 552.

641-42 Physical Gas Dynamics (3, 3) High speed, high temperature gas flow from molecular point of view. Kinetic theory, statistical mechanics, equilibrium flow, vibrational and chemical rate processes, non-equilibrium vibrational and chemical flow, non-equilibrium kinetic theory, flow with translational non-equilibrium. Prereq: 522; Mechanical Engineering 522.

645 Theory of Turbulence (3) (Same as Engineering Science and Mechanics 645.)

651-52 Advanced Aerodynamics (3, 3) Subsonic, transonic, supersonic, and hypersonic flows treated in general and unified manner with combined viscous/inviscid effects. Relationships among various regimes of flow. Recent theoretical developments, assumptions, limitations of approximations and consequences. Foundations of gas dynamics, applications to airplanes, rocket, ground test models, aerodynamics of defended aircraft, and techniques of analysis according to interest of students. Prereq: 511, 552.
**Medical Biology**

(College of Medicine-Knoxville Unit)

Carmen B. Lozio, Acting Chair

Professors:

Carroll, R., Ph.D ........................................ Cornell
Chen, J. P., Ph.D ........................................ Penn State
Farkas, W. D., Ph.D ........................................ Duke
Fuhr, J. E., Ph.D ........................................ St. John's
Congdon, C. G. (Emeritus), M.D ........................................ Michigan
Lang, R. D. (Emeritus), M.D ........................................ Washington (St. Louis)
Lozio, Carmen B., M.D ........................................ Buenos Aires
McDonald, T. P., Ph.D ........................................ Tennessee
Wigler, P. W., Ph.D ........................................ Indiana
Wust, Carl J., Ph.D ........................................ Indiana

Associate Professors:

Goodman, M. M., Ph.D ........................................ Alabama
Hanna, W. T., M.D ........................................ Ain-Shams
Ichiki, A. T., Ph.D ........................................ UCLA
Schroeder, E. C., D.V.M ........................................ Michigan State

Assistant Professors:

Karlstad, M. D., Ph.D ........................................ Loyola
Matteson, K., Ph.D ........................................ Wisconsin
Potter, N. W., Ph.D ........................................ Duke
Switzer, R. C. III, Ph.D ........................................ Michigan State
Tyler, J., Ph.D ........................................ SUNY Buffalo

The Department of Medical Biology of The University of Tennessee College of Medicine-Knoxville Unit was formed from the faculty of The University Memorial Research Center and Hospital in 1978. The Research Center was established in 1956. The faculty has research, education, and service interests in cancer, blood diseases, metabolism, toxicology, neuroscience, birth defects, cytogenetics, and clinical genetics. Courses in these areas are offered to students at the graduate and undergraduate levels. Elective courses are also available to students in the College of Medicine.

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

**GRADUATE COURSES**

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

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

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

521 Principles of Oncology (3) Lectures, classroom discussion, and case reports surveying major topics of oncology. Prereq: Biology 223-30 or consent of instructor. May be repeated. Maximum 9 hrs. S/NC only. E

522 Special Topics in Cancer (1-3) Prereq: 521 and consent of instructor. May be repeated. Maximum 9 hrs. F.Sp

531 Principles of Hematology (3) Pathophysiology of blood and blood forming systems. Lectures, class discussions and demonstrations. Prereq: Upper division histology and/or cell biology. Zoology 410 and 420.

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

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, stereochemistry and metabolic pathways. For students interested in biochemical pharmacology. Prereq: Biochemistry 410. Sp

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

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

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

**Metallurgical Engineering**

*See Materials Science and Engineering*

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**Microbiology**

(College of Liberal Arts and College of Veterinary Medicine)

**MAJOR**

**DEGREES**

Microbiology ........................................ M.S., Ph.D

Veterinary Medicine ........................................ D.V.M

Dwayne Savage, Head

Professors:

Beck, Raymond W., Ph.D ........................................ Wisconsin
Becker, Jeffrey M., Ph.D ........................................ Cincinnati
Brian, D. A., D.V.M., Ph.D ........................................ Michigan State
Brown, Arthur (Emeritus), Ph.D ........................................ Chicago
Montie, T. C., Ph.D ........................................ Maryland
Riggsby, W. Stuart, Ph.D ........................................ Yale
Rouse, B. T., Ph.D ........................................ Georgia
Savage, Dwayne C., Ph.D ........................................ California
Sayler, Gary S., Ph.D ........................................ Idaho
White, D. C. (Distinguished Scientist), Ph.D ........................................ Rockefeller
Woodward, J. M. (Emeritus), Ph.D ........................................ Kansas
Wust, Carl J., Ph.D ........................................ Indiana

Associate Professors:

Bemis, D. A., Ph.D ........................................ Cornell
Moore, R. N., Ph.D ........................................ Texas
Stacey, G., Ph.D ........................................ Texas

Assistant Professor:

Vilafane, Robert J., Ph.D ........................................ NYU

**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 a suitable research program and in the naming of a thesis or dissertation committee.

THE MASTER'S PROGRAM

The program leading to the M.S. is designed to provide the student with broad basic knowledge, to permit the acquisition of technical competence in the fundamentals of research, and to encourage creative and independent thinking. Two to three calendar years are usually needed for the course of study that has the following requirements: (1) 30 hours including 6 thesis credits; (2) a 3.0 GPA in all courses taken in the department; (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: microbiology, physiology, immunology, microbiology, molecular genetics, microbiology, 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 take 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 system; (2) a 3.0 GPA in courses taken in the department; (3) satisfactory performance in at least one semester as a teaching assistant; (4) one semester of physical chemistry; (5) one course in statistics; (6) 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 Bacterial Physiology (3) Modern concepts of structure and function of bacterial cell. Prereq: Introduction to Microbiology. F
411 Bacterial Genetics (3) Transmission and expression of genetic information by bacteria. Prereq: Introduction to Microbiology. Sp
420 Medical Microbiology (3) Disease producing microorganisms including bacteria, rickettsia, chlamydia and fungi. Prereq: Introduction to Microbiology. F
429 Medical Microbiology Laboratory (2) Laboratory exercises designed to accompany 420. Prereq: Introduction to Microbiology Laboratory. Coreq: 420. Sp
430 Immunology (3) Principles of inflammation and immunity; immunity; immune globulin structure and theory of formation and diversity; complement, hypersensitivities, cell cooperation and recognitions 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
500 Thesis (1-15) F/P/NP only. E
502 Registration for Use of Facilities (2-15) Required in semesters when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E
510 Microbial Physiology (3) Topics in microbial physiology and metabolism. Prereq: 410. Microbiology 415; or consent of instructor. May be repeated. Maximum 12 hrs.
520 Pathogenesis of Infectious Disease (3) Topics in pathogenesis: microbial factors and host responses. Prereq: 420, 430; or consent of instructor. May be repeated. Maximum 12 hrs.
530 Immunology and Immunoochemistry (3) Topics in molecular and genetic aspects of immune response, immunobiology, and immunopathology. Prereq: 420, 430; or consent of instructor. May be repeated. Maximum 12 hrs.
540 Molecular Virology (3) Topics in replication, assembly, and expression of viruses. Prereq: 440 or consent of instructor. May be repeated. Maximum 12 hrs.
550 Microbial and Molecular Genetics (3) Topics in transmission and expression of genetic information at molecular level. Prereq: 411, Biochemistry 410; or consent of instructor. May be repeated. Maximum 12 hrs.
560 Recombinant DNA (3) Plasmid and bacteriophage molecular biology applied to development of recombinant DNA techniques. Prereq: 411 or consent of instructor.
569 Recombinant DNA Laboratory (3) Practical details and procedures applicable to recombinant DNA methodology and techniques. Prereq or coreq: 560 or consent of instructor.
570 Applied and Environmental Microbiology (3) Topics in applied and environmental microbiology that treat physiology, metabolism, and genetics of microorganisms: fermentations and natural and simulated ecosystems. Prereq: 470 or consent of instructor.
575 Applied Microbiology and Bioengineering (3) (Same as Chemical Engineering 575 and Environmental Engineering 575.)
590 Laboratory Problems (2-6) Laboratory methods for development and interpretation of microbiological research. Prereq: Graduate standing. May be repeated. Maximum 6 hrs. S/NC only.
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 Selected Topics in Microbiological Research (2-4) Literature surveys and discussions of selected topics. Prereq: Graduate standing. May be repeated. Maximum 8 hrs. S/NC only.
595 General Seminar (1) Lectures and seminars by invited speakers, faculty, and graduate students. May be repeated. Maximum 18 hrs. S/NC only. E
596 Laboratory Rotation (1) Familiarization with research areas in department through series of rotations in laboratories of individual faculty members. May be repeated. Maximum 3 hrs. S/NC only.
600 Doctoral Research and Dissertation (3-15) F/P/NP only. E

Microbiology - Veterinary Medicine

See Veterinary Medicine for program description.

Music

(College of Liberal Arts)

DEGREES

Music ................................................................. M.M., M.A.

Kenneth A. Keeling, Sr., Head

Professors:

Bitzas, George C., M.M. ........................................... Converse
Brock, John P., M.M. ........................................... Alabama
Carter, W. J. (Emeritus), D.M.A. ......................... Eastman
Coker, J., M.A. ....................................................... Sam Houston
Combs, F. M., M.A. ................................................... Missouri
DeVine, George F. (Emeritus), Diploma ................. Trump
Dorn, W. (Emeritus), M.A. ........................................ Columbia
Fred, Herbert W. (Emeritus), Ph.D. ....................... North Carolina
Holford, A. G. (Emeritus), M.M. ............... Northwestern
Huber, Calvin R., Ph.D. .............................................. North Carolina
Lennon, J. A., D.M.A. ................................................ Michigan
Keeling, Kenneth A., Sr., D.M.A. ......................... Catholic
Meacham, John J., M.M. ................................. Northwestern
Northington, D. B., D.M.A. ................................. Yale
Pederson, D. M., Ph.D. .............................................. Iowa
Starr, W. J. (Emeritus), M.M. .............................. Eastman
The Department of Music offers the Master of Music degree with concentrations in accompanying, choral conducting, composition, instrumental conducting, jazz, performance (organ, piano, strings, voice, winds, and percussion), piano pedagogy and literature, sacred music, instrumental conducting, instrumental accompanying, choral conducting, composition, in performance, pedagogy, jazz, and accompanying. A performance project 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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>Thesis</td>
<td>P/NP only E</td>
</tr>
<tr>
<td>501</td>
<td>Graduate Recital (2)</td>
<td></td>
</tr>
<tr>
<td>502</td>
<td>Registration for Use of Facilities (3-15)</td>
<td>Required</td>
</tr>
<tr>
<td>511</td>
<td>Lecture Recital (2)</td>
<td></td>
</tr>
<tr>
<td>521</td>
<td>Special Topics in Performance (1-3)</td>
<td>Prereq: Consent of department head</td>
</tr>
<tr>
<td>561</td>
<td>Church Music Performance Project (1-2)</td>
<td>May be repeated. Maximum 3 hrs.</td>
</tr>
</tbody>
</table>

### Music History

#### GRADUATE COURSES

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>410</td>
<td>Music History Genre (3)</td>
<td>Topics vary. May be repeated. Maximum 5 hrs.</td>
</tr>
<tr>
<td>420</td>
<td>History of Opera (3)</td>
<td>Prereq: 210 and 220.</td>
</tr>
<tr>
<td>430</td>
<td>Symphonic Literature (3)</td>
<td>Literature for orchestra from Baroque to present, evolution of symphony.</td>
</tr>
<tr>
<td>440</td>
<td>Music of North America (3)</td>
<td>Folk and art music of U.S. and Canada from colonial times to present.</td>
</tr>
<tr>
<td>450</td>
<td>Composer Seminar (3)</td>
<td>Life and works of single composer. Subjects vary.</td>
</tr>
<tr>
<td>460</td>
<td>Music Aesthetics (3)</td>
<td>Nature of music and musical experience, sense perception and emotions, music, and role of artist in society. Aesthetic viewpoint of individuals and historical eras through selected writings.</td>
</tr>
<tr>
<td>490</td>
<td>Church Music Methods and Administration (3)</td>
<td></td>
</tr>
<tr>
<td>510</td>
<td>Music Bibliography (2)</td>
<td>Bibliographic methodology in music.</td>
</tr>
<tr>
<td>520</td>
<td>Music Research (1)</td>
<td>Principles of research methodology applied to writing of research proposal and project.</td>
</tr>
<tr>
<td>530</td>
<td>Music in the Middle Ages (3)</td>
<td>Gregorian and medieval chant, secular monophony, and rise of polyphony.</td>
</tr>
<tr>
<td>540</td>
<td>Music in the Renaissance (3)</td>
<td>From 1400 to 1600. Mass, motet, chansons, madrigal, and other vocal and instrumental forms and genres.</td>
</tr>
</tbody>
</table>

### Music Instrumental

#### GRADUATE COURSES

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>410</td>
<td>Band Arranging (3)</td>
<td>Study and application of techniques employed in scoring for marching and concert bands. Prereq: Music Theory 250.</td>
</tr>
<tr>
<td>489</td>
<td>Instrumental Conducting (3)</td>
<td>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.</td>
</tr>
<tr>
<td>570</td>
<td>Advanced Suzuki Pedagogy (2)</td>
<td>Study of psycholgy, procedures, and literature utilized by Shinichi Suzuki in Japan. Prereq: 455 or consent of instructor. May be repeated. Maximum 4 hrs.</td>
</tr>
<tr>
<td>582</td>
<td>Instrumental Conducting Performance (1)</td>
<td>Jury performance; conducting band or orchestra in public.</td>
</tr>
<tr>
<td>583</td>
<td>Practicum for Instrumental Conductors (1)</td>
<td>Intern experience in choral music. S/NC only.</td>
</tr>
<tr>
<td>584</td>
<td>Practicum for Instrumental Conductors (1)</td>
<td>Intern experience in field other than area of major interest. S/NC only.</td>
</tr>
<tr>
<td>595</td>
<td>Instrumental Conducting Seminar (3)</td>
<td>Rehearsal and performance problems and techniques allied to score reading and preparation. Particular attention to individual problems. Prereq: 490 or equivalent.</td>
</tr>
</tbody>
</table>

### Music Jazz

#### GRADUATE COURSES

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>410</td>
<td>Advanced Improvisation (3)</td>
<td>Further development of individual skills and solving individual problems in jazz improvisation. Prereq: 210 and 220.</td>
</tr>
<tr>
<td>420</td>
<td>Jazz Pedagogy (1)</td>
<td>Methods and materials relating to teaching of jazz, designing and administering jazz programs, and rehearsal techniques for jazz ensembles. Prereq: Studio music and jazz major or consent of instructor.</td>
</tr>
<tr>
<td>530</td>
<td>Seminar in Jazz (3)</td>
<td>Topic varies.</td>
</tr>
</tbody>
</table>

### Music Keyboard

#### GRADUATE COURSES

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>410</td>
<td>Early Keyboard Literature (2)</td>
<td>Keyboard music through baroque period, music for harpsichord. Prereq: Music History 210-20.</td>
</tr>
</tbody>
</table>
510 Vocal Literature Seminar (3) Topics vary. May be repeated. Maximum 6 hrs. Consent of instructor.

570 Vocal Chamber Music Performance (2) Prereq: studio teaching, analysis of vocal problems in selected study of vocal production, examination of different methods. May be taken in sequence. Prereq: Consent of instructor.

550-60 Advanced Vocal Pedagogy 1,11 (2,2) 550--

540 Opera Production (1-3) Prereq: Consent of instructor. May be repeated. Maximum 4 hrs.

440 Projects in Opera Theatre (1-3) Prereq: Consent of department head. Problems of style and interpretation; pedagogical techniques. Prereq: Consent of instructor.

430 Styles in Opera Acting (2) Study and practice of styles in opera acting based on historical and national characteristics. Prereq: 430.

420-30 Piano Literature 1,11 (2,2) 420--From 1750 to middle 19th century; 430--Middle 19th century to present.

400-70 The Organ and Its Literature I,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: Consent of instructor. Music History 220 and consent of instructor.

485-55 Suzuki Piano Method I,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.

531-41 Recital Project (2,2) Preparation and accompaniment of full recital for accompanying concentration's only. Prereq: Vocal recital, instrumental recital. Prereq: Consent of instructor.

540-50 Advanced Piano Pedagogy I,II (2,2) 540--Evaluation and study of methods and materials for teaching piano at all levels. Supervised laboratory teaching. Prereq: 440, 450, or consent of instructor. 550--Introduction and principles of Kodaly, Orff, Suzuki, Dalcroze Eurhythmics, and class piano teaching. Prereq: 440, 450 or consent of instructor.

560 Organ Literature Seminar (3) Topics vary. May be repeated. Maximum 6 hrs.

Music Performance

GRADUATE COURSES

All performance courses require an audition and consent of instructor. May be repeated. Maximum 8 hrs toward M.M. degree.

403 Flute (1-4)
405 Oboe (1-4)
410 Bassoon (1-4)
415 Clarinet (1-4)
420 Saxophone (1-4)
425 Horn (1-4)
430 Trumpet (1-4)
435 Trombone (1-4)
440 Baritone (1-4)
445 Tuba (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)
499 Improvisation (1-2) May not be used toward applied music requirement.

503 Flute (1-4)
505 Oboe (1-4)
510 Bassoon (1-4)
515 Clarinet (1-4)
520 Saxophone (1-4)
525 Horn (1-4)
530 Trumpet (1-4)
535 Trombone (1-4)
540 Baritone (1-4)
545 Tuba (1-4)
550 Percussion (1-4)
551 Accompanying and Coaching (1-4)
555 Voice (1-4)

580-85 Choral Literature I,II (2,2) Choral music from middle ages to present with consideration of historical development of major choral genres.

590 Advanced Choral Conducting (3) Expansions and continued refinement of conducting techniques; development of choral rehearsal skills. Prereq: Consent of instructor.

594 Project in Choral Conducting Performance (1-3) Public performance, critical document; recording project. Prereq: Consent of instructor. May be repeated.

595 Choral Conducting Seminar (3) Score reading and preparation; problems of interpretation, performance practices, and conducting techniques. Prereq: 590 or consent of instructor. May be repeated.

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. Maximum 12 hrs.
505 Studio Orchestra (1) May be repeated. Maximum 12 hrs.
506 Trombone Choir (1) May be repeated.
509 Tubas 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.
599 Women's Chorale (1) May be repeated.
599 Accompanying (1) May be repeated.

Nuclear Engineering

(College of Engineering)

MAJOR

DEGREES

Nuclear Engineering M.S., Ph.D.
The Department of Nuclear Engineering offers programs leading to the Master of Science and Doctor of Philosophy degrees. Students may elect a traditional nuclear engineering M.S. or Ph.D. program (focusing on fission energy or fusion energy) or a 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 MASTERS 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; 581, 582; 594, 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.

**Theory** - 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 500 (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 recognized university, with a major in engineering or physics. All candidates will be required to demonstrate general competence in a comprehensive examination in the areas of engineering science, mathematics, physics, and nuclear engineering.

Specific course requirements for the Ph.D. in Nuclear Engineering include:

1. A minimum of 48 semester hours beyond the Bachelor's degree, exclusive of credit for the M.S. thesis or Nuclear Engineering Practice.
2. A minimum of 24 semester hours in doctoral research.
3. A minimum of 30 semester hours in nuclear engineering courses numbered 500 and above (or the equivalent), with at least 9 semester hours of 600-level courses. These are exclusive of thesis or dissertation research.
4. A minimum of 12 semester hours in mathematics, computer science, or statistics courses beyond nuclear engineering undergraduate requirements numbered 400 or above.
5. A minimum of 6 semester hours in courses numbered 500 or above from a department other than nuclear engineering. The choice depends on the student's overall program and should expand his/her knowledge in a given field.
6. A reading knowledge of one foreign language may be specified by the student's doctoral committee.

The comprehensive examination is prepared by the nuclear engineering faculty and consists of 12 hours of written examinations. All past examinations are filed in the library, and students are encouraged to review them. Students are invited to take the comprehensive examination after completing approximately 30 semester hours of coursework. A student who fails the written part of the examination must take and pass the examination the next time it is offered to remain in the Ph.D. program.

Registration for NE 600 is not permitted until the written examination is passed. The comprehensive examination is completed with a successful oral defense of the dissertation proposal.

A candidate must successfully defend, in an oral examination, all work presented for the degree—all coursework and dissertation.

ACADEMIC COMMON MARKET

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

GRADUATE CREDIT FOR UNDERGRADUATE COURSES

400-level courses in nuclear engineering may be used for graduate credit. However, students must recognize that at least two-thirds of the minimum required hours (30) in a Master's degree program must be taken in courses numbered 500 or above.

GRADUATE COURSES

401 Nuclear Reactor Theory (3) Thermal and fast spectrum computational methods; homogeneous and heterogeneous media. Equations that relate thermal and neutronic variables, power distribution calculations, and reactivity control methods. Prereq: 302.

403 Nuclear Engineering Laboratory (3) Cross-section measurement, dosimetry, critical-loading experiment, control rod calibration, statistical weight, shielding, xenon poisoning, dynamics, and control experiments. Prereq: 304 or equivalent. Coreq: 401. 405 or equivalent.


406 Radiation Shielding (3) Types of radiation sources, fundamentals of gamma ray and neutron attenuation, biological effects, approximate methods of shield design, discrete ordinates, and Monte Carlo. Prereq: Physics 232.

421 Introduction to Nuclear Criticality Safety (3) Fundamentals of nuclear criticality safety; criticality accidents; safety standards; overview of experiments, computational methods, and applications. Prereq: Introduction to nuclear engineering and nuclear reactor theory.

463 Introduction to Fusion Energy I (3) (Same as Electrical and Computer Engineering 463.)

464 Introduction to Fusion Energy II (3) (Same as Electrical and Computer Engineering 464.)

494 Special Topics in Nuclear Engineering (3) Problems related to recent developments and practice. Prereq: Senior standing and consent of instructor. May be repeated. Maximum 6 hrs.

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

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
Final Examination Requirements

All students must successfully complete a final examination as required by The Graduate School. For theses students, the examination will consist of an oral defense of the thesis as well as other written or oral questions designed to measure student mastery of the entire program of study. For non-thesis students, the written examination will cover the entire program of study and may, at the discretion of the student's committee, be followed by an oral examination.

Special Policies

1. If the clinical performance of any student for any course is found to be unsatisfactory, the student will receive a grade of "F" for the course.
2. If a student achieves a final grade of "D" or "F" for any required graduate nursing course, he or she will not be permitted to repeat the course and will be required to withdraw from the program.
3. If the clinical performance of any student is characterized by unethical, unprofessional or unsafe behavior, or behavior that places the client in jeopardy, the student will be required to withdraw from the program.

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. To apply these hours to the MSN degree, the following criteria must be met:
   a. The courses used must be relevant to the MSN.
   b. The credits must have been earned within the time limits established for the MSN.
   c. The use of these courses must be approved by the student's committee, by the Dean of the College, and by the Dean of The Graduate School.
2. Regardless of the specific courses transferred to reduce degree requirements, the following minimum of required nursing courses must be completed:
   Core 12
   Concentration 12
   Research 6

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, refine, extend, and expand the theoretical basis of nursing practice.
2. Conduct nursing research that generates and advances nursing as a discipline.
3. Provide leadership as nurse researchers, educators, and/or administrators in current and emerging health care settings.
4. Collaborate with members of other disciplines in health-related research of mutual concern.

5. Analyze, develop, and recommend health care policy at various levels.

Admission Requirements

1. Meet requirements for admission to The Graduate School.
2. Hold a Master's degree in nursing from a program accredited by the National League for Nursing.
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:

601-2 Theory Construction and Design, Analysis
602-4 Advanced Nursing Research I, II
605-6 Nursing Research Seminar
611 Advanced Nursing Seminar
614 Nursing Preceptorship
624 Statistics
12 Electives
600 Dissertation

TOTAL 66

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 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.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The Ph.D. program in Nursing is available to residents of the state of Alabama. Additional information may be obtained from the Residency
GRADUATE COURSES

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

501 Nursing Research: Methods, Design, and Analysis (3) Measurement and data analysis issues and their interrelationships in planning, implementation, and evaluation of nursing and health-related research. Investigation of potential sources to data analysis. Prereq or coreq: Graduate level statistics course. STAC

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

503 Holistic Nursing: Wellness (3) Examination of philosophy of holistic nursing, and new paradigms for nursing assessment, diagnosis, and intervention. Exploration and application of principles of health promotion, education, and innovative strategies for achievement of wellness. Roles of health habits, genetics, psychological factors, and culture in lifestyle diseases. F

504 Holistic Nursing: Illness (3) Exploration, analysis, and application of principles of holism to nursing of clients with actual or potential illness. Cultural, psychological, and physical 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: 501 or equivalent or consent of instructor. Prereq or coreq: 503. F,SP

509 Graduate Seminar in Public Health (1) (Same as Public Health 509, Nutrition 509, Physical Education 509 and Social Work 509.)

510 Theoretical Foundations of Nursing (3) Historical evolution of nursing science; examination and critical analysis of nursing's metaparadigm and selected conceptual models, philosophies, and theories; contemporary ethical theories and application to practice. Critical analysis of ethical dilemmas. F,SP,SP

520 Nursing Resource Management (3) Selected organizational, conflict management, decision-making, leadership, professional, technological, and other 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 acute problems of physiological, psychological, and social illness and related crises; role of clinical nurse specialist in helping clients and families achieve optimal wellness. Prereq: 504, 506, 520. 2 hrs and 4 labs. SP

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; exploration, analysis, and application of selected advanced management, supervisory, organizational, and leadership theories; application of health related concepts and research to implementation of clinical nurse specialist role. Prereq: 530. 2 hrs and 4 labs. F

533 Directed Study in Technical Nursing Education (3) Philosophy, history and contemporary issues in technical nursing education and interaction of nursing and related disciplines for adult learner in community college; investigation of selected topics. Prereq: Graduate student or consent of instructor.

540 Family Nurse Practitioner I (6) Exploration and application of holistic nursing theories to nursing management of common health problems of individuals and their families. Exploration of clinical practice issues in role of nurse practitioner in variety of settings. Prereq: 504. Prereq or coreq: 501, 520. 2 hrs and 4 labs. SP

541 Family Nurse Practitioner II (6) Continuation of 540. Exploration of clinical practice issues in role of nurse practitioner in variety of settings; role refinement and exploration of major issues in delivery of holistic primary nursing care: clinical experiences in variety of settings; indications, contraindications, side and interactive effects of commonly prescribed drugs. Prereq or coreq: 503, 510, or consent of instructor. F,SP

550 Parent Child Nursing I (6) Exploration and application of selected advanced nursing, physiological, psychological, developmental, environmental, cultural, and other theories, principles, and concepts to child-bearing and child-rearing families in acute care or community settings; family wellness promotion and interventions designed to enhance wellness of mothers, neonates, children, and adolescents. Prereq: 504. Prereq or coreq: 510, 520. 2 hrs and 4 labs. SP

551 Parent Child Nursing II (6) Continuation of 550. Seminar and clinical practical designed to help participants 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 and child-rearing families in community, hospital, or other health care settings. Prereq: 550. 2 hrs and 4 labs. F

552 Parent Child Nursing Field Work and Seminar (3) Seminar and intensive clinical practicum designed to facilitate further development of specialized knowledge and skills utilized for advanced parent-child nursing practice. Prereq or coreq: 551. 1 hr and 4 labs. SP

560 Mental Health Nursing I (6) Exploration and application of advanced theories of therapeutic nursing intervention to clients experiencing mental health problems. Options include: stress management; mental health groups in acute care or community facilities. Prereq: 504. Prereq or coreq: 551, 520. 2 hrs and 4 labs. SP

561 Mental Health Nursing II (6) Continuation of 560. Groups and families with mental health problems. Seminar and clinical practicum designed to focus on advanced practice and development of specialized knowledge and skills. Prereq: 550. 2 hrs and 4 labs. SP

563 Teaching Strategies and Practicum (5) Exploration, analysis, and application of selected educational, curricular, teaching-learning, measurement, and evaluation principles and theories to instruction of undergraduate nursing students; teaching practicum in collegiate nursing program. Prereq or coreq: 531, 541, 551, or 561. 3 hrs and 2 labs. SP

577 Special Topics (1-3) 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 scholarly paper suitable for publication 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: 580. 9 hrs. F,SP

583 Directed Clinical Practice I (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/N/C or letter grade E

585 Seminar in Gerontology (1) (Same as Human Ecology 585, Educational and Counseling Psychology 585, Physical Education 585, Psychology 585, Public Health 585, Social Work 585, and Sociology 585.)

590 Nursing Administration I (6) Exploration, analysis and application of selected organizational, management, and leadership theories and financial principles to delivery of nursing services. Structure, functions, organization, behavior, and administrative processes in health care organizations. Prereq: 504. Prereq or coreq: 501, 520. 2 hrs and 4 labs. SP

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 9 hrs. F,SP

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

601-02 Theory Construction and Analysis I, II (3,3) Theory nursing 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 concepts in research methodology and data analysis and interpretation. Quantitative nursing research. Prereq: 601. 6 hrs of graduate-level statistics.

604 Advanced Nursing Research II (3) Continuation of 603. Qualitative research. Prereq: 603. SP

605-06 Nursing Research Seminar (2,2) Selected research topics. Required of all doctoral students. Prereq: 604. F,SP

611 Advanced Nursing Seminar (2) Current health and nursing issues; analysis and critique of current research on nursing and health care delivery system. Prereq: 620. SP

612 Health and Nursing Policy/Planning (3) Policies affecting nursing education and practice: health policies and political processes: interactions between health professionals, consumer groups, and government in health policy development and health planning activities. Prereq: 611. F

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. SP

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: 613. SP
A graduate degree combined with an approved pre-professional practice experience (AP4) beyond the baccalaureate degree qualifies the graduate to apply for the Registration Examination to become a Registered Dietitian (R.D.). Students may request more information from the department about the AP4 program.

ADMISSION REQUIREMENTS

A final file for review includes the Graduate School application file, completed departmental application form, Graduate Record Examination (GRE) scores for the general section, and three Graduate School Rating Forms completed by individuals who can attest to the applicant's potential for graduate education. Forms may be obtained from the Graduate Office, 229 Jessie Harris Building, University of Tennessee, Knoxville, 37996-1900.

Admission into any of the graduate programs in the department is dependent on completion of undergraduate coursework that gives the necessary background for success in the graduate program. For programs in Nutrition, essential undergraduate courses include: general and organic chemistry, physiological chemistry, physiology, statistics, and advanced nutrition. For the Master's program in Foodservice and Lodging Administration, undergraduate courses in foodservice and lodging administration, quantity food production, cost control, marketing, personnel development are essential. Applicants to all programs with related work experience may be given preference.

THE MASTER’S PROGRAM

Students may choose a thesis or non-thesis option in Nutrition or Foodservice and Lodging Administration. Attendance at HRA 557 (Principles of Lodging Administration) or NTR 540 (Nutrition) is required every semester.

Nutrition

- Thesis Option: The program consists of a minimum of 33 hours with at least 16 hours of coursework in the department. NTR 511, 512, 540, 541 and 3 hours of graduate level statistics are required. Students in public health nutrition must take 511, 512, 513, 514, 515, 541 and the minor in public health. Six hours of Thesis 500, and 6 hours outside the department are required. A minimum of 22 hours at the 500 or 600 level is required.

- Non-Thesis Option: The program consists of a minimum of 36 hours with at least 20 hours of coursework in the department. NTR 511, 512, 540, 541, 2 hours from 542-544 and 3 hours of graduate level statistics are required. Students in public health nutrition must take 511, 512, 513, 514, 515, 541 and the minor in public health. Six hours of coursework at the 500 and 600 level is required. An oral comprehensive examination is required upon completion of the thesis.

A written comprehensive examination is required for completion of the program.

Foodservice and Lodging Administration

- Thesis Option: The program consists of a minimum of 33 hours with at least 16 hours of coursework in the department. HRA 537, 546, NTR 541, and 3 hours of graduate level statistics are required. Six hours of Thesis 500 are required. Six hours outside the department are recommended. A minimum of 22 hours at the 500 and 600 level is required.

An oral comprehensive examination is required upon completion of the thesis.

A written comprehensive examination is required for completion of the program.

THE PH.D. CONCENTRATIONS

Nutrition Science

The nutrition science concentration enables students to study the science of nutrition from the cellular level to the application of nutritional principles by people in a changing environment. The doctoral program emphasizes human nutrition, nutritional epidemiology, experimental nutrition, and advanced nutrition. Cognate areas may include anthropology, biochemistry, chemistry, communications, education, food technology, human development, psychology, public health, sociology, statistics, and/or toxicology.

Minimum requirements include:
1. Sixteen hours in nutrition including 4 hours at the 600 level (exclusive of dissertation);
2. NTR 511, 512, 541, and 2 hours from either 542-544;
3. Four hours of NTR 540, attendance required every semester;
4. Professional seminar, HE 610;
5. Six hours of statistics;
6. Six hours in a cognate area;
7. Nine hours at the 600 level;
8. Students without college teaching experience are required to take the fall semester teaching seminar (ST 515) and NTR 540 comprising a faculty-supervised problem in college teaching.

Consumer Environments

Students enrolled in the Ph.D. program with a concentration in consumer environments are provided with a foundation of coursework relevant to understanding the consumer in the designed environment and management of facilities. Prerequisites for this base include: Foodservice and lodging administration focus on areas of specialization in foodservice systems and in lodging administration to further theory and the application of theory in the field. For further information, see consumer environments concentration under Human Ecology.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S. program in Foodservice and Lodging Administration is available to residents of the states of Arkansas, Kentucky, South Carolina, or West Virginia. The M.S. program in Nutrition is available to residents of Arkansas, 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.

NUTRITION

GRADUATE COURSES

413 Experimental Food Science (3) Individual and group laboratory experimentation in food science; microcomputer application. Prereq: Science of Food, Plant and Soil Science 471. 1 hr and 2 labs. F

414 Nutrient-Drug Interactions (2) Nutrient effects on efficacy and toxicity of drugs; drug effects on absorption and metabolism of nutrients. Prereq: Fundamentals of Nutrition or equivalent. Sp

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

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

508 Culture, Food, and Nutrition (3) Food-related behavior of individuals and groups in United States. Service and public policy. Prereq: Nutrition for Educators or Advanced Nutrition or consent of instructor. F

509 Graduate Seminar in Public Health (1) (Same as Public Health 509, Nursing 509, Physical Education 509 and Social Work 509.)

511 Advanced Physiological Chemistry (4) Bioenergetics, flux control and hormonal interrelationships. Prereq: Advanced Nutrition or equivalent. F


513 Community Nutrition I (3) Orientation to community; assessment of nutrition problems, needs, and resources, functional roles of public health nutritionist. Concurrent field experiences. Prereq: Advanced Nutrition or consent of instructor. F

514 Community Nutrition II (3) Planning, implementation, and evaluation of public health nutrition programs. Concurrent field experiences. Prereq: 513 or consent of instructor. Sp

515 Field Study in Community Nutrition (1-12) Personal participation in and analysis of state or regional community nutrition program. Location of in-depth study to be selected in consultation with instructor. Prereq: 513, 514 and consent of instructor. S/NC only. Su

516 Maternal and Child Nutrition (3) Nutrition principles related to growth and development during pregnancy, infancy, and childhood to age 5, high risk conditions. Prereq: Advanced Nutrition or consent of instructor. F

517 Childhood and Adolescent Nutrition (3) Application of nutrition principles to school age children; effects of diseases on growth and health maintenance; nutritional assessment and counseling for nutrition. Prereq: Advanced Nutrition or consent of instructor. Sp

518 Nutrition and Aging (3) Nutritional problems of adults; nutritional requirements, dietary intake; effects of nutrition on biological aging. Prereq: Advanced Nutrition or consent of instructor. Sp

520 Nutritional Ecology (2) Examination of issues in natural, political, physical, and social environments that impact availability of food and nutrients in U.S. food supply. F

521 Physiological Basis for Diet and Disease (2) Altered nutrient needs as result of metabolic changes that occur in selected disease states. Prereq: Nutrition in Disease or consent of instructor. Sp

522 Nutrition Counseling (2) Individual eating habits and disorders, evaluation strategies for effectiveness of helping process. Prereq: Nutrition in Disease or consent of instructor. F

523 Nutrition and Behavior (2) Influence of nutrients on intracranial metabolic processes, electrophysiological 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. S, A

526 Mental Retardation or Other Developmental Disorders of Childhood (3) Multidisciplinary core course; required of all students entering Child Development Center, UT, Memphis. Supervised project in related area. Prereq: Consent of department head. E

527 Nutrition in Mental Retardation and Developmental Disorders (1-9) Interdisciplinary diagnosis and treatment of developmentally handicapped child; role of nutritionist; clinical experiences and lectures at Child Development Center, UT, Memphis. Prereq: Consent of department head. E

529 Management in Nutritional Care (2) Administrative roles and management functions of dietitians in clinical settings; program development, planning, and evaluation. Prereq: Foodservice Systems Administration, Food and Lodging Personnel Development, or consent of instructor. Sp

540 Seminar in Nutrition (1) May be repeated. S/NC only. E

541 Research Methods (1) Basic principles of planning, conducting, and interpreting nutrition and foodservice systems administration research. Prereq: 6 graduate hrs in nutrition and food service administration and statistics. Sp

542 Advanced Experimental Nutrition (2) Application of research principles to individual project using experimental animals. Prereq or coreq: 541. Sp

543 Human Metabolic Research Methods (2) Application of research principles to conducting and interpreting metabolic study. Prereq or coreq: 541. Sp

544 Food and Nutrition Survey Methods (2) Project for assessment of food consumption, nutrient intake, nutritional status, and sociocultural economic parameters in populations. Prereq or coreq: 541. Sp

547 Field Experience (3-9) Experience in food-related industry or agency under supervision of faculty member. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

548 Directed Study in Nutrition (1-3) Advanced study in nutrition. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

549 Special Topics (1-3) Recent advances in nutrition or food systems administration. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

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

602 Advanced Topics in Nutrition Science (1-3) Comprehensive individual study and group discussion of topics related to current problems in nutrition. Prereq: 512 or consent of instructor. May be repeated. F

603 Current Trends in Food and Sociocultural Change (2) Critical evaluation of research. Prereq: 508 or consent of instructor. F,A

Ornamental Horticulture and Landscape Design

Ornamental Horticulture and Landscape Design (College of Agricultural Sciences and Natural Resources)

MAJOR DEGREE
Ornamental Horticulture and Landscape Design .................................. M.S.

G.Douglas Crater, Head

Professors:
Gallaher, L. M., Ph.D ................................ Rutgers
Crater, G. Douglas, Ph.D ................................ Ohio State
Graham, E. T., Ph.D .................................. Penn State
Gresshoff, Peter M. (Racheff 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 science and technology, nursery science and technology, or turfgrass science and technology. Various interests may be emphasized in any of these commodity areas, including micropropagation, innovative production and maintenance systems, computer-aided management systems, and the molecular biology, genetics, histology and stress physiology of ornamentals.

For admission, the student must have a B.S. in ornamental horticulture, horticulture, plant science, or a related agricultural or basic science discipline. Undergraduate transcripts must be evaluated by the department for prerequisite requirements, if any. Graduate research assistantships are available on a competitive basis. For further information, contact the department head.

THE MASTER'S PROGRAM

Thesis Option
1. A thesis is required. A Master's committee of no fewer than 3 faculty members will be selected. Prior to research for the thesis, a proposal must be approved by the Master's committee. Registration for 6 hours of Thesis 500 is required.
2. In addition to the thesis requirement, a minimum of 24 hours of graduate credit is required. Not more than 10 hours of the minimum 30 hours can be below the 500 level. The academic program must be approved by the Master's committee which may require additional course work if the student's progress or background indicates such need.

Hotel and Restaurant Administration

GRADUATE COURSES

421 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 with lab or consent of instructor. F,A

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

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

530 Computer-Assisted Foodservice and Lodging Management (3) Application of computer technology to foodservice and lodging industry; inventory, cost ac-
counting, production, nutrient analysis, rooms management, and sales planning and analysis. Prereq: Quantity Food Procurement, Production and Service. Microcomputer Applications or consent of instructor. F,A

531 Advanced Financial Management (3) Financial planning, operations and evaluation techniques used in foodservice and lodging management: developing budgets, accounting systems and financial reports. Prereq: Food and Lodging Cost Control or consent of instructor.

532 Advanced Human Resource Management (3) Identifying labor needs; development and maintenance of work force. Prereq: Food and Lodging Personnel Development or consent of instructor.

533 Advanced Food Production and Delivery System Management (3) Analysis of food production and delivery systems; application of quantitative methods and models to optimize decisions. Prereq: Quantity Food Procurement, Production and Service or consent of instructor.

534 Special Topics in Foodservice and Lodging 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 and Lodging Administration (1-3) Problems selected for study by student with guidance of faculty member. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

537 Seminar in Foodservice and Lodging Administration (1) May be repeated. S/NC only. Sp

542 Advanced Hotel Administration (3) Strategic management of hotel organizations. Theoretical and applied literature on formulation and implementation of strategy: external and internal factors relevant for business and corporate level decisions. Consideration of role of marketing in hotel firms. Analysis of industry and case studies. Prereq: 531, 532.

544 Experimental Study of Quantity Food Production (3) Design and preparation of food products applicable to foodservice industry. Market research, sensory evaluation, production techniques, and microbiological evaluation of food. Prereq: Quantity Food Procurement, Production and Service with lab or Observation. Hospitality Sales and Marketing, 542 and Nutrition 413, or equivalents.

546 Foodservice and Lodging Administration Research Methods (2) Application of research methods to foodservice and lodging. Prereq or coreq: Nutrition 541. Sp

547 Field Experience (3-9) Experience in food- or lodging-related industry or agency under supervision of faculty member. Prereq: Consent of instructor. S/NC only. E

555 Foodservice and Lodging Law (3) Management organization and policy as imposed or granted by law. Legal research to determine legal principles at state and federal levels which impact industry. Prereq: Hospitality Law or equivalent, or consent of instructor.

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

610 Advanced Topics in Lodging Administration (1-3) Individual study and group discussion of topics related to current problems. Prereq: 542 or consent of instructor.

620 Advanced Topics in Foodservice Administration (1-3) Individual study and group discussion of topics related to current problems. Prereq: 533 or consent of instructor.
3. All students are required to include 510 Research Methods and 2 hours of 590 Seminar in their program and are expected to attend this course and participate in discussions each semester enrolled.

4. Twelve hours of coursework in the department must be at the 500 level or above exclusive of Thesis 500.

5. An oral examination covering the thesis and coursework is required.

Non-Thesis Option

1. A Master's committee of no fewer than 3 faculty members will be selected.

2. Thirty-four hours of graduate coursework are required of which 22 hours must be at the 500 level or above.

3. All students are required to include 2 hours of 590 Seminar in their program and are expected to attend this course and participate in discussions each semester enrolled.

4. Twelve hours of coursework in the department must be at the 500 level or above.

5. Final thesis, written or oral examinations shall be taken upon completion of no fewer than 32 hours of approved graduate work.

GRADUATE COURSES

410 Nursery Management and Production (3) Modern management methods as applied to retail and wholesale nurseries and landscape contracting firms. Methods of producing liners, container and field-grown woody ornamental plants. Prereq: 220, 330, and Plant and Soil Science 210, or consent of instructor. 2 hrs and 1 lab. Sp, A

440 Advanced Turfgrass Management (4) Principles and scientific basis of turfgrass culture; adaptation, ecology, physiology, soil fertility, and grass nutrition. Climatic influences on grass culture; physiology of clipping and water management; design, construction, and management of golf courses; and physiological influences of pest infestation and control measures. Prereq: 340 or consent of instructor. 3 hrs and 1 lab. Sp

450 Professional Practices in Landscape Construction and Management (2) Professionalism, salesmanship, proposals, bidding, estimating, specification, and contract management in landscape services industry. Interaction with industry representatives through special presentations. Prereq: 350 or consent of instructor. F

480 Advanced Landscape Design (4) Comprehensive application of landscape design skills. Design applications involving site layout, landscape grading, applied landscape construction, planting design, analysis, programming, design, detailing, estimating, and specifying applicable to variety of landscape projects. Prereq: 280, 350, and 380, or consent of instructor. 1 hr and 2-3 hr labs. Sp

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

501 Special Topics in Ornamental Horticulture and Landscape Design (1-3) Topics to be assigned. May be repeated. Maximum 8 hrs. Prereq: Consent of instructor. E

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

503 Comparative Pathology (3) Pathogenic mechanisms: Comparative aspects. Study of gross, microscopic and ultrastructural lesions. Prereq: Histology, 2 hrs and 1 lab. Sp, A

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

505 Advanced Topics in Pathobiology (1-3) Neoplasms, hematopathology, clinical pathology, clinical parasitology, clinical immunology, clinical bacteriology and mycology, and clinical virology. May be repeated. Maximum 3 hrs. E

506 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

507 Comparative 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


509 Pathobiology 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. Class meets once monthly. E

600 Ultrastructural Pathology (1) Ultrastructural changes in diseased cells. Interpretation of observations. Prereq: Professional medical degree or consent of instructor. F

507 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, or Microbiology-Veterinary Medicine 611-612. 2 hrs and 1 lab. Sp, A

608 Techniques in Pathology (2) Fixation, processing and staining of tissue specimens; specialized gross dissection techniques; photography of gross specimens and photomicrography. Prereq: Consent of instructor. F

609 Principles of Pathology (4) Advanced topics in pathology and mechanisms of disease: pathophysiology, cellular degeneration, inflammation, immunopathology, heredity, Principal biochemical and morphologic responses of various cells, tissues, and organs to injury and other metabolic derangements. Prereq: Present twice per term on selected topics from current literature and textbooks. Prereq: Consent of instructor. F,A

Residents:

Bouley, D., D.V.M. Tennessee
Dean, D. F., D.V.M. Tennessee
Donnell, R., D.V.M. Tennessee
Duncan, R. B., D.V.M. Ohio State
Silva-Krott, I., B.V.Sc. Austria

See Veterinary Medicine for Program Description.

GRADUATE COURSES

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 (3) Pathogenic mechanisms: Comparative aspects. Study of gross, microscopic and ultrastructural lesions. Prereq: Histology, 2 hrs and 1 lab. Sp, A

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

505 Advanced Topics in Pathobiology (1-3) Neoplasms, hematopathology, clinical pathology, clinical parasitology, clinical immunology, clinical bacteriology and mycology, and clinical virology. May be repeated. Maximum 3 hrs. E

506 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

507 Comparative 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


509 Pathobiology 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. Class meets once monthly. E

600 Ultrastructural Pathology (1) Ultrastructural changes in diseased cells. Interpretation of observations. Prereq: Professional medical degree or consent of instructor. F

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, or Microbiology-Veterinary Medicine 611-612. 2 hrs and 1 lab. Sp, A

608 Techniques in Pathology (2) Fixation, processing and staining of tissue specimens; specialized gross dissection techniques; photography of gross specimens and photomicrography. Prereq: Consent of instructor. F

609 Principles of Pathology (4) Advanced topics in pathology and mechanisms of disease: pathophysiology, cellular degeneration, inflammation, immunopathology, heredity, Principal biochemical and morphologic responses of various cells, tissues, and organs to injury and other metabolic derangements. Prereq: Present twice per term on selected topics from current literature and textbooks. Prereq: Consent of instructor. F,A

Residents:

Bouley, D., D.V.M. Tennessee
Dean, D. F., D.V.M. Tennessee
Donnell, R., D.V.M. Tennessee
Duncan, R. B., D.V.M. Ohio State
Silva-Krott, I., B.V.Sc. Austria

See Veterinary Medicine for Program Description.
Philosophy
(College of Liberal Arts)

MAJOR DEGREES

Philosophy ......................................................... M.A., Ph.D.

George G. Brenkert, Head

Professors:

Aquila, Richard E., Ph.D. ........................................ Northwestern
Brenkert, George G., Ph.D. ........................................ Michigan
Cebik, L. B., Ph.D. ................................................ Nebraska
Davis, John W., Ph.D. ............................................. Emory
Edwards, Rem B., Ph.D. ........................................... Emory
Graber, Glenn C., Ph.D. .......................................... Michigan
Postow, Beisy C., Ph.D. .......................................... Yale
Van de Vate, Dwight, Jr., Ph.D. ............................... Yale

Associate Professors:

Bennett, James O., Ph.D. ........................................ Tulane
Cohen, Sheldon M., Ph.D. ........................................ Northwestern
Bohstedt, Kathleen Emmett, Ph.D. ........................ Ohio State
Lavin, Michael, Ph.D. ........................................... Stanford
Nolt, John E., Ph.D. ............................................... Ohio State
Osborne, Martha Lee, Ph.D. ...................................... Tennessee

Assistant Professor:

Hamlin, H. Phillips, Ph.D. ........................................ Georgia

The Department of Philosophy offers graduate study leading to the Master of Arts and Doctor of Philosophy. The M.A. program includes thesis and non-thesis options and offers concentrations in medical ethics and in religious studies. The Ph.D. program also has a concentration in medical ethics. Detailed information may be obtained from the Director of Graduate Studies in Philosophy.

THE MASTER'S PROGRAM

The department offers both a thesis and a non-thesis option. The course requirements for an M.A. with thesis are 30 hours, including 8 hours in Philosophy 500. Of non-thesis hours, at least two-thirds must be in courses at or above the 500 level. No philosophy course numbered under 400 may be taken for graduate credit. There are no particular courses that M.A. students are required to take. The nature of the student’s coursework should be determined in consultation with the student’s faculty committee. The non-thesis M.A. requires 30 hours of coursework of which at least two-thirds must be in courses at or above the 500 level. Students seeking the non-thesis option must also pass a final written examination on all work offered for the degree. An additional oral examination may be required.

THE DOCTORAL PROGRAM

Specific requirements for doctoral students in Philosophy include a minimum of three academic years of graduate study involving at least 48 semester hours in coursework (normally 16 semester courses or their equivalent, exclusive of credit for thesis and dissertation). Of which no fewer than 30 hours shall be in courses numbered over 500 and no fewer than 6 hours shall be in courses numbered over 600. The specific number and distribution of courses will be determined by the student's faculty committee.

Students must demonstrate a reading knowledge of one foreign language, normally a living language in which there exists a significant body of philosophical literature. In special circumstances relating to the area of dissertation research, the Graduate Committee may approve a language not satisfying these conditions. This may be done by passing the doctoral language examination given by the appropriate department, if available, or by passing French 302 or German 332 with a B or better. Bi- or multilingual (normally, foreign) students, whose native language (other than English) is one in which there is a significant body of philosophical literature, are exempted from the foreign language requirement. Students receiving the Ph.D. with concentration in medical ethics are also exempted.

CONCENTRATIONS

Medical Ethics

The department has an M.A. and Ph.D. program of graduate study with a concentration in medical ethics. Detailed information concerning the program may be obtained from either the Director of Graduate Studies in Philosophy or the Director of the Medical Ethics Program.

Religious Studies

The department has an M.A. program of graduate study with a concentration in religious studies. Details concerning the program may be obtained from either the Director of Graduate Studies in Philosophy or the Department of Religious Studies.

ACADEMIC COMMON MARKET

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

GRADUATE COURSES

400 Special Topics (3) May be repeated when topic varies. Maximum 6 hrs.

411 Modern Religious Philosophies (3) (Same as Religious Studies 411.)

412 Classical Indian Systems of Philosophy: The Moksha Tradition (3) (Same as Religious Studies 412.)

420 Topics in History of Philosophy (3) Figures or movements from antiquity through mid-twentieth century. Prereq: 6 hrs of philosophy or consent of instructor. May be repeated when topic varies. Maximum 9 hrs.

425 American Philosophy (3) Colonial to early 20th Century. Prereq: 6 hrs of philosophy or consent of instructor.

430 Topics in Logic (3) Prereq: 6 hrs of logic or consent of instructor. May be repeated when topic varies. Maximum 6 hrs.

440 Contemporary Ethical Theory (3) Topics in meta-ethics or ethics. Prereq: 6 hrs of philosophy or consent of instructor.

446 Theoretical issues in Medical Ethics (3) Prereq: 240 or 345 or consent of instructor. (Same as Religious Studies 446.)

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 calculation. Prereq: 360 and 1 yr of natural or social science, or consent of instructor.

465 Philosophy of History (3) Speculative and critical aspects of philosophy of history. Prereq: 6 hrs of philosophy or consent of instructor.

473 Philosophy of Mind (3) Problems of mind and body in relation to consciousness and personal identity. Prereq: 6 hrs of philosophy or consent of instructor.

475 Analytic Metaphysics and Epistemology (3) Topics in metaphysics and epistemology in recent Anglo-American tradition. Prereq: 6 hrs of philosophy or consent of instructor.

476 Philosophy of Language (3) Survey of issues such as meaning, reference, and truth. Prereq: 6 hrs of philosophy or consent of instructor.

479 Studies in Recent Continental Philosophy (3) Selected thinkers or topics: existentialism, phenomenology, hermeneutics, structuralism, post-structuralism. May be repeated when topic varies. Maximum 6 hrs.

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

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

520 Topics in the History of Ancient and Medieval Philosophy (3) Intensive critical work on major philosophers or school. May be repeated. Maximum 9 hrs.

522 Topics in the History of Modern Philosophy (3) Intensive critical work on major philosophers or school. May be repeated. Maximum 9 hrs.

524 Topics in the History of Twentieth-Century European Philosophy (3) Intensive critical work on major philosopher or school. May be repeated. Maximum 9 hrs.

527 Topics in the History of American Philosophy (3) Intensive critical work on major philosopher or school. May be repeated. Maximum 9 hrs.

530 Topics in Logic and Philosophy of Mathematics (3) May be repeated. Maximum 9 hrs.

540 Topics in Value Theory (3) May be repeated. Maximum 9 hrs.

542 Ethics (3) Dominant movements in history of ethics. May be repeated. Maximum 9 hrs.

544 Applied Ethical Theory (3) Single author, tradition, or topic in ethical theory, application to issues in health, business, technology, ecology, and other practical fields. May be repeated. Maximum 9 hrs. (Same as Religious Studies 544.)

545 Orientation to Medical Ethics (3) Survey of ethical theories in application to issues in medical ethics. Prereq: Consent of Medical Ethics Committee.

547 Clinical Medical Ethics (3) Medical terminology, history of medical ethics, case study discussion, clinical observation. Open only to students concentrating in medical ethics. May be repeated. Maximum 4 hrs. S/NC or letter grade.

548 Clinical Residency in Medical Ethics (3-12) Open only to students concentrating in medical ethics. Prereq: Consent of Medical Ethics Committee. May be repeated. Maximum 20 hrs. S/NC only.

553 Philosophical Topics in Literature and the Arts (3) Aesthetics, criticism, art and society. May be repeated. Maximum 9 hrs.

560 Philosophy of Natural Sciences (3) Nature of subject matter and method of science. May be repeated. Maximum 9 hrs.


570 Philosophy of Religion (3) Examination of central problems. (Same as Religious Studies 570.)
Physics and Astronomy

(College of Liberal Arts)

MAJOR DEGREES

Physics M.S., Ph.D.

William M. Bugg, Head

Professors:

Bingham, C. R., Ph.D. .................. Tennessee
Bliss, W. E., Ph.D. .................. Michigan State
Bottcher, C., Ph.D. .................. Belfast
Breazeale, M. A. (On Leave), Ph.D. .................. Michigan State
Bugg, W. M., Ph.D. .................. Tennessee
Burgdoerfer, J., Ph.D. .................. Freie Universitat Berlin
Callcott, T. A., Ph.D. .................. Purdue
Childers, R. W., Ph.D. .................. Vanderbilt
Christophorou, L. G., Ph.D. .................. Manchester
Close, F. E. (Distinguished Scientist) (On Leave), Ph.D. .................. Oxford
Colglazier, E. W., Ph.D. .................. Cal Tech
Collins, T. C., Ph.D. .................. Florida
Condo, G. T., Ph.D. .................. Illinois
Cramer, H. W. (UTSI), Ph.D. .................. Yale
Dawds, W. E. (Emeritus), Ph.D. .................. Ohio State
Duckett, K. E., Ph.D. .................. Tennessee
Fox, K., Ph.D. .................. Michigan
Gallar, N. M. (Emeritus), Ph.D. .................. Ohio State
Georgiou, S., Ph.D. .................. Manchester
Guidry, M. W., Ph.D. .................. Tennessee
Harris, E. G. (Distinguished Prof.), Ph.D. .................. Tennessee
Hart, E. L., Ph.D. .................. Cornell
Jacobson, H. C., Ph.D. .................. Yale

Associate Professors:

Breinig, M., Ph.D. .................. Oregon
Elston, S. B., Ph.D. .................. MIT
Ferrell, T., Ph.D. .................. Clemson
Handler, T. H., Ph.D. .................. Rutgers
Lide, R. W., Ph.D. .................. Michigan
Muelhauser, J. W. (UTSI), Ph.D. .................. Tennessee
Shieh, S. Y., Ph.D. .................. Maryland
Sorensen, P. S., Ph.D. .................. Copenhagen

Research Assistant Professors:

Du, Yuan-Cai, Ph.D. .................. Beijing
McCorride, D. L., 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.

All students are expected to take Physics 521-22, 531-42, 551-62, 651-62, and 671-72. All first-year graduate students are required, for advising purposes only, to take a qualifying examination in undergraduate physics during the fall semester registration period.

THE DOCTORAL PROGRAM

A student who intends to present Physics 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 or 411-12 constitutes the minimum courses prerequisite to graduate study.

A student who intends to present Physics 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 or 411-12 constitutes the minimum courses prerequisite to graduate study.

A student who intends to present Physics 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 or 411-12 constitutes the minimum courses prerequisite to graduate study.

A student who intends to present Physics 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 or 411-12 constitutes the minimum courses prerequisite to graduate study.

A student who intends to present Physics 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 or 411-12 constitutes the minimum courses prerequisite to graduate study.

A student who intends to present Physics 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 or 411-12 constitutes the minimum courses prerequisite to graduate study.

A student who intends to present Physics 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 or 411-12 constitutes the minimum courses prerequisite to graduate study.
Astronomy

GRADUATE COURSES

411 Astrophysics (3) Development of analytical physical models of galactic structure of universe, stellar and interstellar matter, and planetary systems. Topical and interdisciplinary reading material. German 332 or French 302 may be substituted for the corresponding language examination. The dissertation topic will be chosen with reference to one of the fields in which research facilities can be made available either at The University of Tennessee in Knoxville, The University of Tennessee Space Institute at Tullahoma, Tennessee; the Oak Ridge National Laboratory, Oak Ridge, Tennessee; or at other research facilities used by the University faculty.

Physics

GRADUATE COURSES

402 Forefront of Physics (2) Survey of modern developments in physics: various forms of quantum mechanics, quantum electrodynamics and recent theories of particles, fields and their interactions. Discussion of unsolved questions in physics, experiments of current interest, readings in recent literature, and applications in other fields, with final oral report and term paper. Recommended for beginning graduate students. Prereq: 401 or consent of instructor.


421 Modern Optics (4) Transmission of light in uniform, isotropic media; reflection and transmission at interfaces; wave mechanics of light, interference, and coherence; light as waves and as particles. Prereq: 431 or 222 and consent of instructor. 3 hrs and 3 labs.


461-62-63 Modern Physics Laboratory (3,3,3) Experimental techniques: spectroscopy, electron microscopy, X-rays, and neutron diffraction. Prereq: consent of instructor. 3 hrs each.

471-72 Health Physics (3,3) Radioactivity, interaction of electromagnetic radiation with matter, radiation quantities and units, point kernel and extended sources, X-rays and gamma rays, neutron activation, interaction of charged particles with matter, stopping power, range-energy relations, counting statistics, shielding, dosimetry, waste disposal, critically-prepared, radiation biology and ecology. Prereq: 340 or 341.

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 techniques under supervision of staff research director whose research area coincides with interests of student. Open to all graduate students in good standing. Prereq: Consent of department and research director. May be repeated with consent of department. Maximum 6 hrs.

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when University facilities or departmental 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; continuum, transitional and free-molecular flows; pipe flow, nozzle flow and sonic orifice expansion flows; reacting and nonreacting flows; shock-tube physics; and an introduction to the method of characteristics and Monte Carlo computational techniques.

506 Experimental Methods (3) Principles, real operational behavior, and hazards of laser systems, radiation detectors, photocell multipliers, image intensifiers, image converters, image dissectors, streak cameras, and fast framing cameras; high vacuum systems including cryogenic-based devices, data acquisition techniques including synchronous detection, digital electronics methods and computer data acquisition and registration methods.

507 Contemporary Optics (3) Topics in geometrical, physical, Fourier, and nonlinear optics and introductory laser physics. Study of optical calculations and design of practical and sophisticated optical systems.

508 Laser Physics (3) Mode analysis, stable and unstable cavity locking, Q-switching, Kerr frequency stabilization, specific laser types: semiconductor and solid-state, excimer, copper vapor and dye lasers.

511-12 Theoretical Physics (3) Classical theoretical physics, with limited use of mathematics. Prereq: 312, 432, advanced calculus, differential equations, and vector analysis.


561 The Theory of Relativity (3) Geometry of space-time, relativistic electrodynamics, particle mechanics and continuum mechanics, Einstein's field equations, Schwarzschild solutions, the classical test of general relativity. Prereq or coreq: 531 and 542.

571-72 Mathematical Methods in Physics (3,3) Linear vector spaces, matrices, tensors, curvilinear coordinates, functions of a complex variable, partial differential equations and boundary value problems, Green's functions, integral transforms, use of complex variables, spherical harmonics, Bessel functions, calculus of variations. Prereq: Advanced calculus and differential equations. May be taken in sequence. (Same as Mathematics 517-18.)


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 physics, and particle physics. Prereq: 571-72.

591 Foreign Study (1-19) See page 31.

592 Off-Campus Study (1-19) See page 31.

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

594 Special Problems (3) Especially assigned theoretical or experimental work on problems not covered in other courses. May be repeated. Maximum 9 hrs. E


600 Doctoral Research and Dissertation (1-35) P/NP only: E


605 Laser Spectroscopy (3) Application of lasers to spectroscopy of atomic and molecular systems; review of classical multipole radiation, atomic L-S and J-J coupling and Zeeman and Stark effects, spontaneous emission of atomic systems and oscillator strengths, selection rules, radiation, quantum beats, stimulated and spontaneous radiative transfer and formation of spatial fields. Study of saturated absorption spectroscopy, resonance fluorescence, and dye lasers. Hanle effects, optical double resonance, optical pumping and hyperfine spectroscopy. Prereq: 521, 541, 508.

606-07 Nonlinear Optics (3,3) Nonlinear optical susceptibilities, wave propagation in nonlinear media, sum frequency and difference frequency generation, harmonic generation, parametric amplification and oscillation, stimulated Raman processes, two- and multi-photon processes, four-wave mixing and phase conjugation, transient coherent optical effects and free induction decay, optical breakdown and nonlinear effects in plasmas. Prereq: 522.
609-09 Quantum Electronics and Electro-Optics
(3,3) Electromagnetic propagation in anisotropic and periodic media, internal and external quantum effects and devices, acousto-optical effects and devices, (linear and nonlinear) effects, and femtosecond optical switching and electronics, and optical computers and processors. Prereq: 606.

610 Quantum Optics (3) Quantum theory of emission and absorption of radiation; frequency-dependent susceptibilities; concepts of electromagnetic field and quantum coherence; quantum mechanics and field theory; and coherent atomic and photon states; interaction of radiation with photons: quantum optics, counting and higher-order coherence of light; scattering phenomena. Prereq: 602.

611 Advanced Quantum Mechanics & Field Theory (3) Second quantization, quantization of electromagnetic field, emission, absorption, and scattering of light, bremsstrahlung, pair creation and annihilation, quantum field theory methods in condensed matter physics, and quantum optics. Topics vary according to instructor. Prereq: 652 or consent of instructor. Prereq or cons of consent. Prereq or consent of instructor.

612 Advanced Topics in Quantum Field Theory (3) Renormalization, Lambda shift, anomalous magnetic moments, gauge theories, electroweak theory, quantum chromodynamics, grand unified theories, and advanced topics in laser physics and quantum optics. Topics vary according to instructor. Prereq 652 or consent of instructor. Prereq or cons of consent.

617-18 Lie Algebras in Mechanics and Physics (3.3) (Same as Mathematics 617-18.)

621-22 Nuclear Structure (3,3) General properties of nuclei; two-body scattering problems; saturation and symmetry properties of nuclear forces; theory of light nuclei; nuclear spectroscopy; special nuclear models; theory of nuclear reactions; theory of beta-decay. Prereq: 571-72.

626-27 Elementary Particle Physics (3,3)626--Survey in elementary particle physics covering experimental methods, conservation laws, invariance principles, and models of interactions. 627--Advanced topics: quark models, electroweak interactions and electroweak theories. Prereq: 652.

631 Advanced Topics in Relativity of Cosmology (3) Topics vary according to interests of students, instructor and availability of textbook. Prereq: 562 and 542 or equivalent. Prereq or coreq: 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: 522, 542, 551. May be repeated with consent of department. Prereq: 511.

642 Advanced Topics in Quantum Theory (3) To meet special needs of students: Angular-momentum theory, beta-ray theory, theory of atomic spectra, molecular structure and valence theory, theory of radiation, electric and magnetic susceptibilities, high energy processes, scattering and collision processes, or theory of fields. Prereq: 522. May be repeated with consent of department. Maximum 9 hrs.

643 Computational Physics (3) Developing computer algorithms for solving representative problems in various fields of physics, celestial dynamics in astrophysics, boundary value problems in electromagnetism, atomic and nuclear structures, band structure on solid state physics, transport problems in statistical mechanics, Monte Carlo simulation of liquids, fitting and interpolation of data, correlation analysis, or optimization strategy. Prereq: 522, 541, 542, and 572.

651-62 Molecular Spectroscopy (3,3) Spectroscopic methods of characterization of molecules, molecules or free particles, scattering, polarons, surface states, F-centers, dislocations, and other defects. Prereq: 542, or equivalent. Prereq. or consi of instructor.

681-82 Molecular Spectroscopy (3,3) Spectroscopic methods of characterization of molecules, molecules or free particles, scattering, polarons, surface states, F-centers, dislocations, and other defects. Prereq: 542, or equivalent.

### Planning

#### Degree Requirements

The M.S.P. requires completion of at least 48 hours of graduate credit, at least 50 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 competency 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, environmental planning, and real estate development planning.

Students have the latitude to propose an alternate specialization consisting of at least 9 hours of coursework and must meet with a faculty committee. Courses are available in transportation, health, education, environmental, and social planning. Each student is required to demonstrate competence in independent 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 program 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 idea, 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's academic record and 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 West Virginia. Additional information may be obtained from the Residence Assistant in the Office of Graduate Admissions and Records.

### GRADUATE COURSES

401 The City in the U.S. (3) Development and character of U.S. cities. Contemporary issues and selected case studies. (Same as Urban Studies 401.)

402 Survey of Planning (3) History of city development and of planning; U.S. experience in urban and other levels of planning. State of the art, process, comprehensive plan, implementation devices. Planning issues in society. Not for credit for M.S.P. degree.
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. This course 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 Fundamentals of Planning (2) History of planning, structure and development of urban areas, operations of contemporary planning, trends and issues.

511 Graphic and Oral Communications in Planning (1)

515 Theory of Planning (2) Analysis of nature and objectives of planning process, role of planner and planning function in public decision-making. Prereq: S/NC or consent of instructor.

520 Planning Research Methods (3) Research techniques in subject areas associated with city and regional planning. Research tools, data collection and analysis as basis for planning and decision-making.

521 Computers in Planning (3) Basic computer concepts, hardware and software, use of mainframe and microcomputers in planning and government.

522 Computers in Planning II (3) Software and systems for planning and local government. Content varies. Projects in small group or individual study mode. Prereq: 521 and consent of instructor.

523 Statistics for Planners (3) Applications of basic descriptive and inferential classical and non-parametric techniques in planning research. Data organization and display, measures of location, dispersion and association; data transformations; some basic probability theory; one and two sample tests; correlation and regression analysis. Prereq: S/NC or consent of instructor.

524 Advanced Data Analysis (3) Applications of statistical data analysis in planning. Regression analysis, multiple regression analysis, analysis of variance, factor analysis, cluster analysis, discriminant analysis, and other statistical models and computer software. Prereq: S/NC or consent of instructor.


526 Library Research for Planning (1) Survey of publications of interest to planners, resources and research techniques. Use of facilities and collections of libraries.

530 Planning Analysis and Forecasting (3) Methods of quantitative analysis and modeling in urban and regional studies. Population, employment, and economic bases of forecasts, forecasting techniques. Coreq: 520 or consent of instructor.

531 Urban and Regional Analysis (3) Past, present and possible future patterns of urban and regional structures drawing on contemporary theories, models, and empirical research.

532 Planning Methods (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: S/NC or consent of instructor.

537 Planning and Transportation (3) (Same as Civil Engineering 558.)

538 Urban and Site Design (3-6) Principles of design of residential subdivisions and some components of physical community, shopping centers, institutional complexes, central business districts. Problems of reverting alternative designs against each other or written regulations. Extensive laboratory experience.

539 Planning for Historic Preservation (3) Planning for preservation, restoration, and conservation of historic buildings, areas and sites as related to comprehensive planning process. National, state, and local government role in planning processes, designation of sites, legislative needs, financing and administrative organizations.

540 Legal Aspects of Planning (3) Legal basis for planning and guiding community development. Legal tools of planning. Prereq: 510 or consent of instructor.

545 Planning and Property Development (2) Process of urban physical growth and change; functioning of private sector real estate development and its relationship to planning. Comprehensive plans and strategies, public and private sectors in urban development and redevelopment. Prereq: 510 or consent of instructor.


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 management, and management of integrated resources. (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 leading U.S. national experience 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/NC or letter grade.

591 Special Topics (1-3) Prereq: Consent of instructor.

592 Readings in Planning (1-3) Prereq: Consent of instructor. May be repeated.

593 Problems in Planning (1-3) Prereq: Consent of instructor.

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**Plant and Soil Science**

(College of Agricultural Sciences and Natural Resources)

**MAJOR**

**DEGREES**

**Plant and Soil Science** ............... M.S., Ph.D.

John E. Foss, Head

Professors:

Allen, Fred L., Ph.D. ..................... Minnesota
Beil, Frank F. (Emeritus), Ph.D. ........ Iowa State
Conley, D. L., Ph.D. ...................... Purdue
Deyton, D. E., Ph.D. ..................... North Carolina State
Dorf, B. V. (Distinguished Prof.), Ph.D. ....... Kent State
Foss, John E., Ph.D. .................... Minnesota
Frisbie, Ph.D. ........................... Iowa State
Hayes, R. M., Ph.D. ...................... Illinois
Hoskinson, P. E., M.S. ................... Tennessee
Howard, D. D., Ph.D. .................... Auburn
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
Raynolds, 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. .............. Louisiana State
Winters, Eric (Emeritus), Ph.D. .......... Illinois

Associate Professors:

Ammons, J. T., Ph.D. .................... West Virginia
Dayton, D. E., Ph.D. ..................... NC State
Gravel, J. G., Ph.D. ...................... Purdue
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
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:

Easington, M. E., Ph.D. .......... California (Riverside)
Logan, Joanne, Ph.D. .............. Nebraska
Mueller, Thomas C., Ph.D. .......... Georgia
Mullen, M. D., Ph.D. ................. NC State
Newton, D. (Adjunct), M.S. .......... Kentucky
Wilson, G. V., Ph.D. ............... Arkansas

The Department of Plant and Soil Science offers graduate programs leading to the Master of Science and the Doctor of Philosophy. Concentrations for the graduate programs are offered in soil science, plant breeding and genetics, and crop physiology and ecology. For further information, contact the department head.

**THE MASTER'S PROGRAM**

**Thesis Option**

This option requires writing a thesis based on original research. Six hours of 500 Thesis are required. Prior to conducting research, the student must develop a detailed written research plan. In addition to the thesis hours, a minimum of 24 hours of graduate coursework is required, of which at least 14 must be taken in courses numbered 501 and above. The student’s advisory committee may require additional coursework if the student's progress is considered inadequate. Each student must be required to take 1 hour of 501 and 1 hour of 503, and to present an exit seminar on the thesis research.

The student’s advisory committee consists of the major professor, who acts as chairperson of the committee, and a minimum of two other faculty members. The advisory committee approves the student's research problem and coursework and conducts the final oral examination integrating the thesis and coursework.

A student having started on the thesis option is not eligible to transfer to the non-thesis option after the first semester of graduate study or after having received a Graduate Research Assistancehip stipend for more than one semester. A student having...
started on the non-thesis option may transfer to the thesis option upon approval by a potential major professor and the Department Head.

Non-Thesis Option
A student desiring the non-thesis option should declare this intention at the beginning of the first semester of graduate studies, and must declare it before the end of the first semester. In lieu of thesis, students are required to complete 3 hours of 593 for satisfactory participation in a single research program for a period of 12 weeks and the writing of an original, creative, and interesting report, both to be conducted by the major professor and approved by the advisory committee. In addition to the research program, a minimum of 30 hours of graduate coursework is required, of which at least 20 must be taken in courses numbered 501 or above. The student's advisory committee may require additional coursework if the student's progress or background indicates such need. Each student is required to take 1 hour of 501 and 2 hours of 503.

The student's advisory committee consists of the major professor, who acts as chairperson of the committee, and a minimum of two other faculty members. The advisory committee approves the student's coursework and the report on participation in a research program for 593. Students are required to take a written comprehensive examination integrating the coursework.

THE DOCTORAL PROGRAM
A minimum of 72 hours beyond the Bachelor's degree, exclusive of credit for Thesis 500, is required. Of this number, 24 hours must be Doctoral Research and Dissertation 600. A minimum of 26 hours must be completed in courses numbered above 500 exclusive of doctoral research and dissertation, of which 6 must be in courses numbered above 600. A 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 full-time 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 areas, direct the research, and recommend the dissertation for approval and acceptance by The Graduate School.

GRADUATE COURSES
411 Soil Microbiology (3) Soil microbial populations and role in soil ecosystem, microbial transformation of organic and organic compounds, decomposition of residues, dynamics of disease agents, and constructs. Intro-duction to Soil Science and Introduction to Organic and Biochemistry or Organic Chemistry. Consent of instructor required. 2 hrs and 1 lab. F.A
412 Soil Genesis, Classification, and Mapping (3) Soil genesis and formation; observing and describing morphological characteristics of agricultural and forest soils; chemical and physical properties of soil; soil fertility. Two Saturday field trips. Prereq: 210 or consent of instructor. 2 hrs and 1 lab. Sp
413 Soil Chemistry (3) Principles concerning structure and behavior of soil materials; colloidal fraction as related to exchange, chemical equilibrium, soil acidity, oxidation-reduction, weathering, nutrient availability and waste disposal. Prereq: 311 or consent of instructor.
414 Soil, Land Use, and the Environment (3) Soil as an environmental component and soil properties affecting land use. Soil as resource in development planning: consideration of nonengineering aspects of site selec-tion for land use, soil survey and resource data in land use, recognition and prevention of soil pollution. Prereq: 210 or consent of instructor. Sp, A
431 Crop Physiology and Ecology (3) Principles of plant 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, A
432 Bioclimatology (3) Solar energy budget; interactions between global, regional and local climates and biological systems: quantification of macro- and micro-climates; microclimates and their modification; automated weather station data collection and analyses; biological responses to climatic stresses; climate vari-ability and change and their effects on biological systems. Prereq: 1 yr physical or biological science, junior standing. 2 hrs and 1 lab. F, A
433 Agricultural Pesticides (3) Regulation of pesticide development, manufacture, transportation, marketing and use in soil and water: structure, degradation and environmental impact of pesticides used in agriculture, forestry and related areas. Prereq: 1 yr biological sciences and 1 yr of organic or inorganic chemistry. 2 hrs and 1 lab. Sp
453 Principles of Plant Breeding (3) Genetic principles and techniques used in crop improvement. Prereq: Biology 220 or equivalent, 2 hrs and 1 lab. Sp
471 Statistics for Biological Research (3) Application of statistical techniques to research: Notation, descriptive statistics, probability, distributions, confidence intervals, t and chi-square tests, analysis of variance, mean separation procedures, linear regres-sion and correlation. Prereq: Mathematics 121 or equivalent. F
500 Thesis (1-15) P/NP only. E
501 Seminar Preparation (1) Application of speaking, writing, and organizational skills in preparation and presen-tation of scientific work to both scientific and general audiences. Preparation of abstracts for scientific presentations. Required of all entering graduate students during their first year of graduate study. F, Sp
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E
503 Seminar (1) Presentations and discussion of current scientific material. May be repeated. Maximum 3 hrs. F, Sp
512 Pedology (3) Physical and chemical weathering processes, factors of soil formation, soil forming proc-esses. Prereq: 412 or consent of instructor. 2 hrs and 1 lab. F, A
514 Soil Physics (3) Physical and chemical relations-hips among solid, liquid and gaseous phases of soil system. Dynamics, interactions, different phases of soil characteristics, segregation and relationship to plant growth. Prereq: 413 or consent of instructor. 2 hrs and 1 lab. F, A
530 Integrated Pest Management (3) Same as Entomology and Plant Pathology 530. F
532 Advanced Crop Ecology (3) General and specific relationships among environmental factors, crop organisms, and agricultural systems: quantification of macro- and microclimatic influences, and their effects on agricultural production. Prereq: 471 or equivalent. 431 or equivalent consent of instructor. F, Sp
551 Advanced Plant Genetics (3) Discovery of genet-ics: controlling elements, induced mutations, genome dynamics of soil solutions, clay structure and surface properties. Interactions in the soil-plant environment. May be repeated. Maximum 6 hrs. E
563 Advanced Soil Chemistry (3) Surface and colloid chemistry as related to nutrient movement in speciation, ion movement, surface charge, surface complexation and soil colloidal stability. Prereq: 413 or consent of instructor. Sp, A
565 Advanced Plant Breeding (4) Development and analysis of composite and composite breeding programs, interfertility, heterosis, methods of selection, in vitro breed-ing, interspecific hybridization, stability parameters, genetic resistance and vulnerability to pests and envi-ronmental stresses. Prereq: 453 and 571 or equivalent or consent of instructor. 3 hrs and 1 lab. F, A
571 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 461, or equivalent. (Same as Animal Science 671.) F, A

Political Science
(Majors of College of Liberal Arts)

DEGREES
Political Science M.A., Ph.D.
Public Administration M.P.A., J.D.-M.P.A., M.S.S.W.-M.P.A.
Michael Gant, Head
THE MASTER OF PUBLIC ADMINISTRATION PROGRAM

The MPA 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 36 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 MPA 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 MPA program. Possible specializations include general government, 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 MPA program.

4. A written final examination, which may be followed by an oral examination, is required.

DUAL J.D.-MPA PROGRAM

The College of Law and the Department of Political Science offer a coordinated dual degree program leading to the conferral of both the J.D. and the MPA degrees. In this program, a student may earn the MPA and J.D. degrees in about four years rather than the five years that would otherwise be required.

The MPA program will award a grade of Satisfactory for successful completion of approved courses offered in the College of Law. Minimum grades assigned by the instructor without credit for any lower grade. The Political Science Department will award a grade of Satisfactory for approved courses offered in the College of Social Work. Grades earned in courses in the other unit will not be computed in determining a student's GPA for the program, but application to the dual program before completion of the requirements for both degrees will not receive credit toward the J.D. or the MPA degree for courses taken in the other program except as such courses qualify for credit without regard to the dual program.

A dual degree candidate must satisfy the requirements for both the J.D. and the MPA 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 courses offered in the College of Law. All courses for which such cross-credit is awarded must be approved by the J.D.-MPA coordinators in the College of Law and the Department of Political Science. In addition to the dual degree program, an approved course in which the student earns a grade of B or higher and a grade of Satisfactory (S) for the J.D. degree and will not be computed in determining a student's GPA for the dual program. Students are strongly encouraged to take both law and political science courses each semester.

Dual degree students who withdraw from the program before completing all requirements will lose all credit for courses taken in the other unit. Students are strongly encouraged to take both law and political science courses each semester.

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 Master of Public Administration degrees. In this program, a student may earn the MPA and J.D. degrees in about four years rather than the five years that would otherwise be required. The MPA program will award a grade of Satisfactory for successful completion of approved MPA courses in which the student earns a grade of B or higher and a grade of Satisfactory (S) for the J.D. degree and will not be computed in determining a student's GPA for the dual program. Grades earned in courses in the other unit will not be computed in determining a student's GPA for the program, but application to the dual program before completion of the requirements for both degrees will not receive credit toward the J.D. or the MPA degree for courses taken in the other program except as such courses qualify for credit without regard to the dual program.

A dual degree candidate must satisfy the requirements for both the J.D. and the MPA 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 courses offered in the College of Law. All courses for which such cross-credit is awarded must be approved by the J.D.-MPA coordinators in the College of Law and the Department of Political Science. In addition to the dual degree program, an approved course in which the student earns a grade of B or higher and a grade of Satisfactory (S) for the J.D. degree and will not be computed in determining a student's GPA for the dual program. Students are strongly encouraged to take both law and political science courses each semester.

Dual degree students who withdraw from the program before completing all requirements will lose all credit for courses taken in the other unit. Students are strongly encouraged to take both law and political science courses each semester.

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 Master of Public Administration degrees. In this program, a student may earn the MPA and J.D. degrees in about four years rather than the five years that would otherwise be required. The MPA program will award a grade of Satisfactory for successful completion of approved MPA courses in which the student earns a grade of B or higher and a grade of Satisfactory (S) for the J.D. degree and will not be computed in determining a student's GPA for the dual program. Grades earned in courses in the other unit will not be computed in determining a student's GPA for the program, but application to the dual program before completion of the requirements for both degrees will not receive credit toward the J.D. or the MPA degree for courses taken in the other program except as such courses qualify for credit without regard to the dual program.
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

Applications for the M.S.S.W.-M.P.A. program must be submitted to the College of Social Work and to the Department of Political Science. In addition, 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.

Curriculum

Students in the dual degree program are required to take a set of core courses from each curriculum, but the program is designed to be flexible, providing students the opportunity to develop special areas of competence. For the dual degree program, a minimum of 78 hours are required (35 hours must be in social work and 30 hours must be in public administration). Admission to candidacy will be completed separately for each degree.

A comprehensive examination is required in each discipline for students receiving the dual degrees. A faculty committee from Public Administration and one from Social Work will write and grade the respective examination.

Dual degree students who withdraw from the program before completion of the requirements for both degrees will not receive credit toward either the M.P.A. or the M.S.S.W. degree for courses taken in the other program, except as such courses qualify for credit toward a degree independent of the dual degree program.

Financial Aid

Students may apply for financial aid to both the College of Social Work and the Department of Political Science. Normally, students will not receive funding from both programs concurrently.

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.

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 Political Science (3) May be repeated with consent of department. 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) Examination 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.
431 U.S. Constitutional Law: Civil Rights and Liberties (3) Analysis of current issues in civil rights and liberties including: first amendment freedoms, equal protection, privacy and rights of accused.
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 administrative power and procedures, and constitutional controls over administrators.
452 Black African Politics (3) Recent evolution and current political environment of Black African nations. (Same as Afro-American Studies 452.)
454 Government and Politics of China and Japan (3) Examination of the political setting, structure and political processes in China and Japan.
455 Latin American Government and Politics II (3) Selected topics on Latin American political dynamics, consideration of leading theoretical explanations. (Same as Latin American Studies 455.)
459 Government and Politics of the Soviet Union (3) Origins and development of Soviet political system, and study of selected policy areas.
460 Revolution (3) Examination of characterististics, 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 policies.
463 Contemporary Middle East Politics (3) Governments and movements in Middle East, their characteristics, bases, and interrelationships.
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 its relationship to international conflict.
475 Ancient and Medieval Political Thought (3) Survey of major western political thinkers from Socrates to Marsilio of Padua.
476 Modern Political Thought (3) Survey of major western political thinkers from Machiavelli to Marx.
500 Thesis (1-15) P/NP only. E
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated with consent of department. Maximum 9 hrs.
510 Scope and Methods in Political Science (3) Procedures of analysis in political science.
512 Quantitative Political Analysis (3) Methods and techniques in quantitative political analysis: univariate and bivariate statistics.
513 Quantitative Political Analysis (3) Methods and techniques in quantitative political analysis: multivariate model building.
514 Research and Methodology in Public Administration (3) Basic techniques 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 structure and public policies. 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.
548 Law and the Administrative Process (3) Constitutional position, decisional processes, regulation and management; limitations on governmental action; questions of structure, role, and administrative choice. May be repeated with consent of department. Maximum 9 hrs.
550 Public Administration (3) Overview of public administration theory and function.
552 Organization Theory (3) Appraisal of major theories of organization and their applicability to public sector.
556 Policy Analysis (3) Role of administrators in policy analysis and decision making. May be repeated with consent of department. Maximum 9 hrs.
558 The Politics of Administration (2) 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.
Polymer Engineering
See Materials Science and Engineering

Psychology
(College of Liberal Arts)

MAJOR
DEGREES
Psychology ......................................... M.A., Ph.D.

Warren H. Jones, Head

Professors:
Burghardt, Gordon M., Ph.D. ............... Chicago
Burstein, Alvin G., Ph.D. ....................... Chicago
Calhoun, William H., Ph.D. ................. California
Cohen, Charles P., Ph.D. ............... Kansas
Cureton, Edward E. (Emeritus), Ph.D. ... Columbia
Fine, Harold J. (Emeritus), Ph.D. ......... Syracuse
Fowler, Raymond D. (On Leave), Ph.D. ....... Pennsylvania
Handel, Stephen J., Ph.D. ............... Johns Hopkins
Handler, Leonard, Ph.D. ................. Michigan State
Johnson, Michael G., Ph.D. .............. Johns Hopkins
Jones, Warren H., Ph.D. ................... Oklahoma State
Lawler, James E., Ph.D. ............... North Carolina
Lawler, Kathleen A., Ph.D. ............... North Carolina
Lounsbury, John W., Ph.D. .......... Michigan State
Lubar, Joel F., Ph.D. ................. Chicago
Malone, John C., Ph.D. .............. Duke
Newton, Kenneth R. (Emeritus), Ph.D. ....... Duke
Pollio, Howard R. (Distinguished Prof.), Ph.D. ........ Tennessee
Samejima, Fumiko, Ph.D. ..................... Michigan
Saudargas, Richard S., Ph.D. ............ Florida State
Shadrin, Mark, Ph.D. ..................... Johns Hopkins
Travis, Cheryl B., Ph.D. ........ California
Verplank, William S. (Emeritus), Ph.D. .... Brown
Wahler, Robert G., Ph.D. .................... Washington

Associate Professors:
McIntyre, Anne, Ph.D. ....................... Yale
Morgan, Wesley G., Ph.D. .............. Tennessee
Nash, Michael R., Ph.D. ............. Ohio

Assistant Professors:
Baldwin, Debora R., Ph.D. .......... Kent State
Hopson, Ronald E., Ph.D. .............. Michigan State

THE MASTER'S PROGRAM
Graduate study leading to the Master of Arts in general psychology is normally available only to students in 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 programs 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 careers in research and teaching in psychology in academic, institutional, or industrial settings. The program is highly flexible 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, ethnology, existential phenomenology, psychometrics, psychophysics, social psychology, and others. Requirements of the program are as follows:

1. Statistics 537-38, or equivalent, and two additional courses numbered above 500 in research methodology, quantitative methods, statistics, or psychometrics.

2. Competence in general psychology, demonstrated by passing the Psychology 513 (Foundations of Psychology) or Psychology 420 (History and Systems of Psychology) or equivalent, plus at least one course or sequence or equivalent from four categories in the following list. (This requirement may be met by passing approved written examinations.)
   a. Biological psychology: 461-69 Physiological Psychology and Laboratory; 526 Neuroanatomy; 527 Behavioral Neurology

688 Special Topics in International Politics (3) Selected topics in international politics. Specific content determined by instructor. May be repeated with consent of instructor. Maximum 9 hrs.

680 Doctoral Research and Dissertation (3-15) Open to only. E

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

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

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

573 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.

572 The Politics of Foreign Policy (3) Analysis of selected issues in foreign policy. May be repeated with consent of department. Maximum 9 hrs.

569 Internship in Public Administration (3-9) Open to only. E

568 Special Topics in Public Administration (3) Topics selected by instructor. May be repeated with consent of department. Maximum 9 hrs.

560 Internship in Law (3) Practice problems in the legal profession. May be repeated with consent of department. Maximum 9 hrs.

558 Internship in Political Science (3) Internship experiences in political science. May be repeated with consent of department. Maximum 9 hrs.

557 Comparative Political Systems (3) Comparative perspectives on political systems. May be repeated with consent of department. Maximum 9 hrs.

556 Internship in Policy Analysis (3) May be repeated with consent of department. Maximum 9 hrs.

555 Special Topics in Policy Analysis (3) Topics selected by instructor. May be repeated with consent of department. Maximum 9 hrs.

554 Policy Research (6) May be repeated with consent of department. Maximum 9 hrs.

553 Special Topics in Policy Research (3) Topics selected by instructor. May be repeated with consent of department. Maximum 9 hrs.

549 Internship in International Politics (3) May be repeated with consent of department. Maximum 9 hrs.
2. 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.
3. 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.
4. 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 foundations 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)
   f. Empirical Methods in Psychology plus either 505 Research Design or 557 Applied Psychological Measurement;
   g. Psychopathology (572, 573, 574);
   h. Psychopathological Assessment (594-595, 596);
   i. Psychotherapy (670, 671, 673, 675);
   j. Ethical, Legal, and Professional Issues in Psychology (405).
5. Satisfactory completion of at least 3 additional graduate-level courses in non-clinical topics in psychology.
6. Satisfactory completion of a one-year clinical internship at a site approved by the program.

GRADUATE COURSES


409 Group Facilitation (3) Study of theory and techniques through supervised experience in small groups. Prereq: 359 and consent of instructor. May be repeated. Maximum 6 hrs.


424 Psychology and the Law (3) Psychological aspects of legal systems. Prereq: 110 or equivalent, upper-division standing and consent of instructor.

430 Health Psychology (3) Survey of psychological factors related to health and illness: stress, personality, and environment. Applications of psychological treatments to physical illness. Prereq: 110 or equivalent, 210.

434 Psychology of Gender (3) Biological, psychological, and social factors in gender. Importance of gender roles and stereotypes for behavior and experience. Prereq: 110 or equivalent, 210, 220. (Same as Women's Studies 434.)


450 Comparative Animal Behavior (3) Prereq: 359. (Same as Zoology 450.)

459 Comparative Animal Behavior Laboratory (3) Coreq: 450. (Same as Zoology 459.)

461 Physiological Psychology (3) Nervous system and physiological correlates of behavior. Biological basis of emotion, learning, memory and stress. Prereq: 110 or equivalent, 210, and 1 yr of biology or zoology introductory sequences or equivalents.

469 Laboratory in Physiological Psychology (3) Laboratory course in the experimental analysis of the nervous system and physiological correlates of behavior. Coreq: 461.

470 Theories of Personality (3) Survey of major theories of human personality and their development. Prereq: 220 and 330 or 330.

480 Theories of Learning (3) Classical and current approaches to learning and cognition. Prereq: 310.

482 Topics in Psychology (3) Intensive analysis of special topics: Afro-American psychology or evaluation of programs in community. Prereq: Biological Basis of Behavior or Behavior and Experience: Humanistic Psychology and at least 9 hrs in 300-level courses. Recommended prereq: Statistics in Psychology, Methods of Research in Psychology. May be repeated. Maximum 6 hrs.

489 Supervised Research (1-9) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs in 399, 489, 491, 492, and 493 combined may apply toward undergraduate major.

500 Thesis (1-3) Prereq: Approval of the student and consent of instructor. May be repeated. Maximum 9 hrs. S/N/C only.

509 Research Practicum (1-3) Required of first-year graduate students in psychology. May be repeated. Maximum 9 hrs. S/N/C 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 survey. Prereq: Consent of instructor.

516 Colloquium in Ethology (1) Current research and theory. May be repeated. Maximum 9 hrs. (Same as Zoology 516.) S/N/C only.

517-18 Proseminar in Industrial and Organizational Psychology (3,3) (Same as Management 567-68.)

520 Interventions for Behavioral Change (3) Principles and techniques for planning, implementing, and evaluating interventions from social learning theory. Interventions by people in community: teachers or supervisors. Token economies and strategies for self-control. Prereq: Consent of instructor.

525 Laboratory Techniques and Instrumentation (3) Procedures for laboratory research involving humans and nonhuman animals: techniques for collecting, transforming, storing, and retrieving data using microcomputers. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

526 General Vertebrate Neuroanatomy (3) Lecture and laboratory. Structure and functioning of central and peripheral nervous system. Prereq: 481, 486, or equivalent and consent of instructor. (Same as Zoology 526.)


528 College Teaching in Psychology (3) Concepts, techniques, and materials for teaching psychology at college and/or university level. Supervised practice. Prereq: Consent of instructor. S/N/C only.


545 Advanced Animal Behavior (3) (Same as Zoology 545.)

546 Ethological Psychology (3) Basic ethology and comparative psychology: adaptations for 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. Maximum 6 hrs.

556 Theory of Mental Measurement (3) Classical and modern test theories. Reliability, validity, item and test-characteristic functions, information functions and other topics. Prereq: 555 and consent of instructor. 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 and consent of instructor. May be repeated. Maximum 6 hrs.

560 Psychology of Learning (3) Review of current evidence from research involving human and/or nonhuman animals. Prereq: 400 and consent of instructor. May be repeated. Maximum 6 hrs.
570 Personality: Theory and Research (3) Advanced survey of psychodynamic 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 (2) Diagnostic criteria of the DSM-III. Examples from written case-histories and recorded interviews. Prereq: Admission to doctoral program in clinical psychology or consent of instructor.

573 Dynamics of Psychopathology (3) Psychodynamic view of the causes and symptoms of major psychoses, neuroses, and adjustment disorders. Prereq: Admission to doctoral program in clinical psychology or consent of instructor.

574 Atypical Development in Childhood (3) Research on etiologies of atypical patterns of development in infancy and childhood. Prereq: 511 and consent of instructor. May be repeated. Maximum 6 hrs.

576 Object Relations (3) European and American conceptions of normal and psychopathological development of object relations. Significance for psychodynamic therapy. 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.

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 6 hrs.

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) Prereq: Consent of instructor. 

601 Seminar in Psychology (3) Prereq: Consent of instructor.

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.

616 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: 540 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; theories of measurement; norm estimation, 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.

666 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/NC 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 Influence in Psychotherapy (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. 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.

684 Neuropsychology (3) Investigation of brain-behavior relationships in adults and children. Introduction to administration of REITAN neuropsychological screening battery. Literature based on implications of brain dysfunction. Prereq: Consent of instructor.

685 Psychopharmacology (2) Connections between pharmacology and psychology. Prereq: Consent of instructor.

693 Field Work in Industrial and Organizational Psychology (1-12) (Same as Management 690.)

695 Field Placement in Clinical Psychology (3) Prereq: Admission to doctoral program in clinical psychology and consent of instructor. May be repeated. Maximum 24 hrs. S/NC only.

696 Advanced Psychology Clinic Placement (1-3) Prereq: Admission to doctoral program in clinical psychology or consent of instructor. May be repeated. Maximum 24 hrs. S/NC only.

Religious Studies

(Graduate Courses)

Charles H. Reynolds, Head

Professors:

Dungan, David L., Ph.D. Harpur
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. Washington
Hackett, Rosalind I. J., Ph.D. Aberdeen
Hodges, John O., Ph.D. Levering
Linge, David E., Ph.D. Vanderbilt

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.
### Romance Languages

**College of Liberal Arts**

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**Professors:**

- John B. Romeiser, Head
- DiPuccio, Denise M., Ph.D. Kansas
- Duncan, Cynthia K., Ph.D. Illinois
- Levy, Karen D., Ph.D. Kentucky

**Assistant Professors:**

- Brizio, Flavia, Ph.D. Washington
- Cazeneve, Odille, Ph.D. Penn State
- Da Cruz, Jose, Ph.D. California
- Holmberg, Christine, Ph.D. Wisconsin
- Millaret, Margo, Ph.D. Texas
- Rodriguez, Alberto, Ph.D. Brown
- Sachs, Hilary, Ph.D. Cornell
- 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 course work plus at least 6 hours in course 500. Thesis. If in French, 501 is required. Alternatively, 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 minor.
2. A thesis, with a minimum of 6 semester hours in course 500.
3. A written examination covering the coursework and selected items from a master reading list.
4. A final oral examination covering the thesis.

**Non-Thesis Option**

1. Completion of at least 30 semester hours, with a maximum of 9 at the 400 level, the rest at the 500 level. If in French, 490 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 minor.
2. Three term papers that have been approved 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.

**Requirements for the Ph.D.**

Candidates 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 at least one concentration, a second concentration, and a cognate field.

1. First Concentration: French, German, or Italian. It consists of at least 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).
   - German 512 (3), French 512 (3), or Spanish 512 (3) or 515-16 (2.2) or history 520 (3).
   - At least 12 hours at the 600 level (exclusive of dissertation hours).
2. Second Concentration: French, German, Italian, Russian, or Spanish (different from the first concentration). It consists of at least 15 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 tests 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 the National Teacher’s Exam, 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 be strongly encouraged to instruct at least two foreign languages, subject to staffing needs.
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 Pèiade. 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) Examination of French literature outside metropolitan France, particularly Africa and Caribbean. Prereq: 212, 218 or equivalent.

420 French Cinema (3) French cinema from earliest days to 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. Stress is placed on class contact rather than outside preparation. Prereq: 342 or 345. 2 hrs weekly.

425 Introduction to Descriptive Linguistics (3) Phonetics and phonemics, morphology and syntax. Types of languages, linguistic groups, dialects, and dialect geography. Application of descriptive linguistics—field linguistics, dialect study, its practical use in learning languages and in language teaching. Introduction to transformational grammar. Prereq: 6 hrs of upper-division English or 6 hrs of upper-division courses in a modern or ancient language exclusive of German and French 301-322 courses in literature in translation, and general courses in Latin and Greek requiring no knowledge of these languages), or consent of department. (Same as German 425, Russian 425, Spanish 425, and Linguistics 425.)

426 Methods of Historical Linguistics (3) (Same as German 426, Russian 426, Spanish 426 and Linguistics 426.)

429 Romance Linguistics (3) Development of Classical Latin through Vugar Latin into major Romance lan- guages. (Same as Spanish 429 and Linguistics 429.)

430 Theatrical French (2-3) Performance in one or more French plays. Prereq: 212, 218 or equivalent and consent of instructor. May apply toward major.

431 Highlights of French Civilization (3) Survey of French civilization from the Gauls to World War II. Historical events, daily life, all forms of arts. Prereq: 212, 218 or equivalent.

432 Contemporary French Culture (3) French con- temporary civilization and culture since World War II. Problems, trends, and organization of French society today. Prereq: 212, 218 or equivalent.

434 Literature of Quebec (3) Survey of literature of Quebec as well as French literature connected with North America. Readings include explorer and missionary works, such as Voyages of Champlain and Journals of Jesuits, and literature of contemporary Quebec. Prereq: Intermediate French or equivalent.

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

501 Techniques in Literary Analysis (2) Required for M.A. program. Intensive course in explication de texte, a close stylistic analysis of texts representative of different eras and of different genres.

502 Registration for Use of Facilities (3-15) Required 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 appli- cation of methods for teaching and evaluating basic language skills and foreign language skills, and cultural aspects through seminars, demonstrations, peer teach- ing, and observation of foreign language classes. Re- quired of all M.A. and Ph.D students holding Graduate Teaching Assistantships, except those whose previous training or experience warrants their being excused by department.

515-16 Bibliography and Methods of Research (2,2) Survey of critical research tools and scholarly contribu- tions in French literature and language. Practical exer- cises on compiling of scholarly data.

521-22 Old French (3,3) Medieval French language and literature. Focus on history and development of Old French. Close reading of major texts from medieval genres, hagiography, epic, romance, lyric poetry, drama.

531 French Literature of the 16th Century I (3) Litera- ture of first half of 16th century, Rabelais and other prose writers, humanists, and poetry of Marot, Lyonnais group, and young Pèiade writers.

532 French Literature of the 16th Century II (3) Literature of second half of 16th century, mature works of Pèiade writers and such poets, as d'Aubigné and Sponde, Montaigne; writers of scientific works and memorialists; drama.

541 French Literature of the 17th Century I (3) French prose and prose works of 17th century.

542 French Literature of the 17th Century II (3) Classical French theatre of 17th century.

551-52 French Literature of the 18th Century: the Philosophes (3,3) Textual analysis of works of Voltaire, Diderot, Rousseau, and other major French 18th-cen- tury writers.

559 Problems in Linguistics: Romance Languages (3) Maximum 6 hrs with consent of department. (Same as Spanish 559 and Linguistics 559.)


571-72 Trends in Modern French Literature (3,3) In- depth study of some of most revolutionary, challenging poets, novelists, dramatists of 20th century.

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 con- sent of instructor.

403-04 Literature of the Raniocimento (3,3) From Pulto to Tasso, Quattrocento and Cinquecento. Prereq: 212 or consent of instructor.

405 Modern Italian Poetry (3) From Pascali 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)

421 Italian Literature and Cinema (3) Italian literature and cinema from 1930 to present focusing on literary works translated into English and adapted into film. Investigation of relationship between literature and cin- ema and achievement of greater understanding of Italian culture. Films in Italian with English subtitles. (Same as Cinema Studies 421.)

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 re- peated 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 Por- tuguese 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 (3) 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, or 218 or equivalent.
423-24 Advanced Conversation and Composition (3,3) Advanced conversational and written skills in Spanish for pre-professionals.
425 Introduction to Descriptive Linguistics (3) (Same as French 425, German 425, Russian 425, and Linguistics 425s.)
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 Quijote 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 world literature. 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.
450 20th-century Hispanic Theatre (3) Major 20th-century Spanish American dramatists. Prereq: 311, 312 or equivalent.
450 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, 450 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—Historical survey from Conquest to late 19th century. 474—Major literary movements, writers and works of 20th century. Prereq: 311, 312 or equivalent.
479 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 the language through teaching and evaluating basic language skills and cultural aspects through seminars, demonstrations, peer teaching, and observation of foreign language classes. Required of all M.A. and Ph.D. students holding Graduate Teaching Assistantships, except those whose previous training or experience warrants their being excused by department.
522 Advanced Communication Skills for Teachers and Other Professionals (3) Advancement of oral and written proficiency in Spanish through extensive use of authentic contemporary materials; class lectures and discussions; oral and written 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 Golden Age Prose (3) Wide range of prose fiction in Spain during 16th and 17th centuries. Moorish, picaresque, sentimental, pastoral and exemplary novels, and dialogues.
534 Don Quijote (3)
535 Golden Age Poetry (3) Garcilaso, Fray Luis de Leon, San Juan de la Cruz, Lope de Vega, Quevedo, and Gongora.
542 The Generation of '86 and Ortega (3) Unamuno, A. Machado, Azorin, Valle-Inclán, Benavente, Ortega y Gasset.
543 The 20th-Century Spanish Novel (3) Baroja, Azorin, Valle-Inclán, Pérez de Ayala, Cela, Delibes, Goysolsio, Malute, and at least one other important novelist.
545 Modern Spanish Poetry (3) From Bécquer, Unamuno, A. Machado, Jiménez, Lorca, Guiffre, 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) The 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 8 hrs.
552 Directed Readings (3)
559 Problems in Linguistics: Romance Languages (3) (Same as French 559 and Linguistics 559.)
561 Spanish American Literature to 1880 (3) Selected works of important writers from colonial period and 19th century up to Modernism.
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 in 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. Letter grade or S/NC.
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 DEGREE
Veterinary Medicine ........................................... D.V.M.
D. O. Goble, Interim Head.

Professors:
Barron, H. T. (Emeritus), D.V.M. ...... Texas A&M
Grau, W. H. Jr., V.M.D. ....... Pennsylvania
Hall, R. F., D.V.M. ............. Illinois
Hoffman, P. M., D.V.M. ......... Georgia
Shires, G. M., 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
Henton, J. E., D.V.M. .......... Michigan State
Kerr, L. A., D.V.M. .............. Oklahoma State
Linnabary, R. D., D.V.M. ....... Ohio State
Pohrbach, B. W., V.M.D. ...... Johns Hopkins
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
Olchowy, T. W. J., D.V.M., Ph.D. Guelph
Welborn, M. G., D.V.M. ...... Louisiana State

Residents:
Korenck, N. L., D.V.M. ........ Louisiana State
Matthews, H. K., D.V.M. ....... Ohio State
Sommardahl, C. S., D.V.M. .... Louisiana State
Tuckler, R. L., D.V.M. ....... California (Davis)
Wan, P. Y., D.V.M. ......... Georgia

Interns:
Moffatt, D. A., D.V.M. ........ Prince Edward
Whitaker, T. B., D.V.M. ....... Tuskegee

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
Social Work

(College of Social Work)

**MAJOR**

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Eunice Shatz, Dean

**Professors:**

Bloch, M. H. (Emeritus), M.S. Ohio State
Bonovich, Robert C. (Emeritus), D.S.W. Washington (St. Louis)
Fryer, Gideon W. (Emeritus), Ed.D. Columbia
Glisson, C. A., Ph.D. Washington (St. Louis)
Granger, Ben P., Ph.D. Brandeis
Hirayama, H., D.S.W. Pennsylvania
Kronick, Jane, Ph.D. Yale
Mullins, M. Kate, Ph.D. Tennessee
Noe, Roger M., D.S.W. Tulane
Orten, J. D., D.S.W. Alabama
Rubenstein, H., Ph.D. Chicago
Shatz, Eunice, Ph.D. Brandeis

**Associate Professors:**

Avery, R. S., Ph.D. Brandeis
Bell, W. J., D.S.W. Tulane
Cetingok, M., Ph.D. Washington (St. Louis)
Chapping, J. W., Ph.D. Peabody
Crutchts, G. Thomas, D.S.W. Tulane
Faver, C., Ph.D. Michigan
Jennings, J., Ph.D. Michigan
Moses, A. E., D.S.W. California
Spicuzza, Frank, M.S.S.W. Tennessee
Tate, Nellie E., Ph.D. Brandeis
Vaughn, H. H., Ed.D. Memphis State

**Assistant Professors:**

Campbell, P. M., D.S.W. Alabama
Collier, J. C., M.S.W. Tulane
Fiene, Judith, Ph.D. Tennessee

**Field Practice Coordinators:**

Betz, Phyllis (Knoxville), M.S.S.W. - Tennessee
Harris, Joyce (Nashville, M.S.S.W. - Tennessee
Pomerantz, Edward (Memphis), M.S.W. - Barry

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**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, and
2. An overall GPA of 3.0 or better on all grades.

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.

**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 supplemental to those of the University. Additional information about College stipends may be obtained from the College of Social Work.

**Field Practice**

Field instruction is a critical component of the student's first- and second-year programs. Through cooperation with a wide range of social agencies and human service programs throughout Tennessee, the college is able to provide field placements in a variety of social work practice areas. The faculty works closely with the placement agencies and the field instructors to ensure that students have quality field practice experiences, meeting the objectives of the core curriculum and the concentration.

The college uses a concurrent class and field plan. Students are in field two days per week during the first year and three days per week in the second year.

First-year agency placements are selected to provide practice experiences related to the foundation curriculum content and beginning concentration. Within the placement, each student's experiences are planned and designed according to educational objectives.

Second-year placements are selected according to the student's area of concentration.
individual career interests, and educational needs. Students and their academic committees develop a plan of study consisting 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 begins during the first year of study, the elective requirement is completed and dissertation research begins in the second year of study, and dissertation research is continued in the third year of study. While it is generally expected that the coursework will be completed on a full-time basis, dissertation research can be completed on a planned part-time basis.

Curriculum

Students in the dual degree program are required to take a set of core courses from each curriculum, but the program is designed to be flexible, providing students the opportunity to develop special areas of competence. For the dual degree programs a minimum of 36 hours is required (35 hours must be in social work and 30 hours must be in public administration). Admission to candidacy will be completed separately for each degree.

Transfer Credits

Coursework equivalent to the first year of the Master’s program, completed in another accredited graduate social work program, is usually accepted toward degree requirements. Applicants must meet the admission requirements of The Graduate School and the College of Social Work. Transfer courses must be approved as equivalent to required and/or elective courses taken for graduate credit and passed with a grade of B or better. An S (earned on an S/N/C system) for the field practicum is also accepted. In addition, transfer courses must be 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.

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 or experience. Applicants who do not meet these requirements, but believe they have equivalent credentials should contact the Chair of Ph.D. program for further information regarding admissions criteria.

General Requirements

1. A minimum of 60 semester hours beyond the Master's degree including a) completion of 21 credits of required coursework, b) completion of 15 credits of advanced electives, at least 12 of which are taken outside the department, and 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.

3. Completion and defense of the dissertation.

Curriculum

The curriculum of the Ph.D. program consists of foundation coursework, electives, and dissertation research. The foundation curriculum consists of 21 hours of coursework in the history and philosophy of social work, issues in direct service and administration and planning, areas of practice, and research methodology and statistics. Upon this foundation, students and their academic committees develop a plan of study consisting of coursework in Social Work and other departments of the University. Typically, the foundation curriculum is completed and elective coursework begins during the first year of study, the elective requirement is completed and dissertation research begins in the second year of study, and dissertation research is continued in the third year of study. While it is generally expected that the coursework will be completed on a full-time basis, dissertation research can be completed on a planned part-time basis.
Specific courses required are 601, 602, 612, 613, 640, and Statistics 531 and 532 or any two graduate level statistics courses approved by the Doctoral Program Chair.

Examinations
All doctoral students are required to pass a qualifying examination and a comprehensive examination. The qualifying examination covers the entire Doctoral Program. The comprehensive examination is administered by members of the doctoral committee and is designed for the student to demonstrate comprehensive knowledge of the major and cognate areas and the dissertation topic. In case of failure of either examination, the student may request a retake. The result of the second examination is final.

Financial Aid
Financial aid is available to qualified students in the form of fellowships, scholarships, and teaching and research assistantships. Graduate assistantships and other forms of assistance are awarded on the basis of merit and interest to applicants who are accepted into the Ph.D. program.

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 COURSES
Graduate students majoring in fields other than social work are admitted to certain social work courses with the approval of the College of Social Work and the student's major professor.

500 Thesis (1-15) 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, Nutrition 509, Physical Education 509 and Nursing 509.
510 Social Work Research (3) Research methodology applied to problems in social welfare. Problems 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 social levels presented from ecological perspective. Assessment, planning, communication, 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-dysfunctional and normal-deviant continuum: stress, development and maturation. Open systems approach to understanding the biological, psychological, sociological, and social variables, implications of culture, race, ethnicity, and gender. Prereq: Admission to college or consent of instructor.
516 Social Welfare Policy and Services (3) Development of contemporary social policy at local, state, national, and international levels. Contribution of social work professionals to formal policy-making processes. Policy formulation and development techniques, application of policy to specific social issues. Prereq: Consent of instructor.
520 Social Work Treatment with Individuals and Families (3) Nature and process of practice with individuals and families in helping them resolve or cope with problems of living. Working with disadvantaged clients and enhancing client competence. Prereq: Foundation or consent of instructor. Sp
521 Social Work Treatment with Couples (3) Theories and practice of social work with small groups. Treatment groups, task groups. Prereq: Foundation or consent of instructor.
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 of and recent research in etiology of psychological 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 techniques of treatment 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 to problems 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 diverse models of social welfare administration, their historical and philosophical perspectives, context for designing organizational structure and processes, planning financial and human resource development, agency policies and programs, and management of service delivery systems. 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 development at all levels of human service organizations. Knowledge and skills in accounting, budgeting and auditing; techniques in fundraising, grant writing, marketing and other financial management and resource development techniques. Prereq: Foundation or consent of instructor.
544 Management Information Systems and Evaluative Research (3) Management information systems designed to evaluated agency performance, planning and resource allocation, and methodology; and utilization for organizational decision-making and policy setting. Prereq: Foundation or consent of instructor.
545 Human Resources Development in Social Welfare Administration (3) Administrative and leadership skills required for management and development of human resources in social work practice and social welfare administration and planning. Prereq: Foundation or consent of instructor.
550 Seminar in Social Welfare Administration and Planning (3-2) Areas and issues relating to methods and techniques of social welfare administration and planning. Prereq: Foundation or consent of instructor. May be repeated. Maximum 6 hrs.
551 Seminar in Social Welfare (2-3) Social welfare problem areas of interest and planning for the development of resources to meet human needs. Prereq: Foundation or consent of instructor.
553 Social Planning (3) Theory, philosophy, implications for programs for planning social change in different fields of service. Prereq: Foundation or consent of instructor.
554 Social Policy Analysis (3) Techniques for assessing social, political, and economic implications of social policy proposals. Prereq: Foundation or consent of instructor.
560 Seminar in Human Behavior and Social Environment (2-3) Areas of current importance in understanding human behavior and social environment. Specific theories, research and/or issues. Prereq: Foundation or consent of instructor. May be repeated. Maximum 6 hrs.
561 Supervision and Consultation in Social Work (3) Roles, techniques, and practices of social work supervision and consultation. Prereq: Foundation or consent of instructor.
562 Social Work and Black Families (3) Historical and contemporary theories about black family systems. Development of frameworks to assess and plan for families within service delivery systems. Prereq: Foundation or consent of instructor.
563 Social Aspects of Illness (3) Social, economic, and emotional problems arising from or related to illness and disability and their implications for social work. Prereq: Foundation or consent of instructor.
564 Substance Abuse (3) Survey and analysis of social, cultural, medical and psychological factors underlying addiction and abuse in relation to recent research and treatment innovations. Prereq: Foundation or consent of instructor.
565 Roles and Status of Women (3) Causes and consequences of women's social and economic roles and statuses in American society. Variations in women's experiences by race and ethnicity, class, age, and life cycle. Prereq: Foundation or consent of instructor.
566 Social Gerontology (3) Physical, psychological and social aspects of aging. Major social policies and programs. Prereq: Foundation or consent of instructor.
570 Advanced Standing (12) Twelve-week program providing qualified students with intensive academic and field experience to enter final year of graduate study upon successful completion of term. S/NC only. Su
580 Field Practice (3) Instruction and supervision in social work practice. Prereq or coreq: 512. S/NC only. E
581 Field Practice (4) Instruction and supervision in social work practice. Prereq or coreq: 512. S/NC only. Sp
582 Field Practice (8) Instruction and supervision in social work practice. Prereq or coreq: 512. S/NC only. Sp
583 Field Practice (10) Instruction and supervision in social work practice. Prereq or coreq: 512. S/NC only. Sp
584 Management Information Systems and Evaluative Research (3) Management information systems designed to evaluate agency performance, planning and resource allocation, and methodology; and utilization for organizational decision-making and policy setting. Prereq: Foundation or consent of instructor.
584 Field Practice (2-6) Instruction and supervision in social work practice. Prereq or coreq: 512. May be repeated S/N/Y 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 565, 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 (3-15) 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 3 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.


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 practice issues. Prereq: First year required Ph.D. courses or consent of instructor. May be repeated. Maximum 9 hrs. F,Sp.

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**Sociology**

(College of Liberal Arts)

**MAJOR DEGREES**

Sociology ............................................. M.A., Ph.D.

**Professors:**

Beetz, D. Michael, Ph.D. ......................... Michigan State
Black, John A., Ph.D. ............................... Iowa
Clelland, 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
Shover, Neal, 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

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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, 681, 682, 683, and 665. The political economy concentration includes 504, 540, 541, 643, 644, and 645. Both the Master's and the doctoral program allow for the construction of individualized programs of study. Detailed information may be obtained from the Director of Graduate Studies in Sociology. All incoming students will be advised by the Director of Graduate Studies.

**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).

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**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 foundation course (504, 505, or 560). At or near the end of all coursework, the student must take an oral examination on coursework 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 602 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 demonstrates their understanding of research, theory, and report writing. All students must take final written and oral examinations that include questions on their general coursework in theory and methods and on their special areas of study.

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Subject to approval by the student's committee, up to 12 hours may be taken in courses outside the department for either program.

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**THE DOCTORAL PROGRAM**

**Coursework**

A 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. Course 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 collaboratist) 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.

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**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 Graduate Assistant in the Office of Graduate Admissions and Records.

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**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 models, 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 characteristics, and prevalence of disease.

415 Sociology of Aging (3) How roles and statuses change with age in relation to major social institutions;
impact that rapidly increasing number of older people has on society, effect of society on older people. Underlying assumptions and logical procedures used by sociological data collection techniques, data, reduction, and sociological theory is; its major figures and their approaches to understanding society.

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 strategies. May be repeated. Maximum 6 hrs.

521 Sociological Theory I (3) Assessment of what sociological theory is; its major figures and their approaches to understanding society.

531 Research Methods in Sociology (3) Research design, measurement, sampling, quantitative and qualitative data collection techniques, data, reduction, and analysis.

534 Advanced Sociological Analysis (3) Underlying assumptions and logical procedures used by sociologists in formulating explanations: foundations of sociological research strategies and techniques.

535-536 Statistical Analysis in Sociology I, II (3, 3) Should be taken in sequence. 535 - Symbolic logic, set theory, linear regression of sociological models. 536 - Non-parametric analysis, log-linear analysis, advanced regression. Prereq: Introduction to Statistics 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 movement, human collective actions and efforts of collective 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 impact of various development paths upon selected aspects of social structure and change.

551 Delinquency and the Social Structure (3) How study of delinquency and juvenile justice is affected by changing structures of childhood and adolescence, changing demographic and institutional influences, and changing views about responsibility and punishment.

560 Environmental Sociology (3) Systematic treatment of current research in environmental sociology. Social impact analysis and conflicts 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 and organizational structure: job satisfaction, motivation, morale and interpersonal phenomena.

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 and change. Prereq: 505 or consent of instructor. May be repeated. Maximum 6 hrs.

612 Sociological Theory II (3) Distinct schools of sociological theory and contributions of their principal exponents.

629 Supplementary Readings in Sociological Theory (3) Individual guidance. Preparation for comprehensive examination. Prereq: Consent of instructor. S/N only.

633 Survey Design and Analysis (3) Systematic exploration of survey problems through student participation in design and analysis of survey. Prereq: 531 or consent of instructor. (Same as Child and Family Studies 633.)

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/N only.

643 Class Analysis (3) Critical analysis of theories and research on class structure and conflict.

645 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.

655 Advanced Studies in Criminology (3) Intensive examination of selected topics in criminology. Recommended prereq: 505. May be repeated. Maximum 6 hrs.

661 Theory and Methods of Human Ecology (3) Historical and contemporary studies of interaction between humans and their environment. Prereq: Consent of instructor.

665 Advanced Studies in Energy, Environment and Natural Resources Policy (3) Topical seminar covering particular line of research and theory with area. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

666 Seminar in Sociology of Law (3) Selected contemporary research issues related to social psychological theories. Prereq: 511 or consent of instructor. May be repeated. Maximum 6 hrs.

667 Advanced Studies in Social Psychology (3) Selected contemporary research issues related to social psychological theories. Prereq: 511 or consent of instructor. May be repeated. Maximum 6 hrs.

695 Advanced Special Topics (3) Topic of special interest or student-initiated courses that will not be regularly offered. Prereq: Consent of department. May be repeated. Maximum 6 hrs.

999 Tutorials in Advanced Topics (1-6) Individual instruction. Prereq: Consent of department. May be repeated. Maximum 6 hrs.
THE MASTER'S PROGRAMS

Special Education

The department offers two tracks for the Master's degree in Special Education for all areas of concentration. Track 1 is for students who are already licensed to teach in special education or a related field or those who are seeking a Master's degree without teacher licensure. Track 2 is for students seeking initial licensure. Thesis and non-thesis options are available for both tracks.

An area of concentration may be selected from the following: early childhood special education, general special education, or education of the hearing impaired.

Track 1 students select coursework based on their area of concentration as described below. Some coursework may apply toward State of Tennessee endorsements (add-on certification areas). The non-thesis option requires 36 hours, including a minimum of 18 in special education, and a final written and oral comprehensive examination. The thesis option requires 30 hours including 6 hours of Thesis 500.

Track 2 students select coursework based on a specified course of study required for teacher licensure and options for areas of specialization and/or cognates as described below. The non-thesis option requires 24 hours of internship year coursework and an additional 12 hours prescribed by the student's committee, for a total of 36 hours. The thesis option requires 6 additional hours of Thesis 500 for a total of 42 hours.

Students completing a program of study in the early childhood special education concentration area are qualified to be preschool teachers, home-based interventionists, educational consultants, and family service coordinators. The curriculum is interdepartmental in nature, with most of the coursework offered by the Departments of Special Services Education and the Department of Child and Family Studies. Additional department offerings may be included through elective hours.

Students completing a program of study in the general special education concentration area are qualified to be teachers and/or consultants in a variety of special education programs providing services to people certified as mentally disabled, emotionally disturbed, gifted, physically disabled, multiply disabled, and socially or emotionally disturbed. Students completing a program of study in special education should expect to spend four semesters, in- cluding summer, in classwork and in internship. Internships (student teaching) may be completed at the Tennessee School for the Deaf, in mainstream programs in the state or in programs for the hearing impaired in North Carolina, Kentucky, Georgia, Virginia, and the District of Columbia.

Rehabilitation Counseling

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 classwork and in internship. The program requires 54 semester hours. Both a thesis and non-thesis option are available.

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. The 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 only. Sp,Su

421 Field Experience in Modified Programs (3) Practicum in teaching in modified programs: planning, implementing, and evaluating instruction. Prereq: Special Education Principles and Special Education Strategies, Admission to Teacher Education and Curriculum and Instruction 422, Core 420, SNC only.

423 Communication Processes for the Hearing Impaired (3) Expressive and receptive vocabulary development in sign communication. Fingerspelling and educational applications of sign language.

424 Nature of Hearing Impairments (3) Basic principles of audiology: anatomy and physiology of hearing; nature and causes of hearing loss; methods and instrumentation for assessment of hearing level; interpretation of audiologic services to medical and other rehabilitative disciplines.

425 Introduction to the Psychology and Education of the Hearing Impaired (3) Primarily for those planning to teach hearing impaired. Overview of research related to psychology, social adjustment, communication methodology, language development and education of hearing impaired. Survey of literature. Visits to programs.
430 Psychology and Education of Students with Moderate/Severe Disabilities (3) Nature and characteristics of persons with moderate/severe disabilities and educational strategies appropriate for those persons. Prereq: Special Education Principles and Special Education Strategies. Admission to Teacher Education and Curriculum and Instruction 422.

431 Field Experience in Comprehensive Programs (3) Special Education Principles and Special Education Strategies. Admission to Teacher Education and Curriculum and Instruction 422. Coreq: 430. S/NC only.

433 Clinical Practice in Speech-Language Pathology (1-4) (Same as Audiology and Speech Pathology 433.)

434 Clinical Practice in Speech-Language Pathology II (1-4) (Same as Audiology and Speech Pathology 433.)

440 Voice Disorders (3) (Same as Audiology and Speech Pathology 440.)

454 Education of the Gifted and Talented Children (3) Orientation to psychometric and behavioral studies of giftedness. Analysis of past and present school practices in reference to curriculum and program implementation. Sp

456 Speech and Language Basis of Learning Disabilities (3) Developmental communication development; understanding of speech and language impairments in school-age students; integration of oral/written language with listening, reading, writing, and research curriculum, especially for high incidence special education students.

470 Psychology of the Exceptional Child (3) Varieties of exceptional children; general characteristics and educational needs. Implications of developmental variations for functioning as adults. Opportunity to expand study upon particular exceptionalism. 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.)

481 Policies, Procedures, and Practices in Special Education (3) Comprehensive review of Federal and State laws and regulations which direct implementation of special education programs in all public and private facilities and agencies. Multiple service delivery models. Sp

482 Speech and Language Services in the Schools (3) Organization and operation of speech and language programs in schools. IEP process as it affects assessment, case-selection, and programming for students ages 4-21. Content and materials, group interactions, and classroom consultation. Sp

483 Clinical Practice in Communication Disorders in Schools (3) Supervised practice with children with communication disorders. Prereq: 433, 434 (60-100 clock hours), 485.

484 Internship with Hearing Impaired Children (6) Supervised practicum with preschool, day school and residential students.

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

502 Registration for Use of Facilities (3-15) Required of all residents. May be repeated. S/NC or letter grade.


504 Clinical Experience in Teaching and Supervision of Exceptional Children (3-8) Placement in educational settings. May be repeated for credit. S/NC or letter grade.

506 Internships in Teaching in Special Education and Rehabilitation (3-15) Placement in professional special education and rehabilitation 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) Utilization of psychological, educational, social and vocational, diagnostic materials and resources appropriate for hearing impaired persons to provide guidance in career decisions and individualized rehabilitation plan.

510 Advanced Educational and Clinical Procedures (3-6) Integration of advanced educational and clinical procedures necessary for knowledge in implementing instruction and for consulting with other persons in treatment of exceptional individuals. May be repeated. Maximum 6 hrs.

519 Speech Development of Hearing Impaired (4) Theories of speech development, approaches in training perception and production of speech, and aural habilitation. Prerequisites: 430 and 484.

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.


524 Linguistics in the Education of the Hearing Impaired (3) Recent research and developments in the 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 in ASL. 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 techniques and procedures necessary to teach the hearing impaired student. Practice in preparation of developmentally appropriate reading materials. Methods which assist in integrating hearing impaired students in regular reading curricula and materials. Prereq: 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 Caseload Management in Rehabilitation (3) Determination of employment-readiness of people with disabilities; identifying appropriate jobs for selected clients; and assisting clients in seeking, obtaining, and retaining employment. Methods appropriate for use of innovative assessment approaches; analysis of appropriate vocational programming and decision-making related to nature and needs of disabled learners. Prereq or coreq: 553 or consent of instructor.

534 Vocational Assessment: Statistical Methods (3) Process principles and techniques used to determine vocational assets and liabilities to people with disabilities. Functional analysis of biographical and interview data; selection and application of relevant psychometric instruments; integration of statistical data into diagnostic reports; application of computer-generated reporting systems.

537 Vocational Education: Clinical Methods (3) Process, principles, and techniques used to assist individuals in determining and understanding their own work behavior; and vocational assessment and use of occupational exploration programs and work samples; application of situational tasks, job tryouts, and simulated work experiences in vocational evaluation. Clinical interpretation of data through formal staff conference, vocational counseling, and report writing.

539 Transition from School to Work (3) Development of programs and procedures to facilitate adjustment of exceptional persons to independent living. Evolving 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 social rehabilitation.

543 Medical Aspects of Disability (3) Etiology and clinical symptoms related to disability conditions served by special education and rehabilitation personnel. Relevant measures to determine presence of disabilities and handicaps. Skills necessary to communicate with lay and professional persons.

545 The Rehabilitation Interview (3) Interview as used in assessment and treatment of people who have disabilities and vocational handicaps.

547 Practicum in Rehabilitation (3) Supervised experience in area of rehabilitation; application of concepts, principles, and skills. Prereq: Consent of instructor.

549 Internship in Rehabilitation Counseling (12) Supervised practice in vocational rehabilitation counseling. Full time clinical experience for second-year students (600 clock hrs required).

551 Issues and Theories in Cognitive Education for Disabled Learners (3) Cognitive education theories; implications for disabled learners; effects of philosophy, attitudes, and expectations, perspectives on environment; characteristics of learners with cognitive deficiencies. Coreq: 552 or consent of instructor.

552 Instructional Systems in Cognitive Education for Disabled Learners (3) Informal and formal assessment approaches, data collection, instructional programming and decision-making related to nature and needs of disabled learners. Prereq or coreq: 551 or consent of instructor.

553 Assessment of Exceptional Students (3) Current issues related to assessment; advanced study of evaluation models for special education; dynamic and other innovative assessment approaches; advanced study of application to educational programming; basic statistics and application in assessment.

554 Assessment in Early Childhood Special Education (3) Determination of developmental, intellectual, and emotional potential of children from birth to third birthday. Application of 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.

555 Characteristics of Affective/Motivational Functioning in Children with Disabilities (3) Definition, methods, identification and symptoms of children with affective/motivational development in disabled youngsters. Comparison to normal development and that of children labeled as retarded. Functional and emotional characteristics of learners with affective/motivational problems.

556 Instructional Systems for Affective/Motivational Education for Children with Disabilities (3) Educational strategies and models of instruction: simulation, demonstration, and media. Teaching techniques, materials, and teacher/pupil/group interactions. Therapeutic forms of education through art, music, role play, puppetry, literature, and group and individual counseling. Prereq or coreq: 555 or consent of instructor.

558 Neuromuscular and Health Disorders: Educational Implications (3) Neurological impairments, physical disabilities, visual and hearing handicaps, autism. Investigation of instructional techniques and adaptations.
561 Psychology of Mental Retardation (3) Psychological, social, legal, and ethical issues relative to mental retardation.

562 Instructional Systems for the Mentally Retarded (3) Specific developmental, behavioral, educational, and social strategies and techniques. Curricular design techniques and evaluation. Educational needs of mentally retarded children and youth. PreReq or coreq: 561 or consent of instructor.


566 Instructional Systems for the Gifted and Talented (3) Instructional methods and systems evaluated in terms of effectiveness in various educational and social settings. 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 9 hrs. S/NC or letter grade.

585 Seminar in Research Techniques in Special Education (3) Evaluation of appropriate research methodologies with handicapped populations.


590 Application of Microcomputer Technology in Special Education and Vocational Rehabilitation (3) Application of microcomputer technology with all categories of exceptionalities and across all chronological and functional age ranges. Microcomputer adaptive software, special switch access, authoring systems, telecommunication, and strategies for cognitive development.

591 Clinical Studies (4) Relationship between educational theory and application during internship; research project, development of portfolio, and capstone experience.

592 Assistive Technology in Special Education and Vocational Rehabilitation (3) Technology as applied to needs of school age and post-secondary age students/clients. Delivery of assistive technology services; software programs and assistive devices; delivery systems, interdisciplinary evaluation/planning, and funding issues.


595 Clinical Experience in Assessment and Instruction (3) Academic remediation applied in lab/school setting; tasks related to teaching: assessment, preparation of lessons, and delivery of instruction. Coreq: S/NC or letter grade.

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

601 Seminar in Educational Theories in Special Education and Rehabilitation (3) Education theories: education and rehabilitation of exceptional persons. Theoretical applications in educational settings. PreReq: Admission to doctoral program or consent of instructor.

602 Seminar in Social Processes in Special Education and Rehabilitation (3) Social phenomena which influence impact of disability on person and on significant others. Implications for habilitation. PreReq: Admission to doctoral program or consent of instructor.

603 Seminar in Research 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 in Special Education and Rehabilitation (3-6) Placement with professional experience in the theoretical and practical aspects of research. PreReq: 9 hrs in statistical and research methods. May be repeated. Maximum 6 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)

Faye D. Julian, Acting Head

Professors:

Julian, Faye D., Ph.D. .......... Tennessee

Lester, Lorayne W., Ed.D. .......... Tennessee

Yeomans, G. Allan (Emeritus), Ph.D. .......... Louisiana State

Associate Professors:

Ambrestor, M. L., Ph.D. .......... Ohio State

Buckley, J. E., Ph.D. .......... Northwestern

Cook, N. C., M.A. .......... Alabama

Glenn, Robert W., Ph.D. .......... Northwestern

Assistant Professor:

Ambler, R. S., Ph.D. .......... Ohio State

Haas, John W., Ph.D. .......... Kentucky

Graduate courses in Speech Communication provide opportunities for students in a variety of disciplines to investigate how oral language can affect 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.

450 History of Rhetorical Theory (3) Western rhetorical theory from Plato to present.

455 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 46S.)

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.

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.

530 Topics in Group and Interpersonal Communication (3) PreReq: 320, 330, 420, or consent of instructor. May be repeated. Maximum 6 hrs.

550 Communication Theory (3) Analysis of contemporary theories of human communication, similarities and differences of communication processes in intrapersonal, interpersonal, small group, organizational, and public communication. PreReq: 350 or equivalent or consent of instructor.

560 Studies in Rhetoric (3) Content varies. PreReq: 460 or consent of instructor. May be repeated with consent of department. Maximum 9 hrs.

570 Legal and Ethical Issues of Communication (3) Communication rights and responsibilities. PreReq: Consent of instructor.

575 Directing the Forensics Program (3) Philosophy and methods of directing co-curricular and extracurricular forensic activities in high schools and colleges; competitive and non-competitive approaches to directing debate, oral interpretation and public speaking events.

589 Theory and Production Techniques of Oral Interpretation (3) Literary, psychological, communicative, and aesthetic approaches to collection, adaptation, and oral presentation of literature. PreReq: 380, 385, 480, or consent of instructor.

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

**Statistics**

(Registered in the College of Business Administration and Intercollege Program)

MAJORS

DEGREES

Statistics ........................................ M.S.

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

David L. Sylwester, Head

Professors:

Downing, Darryl J. (Adjunct), Ph.D. .......... Florida

McLean, Robert A., Ph.D. .......... Purdue

Parr, William C., Ph.D. .......... Southern Methodist

Philpot, John W., Ph.D. .......... VPI

Sanders, William L. (Adjunct), Ph.D. .......... Tennessee

Sylwester, David L., Ph.D. .......... Stanford

Thigpen, Charles C., Ph.D. .......... VPI

Associate Professors:

Guess, Frank M., Ph.D. .......... Florida State

Leinaker, Mary C., Ph.D. .......... Kentucky

Leon, Ramon V., 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
The M.S. program in Statistics provides students with the foundations in theory and practice required for careers in applied statistics. In addition to the education traditionally offered in such a program, the department offers a concentration in industrial statistics, which provides unique opportunities for experiences in practical applications of statistics. Through involvement in The University of Tennessee Institute for Productivity Through Quality and related programs, department faculty participate in a variety of consulting and research projects in industry. Students may supplement their classroom study with an industrial internship and participation in research projects dealing with industrial problems. Department faculty also collaborate with researchers from many academic disciplines and hold joint appointments with the College of Agriculture, the Computing Center and the Medical Center.

Statistics graduate students may gain consulting experience by working with faculty involved in these consulting activities. All students are required to participate in supervised internship or consulting activities as part of their graduate program.

Individuals with undergraduate or graduate degrees in other disciplines are encouraged to enter the program. The candidate’s mathematics background should include differential and integral calculus of several variables. Individuals with limited mathematics background should seek departmental guidance regarding specific ways in which they may prepare themselves for the program by taking coursework as non-degree students. Requests for application forms and further information may be sent to the Director of Graduate Studies, Department of Statistics, Stokely Management Center, University of Tennessee, Knoxville, TN 37996-0532.

Admission Requirements

General admission requirements for The Graduate School are stated beginning on page 13. Applicants for Statistics must submit results of the Graduate Record Examination (GRE) general portion, although GMAT exam scores may be substituted. Applicants for the statistics program must have completed at least two years of college-level mathematics, including the calculus of several variables and matrix algebra, and be proficient in a computer language. Applicants whose native language is other than English must submit results of the Test of English as a Foreign Language (TOEFL).

Curriculum

A minimum of 33 credit hours must be completed for the Master’s degree. Required of all students are 6 hours in statistical methods, 6 hours in statistical theory, 1 hour in statistical computing, and 3 hours in either supervised consulting or internship. Students must complete a minimum of 21 hours in approved statistics courses, exclusive of consulting, internship, independent study, or thesis.

First Examination

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 2 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 retook 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 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 Statistics minor and/or joint major curriculum offered through the program. Curriculum requirements for the statistics component of each joint degree are specified in terms of completion of alternative sequences of course options. Course options consist of courses in statistics, offered either by the Department of Statistics or by other departments, that have been reviewed and approved by the executive committee. Interested students should contact their major department head for information on specific course requirements.

General Admission Requirements

1. The student's sponsoring department must have established with the executive committee an approved joint degree program along with specifying the statistics courses taught by the Statistics Department and/or other departments.

2. The student's Admission to Candidacy form must contain all courses required for the Statistics minor/major set off in a group and labeled "Statistics courses required for the minor/major."

3. In many cases, a student may not decide to apply for participation in the program until he/she has completed two or three courses in statistics. In that case the student's major professor should file a program change with the cooperating departments and assist the student in obtaining a Statistics Department faculty member to serve on the student's committee.

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 must complete all statistics 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 of the Statistics minor/major is recognized by appropriate documentation on the student's transcript. Students who do not complete all requirements for the Statistics major/minor will still receive academic credit for statistics courses they have successfully completed.

Degree Program:

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<tr>
<td>Hours</td>
<td>51</td>
<td>8</td>
<td>16</td>
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**Approved 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 prereq or coreq of 561.
ACADEMIC STANDARDS

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

GRADUATE COURSES

411 Introduction to Statistical Computing (3) Use of computer operating system commands and packaged programs for statistical analysis and file management. Not available for credit for statistics majors. Prereq: 201 or 251.


462 Analysis of Variance and Experimental Design (3) Variance techniques for single and multifactor models. Post hoc procedures. Design considerations for completely randomized block, factorial, hierarchical, and split-plot experiments. Major writing requirement. Prereq: Probability and Statistics for Scientists and Engineers or Regression Analysis. Note: Not counted toward a graduate major or minor in statistics.


500 Thesis (1-18) P/NP only. E

501 Statistics for Management (3) Fundamentals of descriptive and inferential statistics. Introduction to probability models, statistical inference: statistical process control, correlation and regression, basic time series. Open only to MBA students.

502 Registration for Use of Facilities (3-15) Required for students who need to use computer laboratory facilities. Registration for use of VAX or UNIX computer packages. Major writing requirement. Prereq: 6 hrs of statistics or consent of instructor. Note: Not counted toward a graduate major or minor in statistics.

531 Statistical Models for the Social Sciences I (3) Probability distributions, sampling distributions, parametric and nonparametric estimation and hypothesis testing, simple linear regression and correlation. Credit not given for both 531 and 537. Prereq: 1 yr college mathematics and 1 course in statistics.

532 Statistical Models for the Social Sciences II (3) Multiple regression, analysis of categorical variables, linear general linear model, analysis of variance and covariance. Credit not given for both 532 and 537. Prereq: 1 yr graduate-level mathematics and 1 undergraduate statistics course.

537 Statistics for Research in the Behavioral and Biological Sciences (3) Principles and applications of statistical methodology, integrated with considerable use of major statistical computing system. Probability and statistical inference, sampling distributions, hypothesis testing, estimation, nonparametric inference methods, regression, analysis of variance and covariance, multiple regression, discriminant analysis, classification, covariance, and canonical correlation analysis. Prereq: 1 yr graduate-level mathematics and 1 undergraduate statistics course.


561 Introduction to Computing for Data Management and Analyzing existing environment for beginning graduate students; use of operating system commands, system editor, utility programs and major statistical software. SAAS, for data entry and editing, file management, and statistical analysis in interactive and batch environments. IBM, CMS, and MVS. Use of microcomputer for statistical analysis. Coreq: 531, 537, or 571, or consent of instructor.


564 Theory of Statistical Inference (3) Introductory theory underlying common statistical procedures of hypothesis testing and estimation. Prereq: 563.

566 Statistical Techniques in Industrial Processes (3) Applications of control charts and other statistical techniques in industrial settings. Attributes and variables control charts, process capability analysis, aspects of sampling, statistical tolerancing, estimation of variance components, problems of measurement, special industrial applications. Prereq: 571 or equivalent.


572 Applied Linear Models (3) Simple and multiple linear regression using matrix algebra and general linear model; polynomial regression, weighted least squares regression, variable selection techniques, multicollinearity, regression diagnostics; general linear model approach to analysis of data from designed experiments. Use of standard computer packages. Prereq: 571 and matrix algebra.

573 Design of Experiments (3) One-way ANOVA, multiple range tests, equal and unequal variances, transformations, factorial experiments, completely randomized designs, analysis of covariance, split-plot and nested designs, fractional factorials, sequential designs. Prereq: 571.

585 Principles of Statistical Process Management (3) Control charts and other statistical techniques applied to management of business processes. Prereq: Consent of department head.

587 Graduate Seminar (1) Directed readings and active participation in colloquium program of Department of Statistics and of student’s minor program. Prereq: Consent of statistics department director of graduate studies. May be repeated. Maximum 2 hrs. S/NC only.

595 Statistical Consulting Practicum (1-6) Supervised participation in real-life statistical problem solving, including proposal writing and oral presentation. Prereq: 2 courses in graduate-level statistics and consent of statistics department director of graduate studies. May be repeated. Maximum 6 hrs. S/NC or letter grade.

597 Special Topics in Statistics (1-3) Presentation of specialized topics in probability and statistical processes. May be repeated. Maximum 6 hrs.

675 Categorical Data Analysis (3) Log-linear analysis of multidimensional contingency tables. Logistic regression. Theory, applications, and use of statistical software. Prereq: 1 yr graduate-level statistics, regression analysis and analysis of variance and familiarity with CMS or VAX; or consent of instructor.

681 Special Topics in Probability (1-3) Presentation of specialized topics in probability and stochastic processes. May be repeated. Maximum 6 hrs.

683 Special Topics in Statistics (1-3) Presentation of specialized topics in statistics. May be repeated. Maximum 6 hrs.

Technology and Adult Education (College of Education)

MAJORS

DEGREES

Technology and Adult Education ....................... M.S.
Vocational-Technical Education ....................... Ed.D.
Adult Education ......................................... Ph.D.

Gerald D. Cheek, Head

Professors:

Cameron, W. A., Ph.D. ..................... Ohio State
Campbell, C. P., Ed.D. ..................... Maryland
Cheek, Gerald D., Ph.D. ................ Kansas State
Coakley, Carroll B., Ph.D. ................ Wisconsin
Craig, D. G., Ed.D. ....................... Cornell
Haskell, R. W., Ph.D. ....................... Purdue
Matthews, John I., Ph.D. ................ Arizona State
Peters, John M., Ed.D. ..................... NC State
Reed, J. L. (Emeritus), M.S. .............. Oklahoma State
Waggoner, George A. (Emeritus), M.S. ..... Indiana
Woodin, R. J. (Emeritus), Ph.D. ........ Ohio State

Assistant Professors:

Brewer, Ernest, Ed.D. ...................... Tennessee
Brockett, Ralph, Ph.D. ..................... Syracuse
Hanson, R. Ph.D. ................................ Purdue
Katsworn, Carol, Ed.D. .................. Ed.D.
Ledford, B. J., Ed.D. ...................... Tennessee
Mann, E. C., Ed.D. ....................... Penn State
Petty, G. C., Ph.D. ....................... Missouri
Raddift, B. J., M.S. ....................... West Virginia

Assistant Professors:

Pierce, R., Ph.D. ............................... Ohio State
Powell, Terrence L., M.S. ................ Oklahoma
Reynolds, Eunice, Ed.D. .................... Tennessee

THE MASTER'S PROGRAM

The Department of Technology and Adult Education offers graduate programs leading to the Master of Science with a major in Technology and Adult Education. The program is available with concentrations in adult education, business and marketing education, industrial education, industrial training, and vocational-technical education. The thesis option requires the completion of 33 semester hours including 6 hours of thesis. The non-thesis option requires the completion of 36 hours of coursework.
Details and specific requirements for the various degree options may be obtained from the coordinators of the service areas.

THE SPECIALIST PROGRAM

The Ed.S. program is a cooperative undertaking involving all vocational service areas. Concentrations are available in agricultural, business, marketing and distributive, home economics, industrial, and technical education, and in general vocational education.

The degree requires a minimum of 60 hours of graduate study. Credits earned for the Master's degree may meet program requirements in the courses which contribute to the program objectives of the candidate. A major core of studies offers advanced concepts in technological and adult education.

THE DOCTORAL PROGRAM

The comprehensive Ed.D. program in the department is designed to provide opportunities for graduate students to achieve professional objectives, develop needed competencies, and gain desirable experiences and understanding of technological and adult education.

The minimum requirements in the doctoral program consist of the following: departmental specialization, 12 hours; departmental core and electives, 24 hours; professional education core, 9 hours; research techniques, 12 hours; and dissertation, 24 hours. A minimum of 90 hours above the bachelor's degree is required.

The Doctor of Philosophy with a major in Education includes concentrations and specializations as listed under education.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S. and Ed.D. programs in Technological and Adult Education are available to residents of the state of South Carolina; the Ed.D. programs are available to residents of Kentucky and West Virginia. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.

GRADUATE COURSES

401 Utilization of Community Resources (3) Strategies of developing linkages between vocational education and private sector through advisory committees, councils, and working partnerships. Development and management of public relations programs. Prereq: 3 yrs teaching experience. Sp

415 Coordination Techniques (3) Necessary procedures, duties and responsibilities to implement, maintain, and evaluate successful cooperative education programs. Prereq: Senior standing and consent of instructor. Sp

430 Principles and Organization of Business and Marketing Education (3) Historical background, development needs. Principles of vocational education in business and marketing, curriculum implications; establishing, evaluating, and implementing programs. Prereq: Consent of instructor. F, Su

432 Methods and Materials in Business and Marketing Education (3) Teaching techniques, aids and evaluation in subject matter fields. Prereq: Consent of instructor. F, Su

436 Supervised Occupational Experience (3-9) Practical field experience in business and marketing settings under supervision of practitioner and departmental representative. May be repeated. Maximum 9 hrs.

439 Areas of Marketing (3) Marketing, personnel development, and management as practised in traditional leadership program in marketing education. Prereq: 436. F, Su

454 Training Aids Development (3) Study and preparation of instructional aids and non-print media commonly used by technical instructors and trainers. Prereq: Senior standing or consent of instructor. F, Su

455 Performance-Based Evaluation (3) Assessing, evaluating work performance with emphasis on trainee characteristics, individual worker job performance. Prereq: Senior standing or consent of instructor. Sp, Su

456 Organization and Operation of VICA/HOSA (3) Principles of organization, philosophy, and activities of vocation-technical programs. Prereq: Senior standing or consent of instructor. Sp, Su

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

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. 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. Research methods. Historical, psychological, and adult education. Prereq: 12 hrs of graduate credit. F, Su

505 Selection, Placement, and Follow-up Procedures in Technological and Adult Education (3) Methods and procedures utilized in establishing criteria for trainee selection and placement in instructional programs and work jobs. Collecting, 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, philosophy of adult education agencies, associations, programs, issues, and literature illustrating process of adult education and diversification 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 representatives. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

510 Foundations of Technological and Adult Education (3) Historical, philosophical, economical, social, and psychological foundations of technological and adult education; fundamental principles and contemporary objectives. Prereq: Consent of instructor. F

511 Issues and Trends in Technological and Adult Education (3) Academic, economic, cultural, and other handicaps of special students. Prereq: 9 hrs of graduate credit. F, Su

513 Special Topics in Technological and Adult Education (1-3) Specific objectives, activities, and evaluation. 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. Prereq: May be repeated. Maximum 6 hrs. E

515 Microcomputer Operations and Programming in Education (3) Operating procedures and BASIC programming for education and training applications. Hands-on experience in operating and programming microcomputers, writing, debugging, and running educational programs using sequential data files. Prereq: Consent of instructor. F

516 Microcomputer Software Development (3) Advanced computer design in BASIC, assembly language, and binary files, search and sort algorithms, and bitmapped graphics for educational environment. Hands-on learning and program development. Prereq: 515 or consent of instructor. E

518 Education Specialist Research and Thesis (3) May be repeated. Maximum 9 hrs. N/P only. E

521 Program Development and Operation in Technological and Adult Education (3) Theories and methods of research from practice to planning and operating education programs. Prereq: Consent of instructor. F, Su

522 Adult Development (3) Changes in characteristics of adults over life span and implications for adult education. Prereq: Consent of instructor. F, Su

523 Post-Secondary Education for Adults (3) History, evolution, philosophies, and trends of post-secondary education; university programs, institutions, and clients. Prereq: Consent of instructor. Sp, Su

524 Continuing Professional Education (3) Theories and concepts supporting design and management of educational programs for adults in professions. Prereq: 510 or equivalent. Sp

530 Methods and Materials for VOE Programs (3) Development of instructional aids, research methodologies, and evaluation. Prereq: Consent of instructor. F

531 Organization and Supervision of VOE and Marketing Programs (3) Developing office and marketing programs that meet the needs of a particular industry. Prereq: Consent of instructor. Sp, Su

532 Improvement of Instruction in Basic Business and Marketing Education (3) Issues, research findings, methods, and materials for improved instruction of both secondary and post-secondary levels. Prereq: 12 hrs of graduate credit. Sp, Su

533 Improvement of Instruction in Office Technology (3) Research, principles of learning issues, and materials in typical business communications and office procedures. Prereq: Consent of instructor. Su

534 Improvement of Instruction in Accounting and Data Processing (3) Principles of learning, issues, research findings and 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, Su

536 Organizing and Teaching Adult Business and Marketing Education (3) Planning, organizing, promoting, teaching, and evaluating continuing education programs in business and marketing education; utilizing trade associations, employment agencies, businesses, community 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; teacher-made tests. Prereq: Consent of instructor. Sp, Su

540 Special Topics in Business and Marketing Education (1-3) Specific objectives, activities, and evaluations. 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 in business and marketing teachers. Prereq: 15 hrs of graduate credit. E

542 Problems in Business and Marketing Education (3) Selective research problems in teaching and administration of business and marketing education and related areas. Prereq: Consent of instructor. E

550 Administration of Industrial Education Programs (3) Developing, staffing, administering, and evaluating trade, industrial and technical education programs in secondary and post-secondary school settings. Prereq: Consent of instructor. Sp, Su

551 Supervision of Industrial Education Programs (3) Techniques used to improve industrial education
programs. Staff development, curriculum improvement, and program updating techniques. Prereq: 455 or equivalent. F,Su

552 History and Philosophy of Industrial Education (3) Social, political, and economic events that impact development of industrial education. Philosophical problems of education. Prereq: Consent of instructor. F,Su

553 Planning Technical Education Facilities (3) Preparation of educational specifications, site selection, and basic planning. Topics related to 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 supervision, and related training. Prereq: Curriculum development course and consent of instructor. F,Su

555 Curriculum Planning for Industrial Education Programs (3) Developing performance-based, criterion-referenced instructional programs. Prereq: 374 or 554 or consent of instructor. Sp,Su

556 Staff Development Programs (3) Strategies for assessing, planning, and implementing programs for professional development of vocational-technical personnel. Prereq: 551 or consent of instructor. Sp

557 Advanced Methods of Teaching Technical Subject Matter (3) Instructional strategies and effective application of innovative methods and teaching specialized skills and technical information. Diversifying and individualizing technical instruction. Prereq: 373 or 375. Sp

558 Seminar in Educational Leadership (1-3) Current issues, innovations, problems associated with technical programs. Prereq: 12 hours of graduate courses. May be repeated. Maximum 6 hrs. F,Su

559 Evaluation of Technical Training Programs (3) Internal and external evaluation of training programs to maintain quality control and/or to justify revisions. Prereq: 455 and consent of instructor. Sp,Su

571 Supervisory Skills for Improving Industrial Productivity (3) Philosophy of improving industrial productivity through quality and introduction to basic tools of statistical process control. Deming philosophy, control charting and interpretation, process capability, techniques for training hourly workers in quality control, and measurement procedures for quality control. Prereq: Statistics course and consent of instructor. F,Su

572 Advanced Training Methods for Industrial Productivity (3) Techniques of training hourly workers in use of statistical process control tools. Techniques for involving hourly workers and supervisors in quality assurance, inventory control, and productivity improvement groups. Prereq: 571. Sp,Su

600 Doctoral Research and Dissertation (3-18) P/NP only. E

601 Curriculum Planning in Technological and Adult Education (3) Curriculum theory, models, concepts, planning evaluation and implementation of specialized program areas. Prereq: 555 or equivalent. Sp

602 Planning and Evaluation of Programs in Technological and Adult Education (3) Techniques utilized in planning, developing, and evaluating instructional programs. Prereq: 500-level planning course and consent of instructor. Sp

604 Seminar in Technological and Adult Education (1) Required 2 consecutive semesters during doctoral residency. May be repeated. Maximum 3 hrs. SNC only. E

605 Administration and Supervision of Technological and Adult Education (3) Leadership, policy, organization, planning, personnel, student development services, and budgeting relating to vocational technical and adult education at secondary, post-secondary, and higher education levels. Principles, problem solving, and management of people. Administrative theory course and consent of instructor. F,Su

610 Research Development in Technological and Adult Education (3) Proposal development, theoretical background, and research design including implementation of statistical techniques, and evaluation of research in technological and adult education. Prereq: 6 hrs of advanced statistics courses and consent of instructor. Sp,Su

611 Internship in Technological and Adult Education (3) Field experience in relevant organizations. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

613 Special Topics in Technological and Adult Education (3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E

615 Advanced Microcomputer Software Applications (3) Advanced programming and applications of intelligent or program-generating software. Progression of commercial relational database management program environments. Concepts and applications of communications and networking. Hands-on environment. Prereq: 516 or equivalent. Sp,Su


620 Seminar in Adult Education (3) Issues in adult education theories and concepts, philosophical positions, research trends and methodologies. Prereq: 516 or equivalent. F,Su

621 Advanced Seminar in Program Planning (3) Concepts, principles, and theories related to program planning in adult education. Prereq: 521 or equivalent. Sp,Su

622 Advanced Seminar in Adult Development (3) Adult development research and designing research for studies of life cycle. Prereq: 522 or equivalent. Sp,Su

626 Adult Problem Solving and Learning (3) Contemporary research and theories in adult problem solving and learning. Prereq: 521 or equivalent. F,Su


631 Higher Education in Business and Marketing Education (3) The Department of Textiles, Retailing, and Interior Design offers Master's degrees with majors in Interior Design and in Textiles, Retailing and Consumer Sciences. The program in Textiles, Retailing and Consumer Sciences offers concentrations in textile science and in retail and consumer sciences.

The Master's program in Interior Design will provide a balance of coursework in the theoretical foundations of the field; emphasis is placed on the dissemination of knowledge. The program is accredited by the Foundation for Interior Design Education Research (FIDER). 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: historic preservation and adaptive use; history of interior design, computer-aided design, and human environment interaction. Supporting courses are available in lighting, furniture design, business practices, etc.

The programs in Textiles, Retailing and Consumer Sciences prepare students for careers in industry, business, public and private agencies, and educational institutions. Master's level work enables students to conduct research in retail management and merchandising and in the consumer related areas to retail decision making. Students in textile science are expected to have a solid foundation in mathematics, as well as a formal background in a physical science or engineering.

Interested students should contact the department head for more information.

ADMISSION REQUIREMENTS

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

In addition to specified entrance requirements stipulated by The Graduate School, admission to the 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.

THE MASTER'S PROGRAMS

Interior Design

The M.S. in Interior Design requires the completion of 36 hours of graduate credit. The requirements for the degree differ as follows: in the major (510, 552, 564, and 590) 18-21 hours; a cognate area, 9 hours; research methods, 3 hours; a comprehensive design project with acceptable documentation, a
publication paper with outside review, or a thesis, 6 hours.
Based on interest and prior background, each student has a choice of the area(s) of emphasis within the field of interior design beyond the core curriculum. Emphasis may include professional interior design, historic preservation, history of interior design, environment and behavior, or computer-aided design.
Each student is required to demonstrate competence in individual research in one of the following ways:
**Thesis Option:** Complete a thesis for 6 hours credit. An oral examination will occur upon completion of the program.
**Non-Thesis Option:** Complete a comprehensive design project with acceptable documentation or a publishable paper. To be eligible, the student must have completed 12 hours of graduate credit in interior design with at least a 3.0 GPA. Having met this criterion, the student must present a proposal to the supervisory committee that will include 6 hours of subsequent coursework. This proposal must outline the nature of the project and/or paper and explain the methodological approach. A comprehensive oral and written examination, administered by the committee, will occur upon completion of the program.

**Textiles, Retailing and Consumer Sciences**
The major in Textiles, Retailing and Consumer Sciences has concentrations in Retail and Consumer Sciences and in Textile Science. Requirements are listed below.
A comprehensive oral examination, administered by the thesis committee, will be given upon completion of the thesis research. A non-thesis option is not available.

**Retail and Consumer Sciences**
Major (Required courses: 510, 511, 550, 582, 590)
- Cognate Area: 6 hours
- Statistics: 3 hours
- Total: 34 hours

**Textile Science**
- RCS 552: 3 hours
- Research Methods: 3 hours
- TS 590: 1 hour
- Textile Science courses: 12 hours
- Cognate Area: 6 hours
- Statistics: 3 hours
- Thesis: 6 hours
- Total: 34 hours

Note: Must include RCS 562 or equivalent; or 3 hours of laboratory techniques in materials analysis and characterization.

**THE PH.D. CONCENTRATIONS**

**Consumer Environments**
Students enrolled in the Ph.D. program with a concentration in consumer environments are provided with a foundation in management and retail and consumer sciences or in understanding the consumer in the designed environment and management of facilities. From this base, students focus on retail and consumer sciences or on areas of specialization including historic preservation and adaptive use, human environment interaction and facilities management to further theory and application in advanced study and research. See the consumer environments concentration under Human Ecology.

**Textile Science**
Students enrolled in the Ph.D. program in Human Ecology with a concentration in textile science take one common course which provides a foundation for the integration of textiles and apparel in the context of the near environment. A required departmental research seminar exposes students to research being conducted in all areas of study in the department.

1. College Professional Seminar, HE 610 (3 hours);
2. RCS 552 (3 hours);
3. Research Methods which must include 6 hours of laboratory techniques in materials analysis and characterization;
4. TS 590 (2 hours). Attendance at seminar is required for all full-time students.
5. Six hours in statistics at the 500-600 level;
6. Eighteen hours in textile science courses;
7. Nine hours in a cognate area;
8. Eighteen hours in other courses which may include up to 6 hours of dissertation; and

**ACADEMIC STANDARDS**
1. Evaluation of student progress will normally occur prior to enrollment for thesis hours (or the non-thesis option) and during the second semester of full-time enrollment in the program. The review of the student will be undertaken by the faculty with consideration given to factors such as: GPA (minimum 3.0), portfolio evaluation, and demonstrated research capability.
2. If progress or performance is deemed insufficient, the faculty may recommend probation with specific goals set for a specified time or termination.

**ACADEMIC COMMON MARKET**
An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UT Knoxville on an in-state tuition basis. The M.S. program in Interior Design is available to residents of the states of Kentucky, Louisiana, or Virginia. The M.S. program with a concentration in retail and consumer sciences is available to residents of the state of Mississippi. Additional information may be obtained from the Residence Assistant in the Office of Graduate Admissions and Records. For the Ph.D., see Human Ecology.

**Interior Design**

**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.
475 History of American Interior Architecture (3) Major styles of interior architecture, decoration, and decorative arts within cultural context, colonial era through nineteenth century. European influences. Pre-
req: 270 or consent of instructor. S
500 Thesis (1-15) P/NC only. E
532 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 Needs Assessment and Design Programming (3) Use of systematic design methodology and design research methods as part of design problem-solving experience. Lecture and studio. May be repeated. Maximum 6 hrs. Prereq: Admission to graduate program. F
531 Research Methods in Historic Preservation (3) Methodology for historic preservation problems in interior design. Prereq: Architecture 403 or consent of instructor. F
542 Special Topics: History of American Interior Design (3) Philosophical and stylistic movements, America of seventeenth, eighteenth; or nineteenth centuries. Topics vary. Prereq: 475 or consent of instructor. May be repeated. Maximum 6 hrs. F
552 Seminar in Interior Design (3) Twentieth-century design concepts, persons, motivation; and creative components leading to visual innovation. Prereq: 470 or consent of instructor. S,
555 Micro-computer Research Applications in Interior Design (3) Advanced micro-computer concepts and applications for research in interior design. Project design and management, optimization of design criteria, programming, schematic design, computer-aided design, advanced spreadsheet and database analysis, and desktop presentation. Prereq: Consent of instructor. Sp.
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.
568 Facilities Planning (3) Considerations in programming design, management and operation of specialized facilities: hotels and restaurants, work environments, eating facilities, retail-consumer interface and environments for elderly.
580 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
581 Directed Study in Historic Preservation (1-3) Independent advanced research in historic preservation relevant for interior design. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E
582 Directed Study in Historic Design (1-3) Independent advanced research in area of historic stylistic movements in interior design. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E
584 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
585 Directed Study in Facilities Planning (1-3) Independent advanced research in facilities management. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E
590 Research Seminar (1-2) S/NC only. E
600 Dissertation (3-15) P/NC only. E
510 Issues in Interior Design (1) Readings, reports, and discussion concerning current research and related issues in interior design: history of interior design, his-
toric preservation, environment and behavior. Registration each semester of residence.

620 Advanced Special Topics in Interior Design (3) Seminar, lecture, discussion, group work. Quadrant design, advances in historic preservation, environment and behavior. Topics vary. Prereq: 510, 552, 562, 564. May be repeated. Maximum 9 hrs.

625 Integrative Facilities Design in Consumer Environments (3) Methodologies and skills necessary for creation of settings responsive to needs of users. Techniques for programmatic analysis and development goals, user requirements, technical, functional, and behavioral analysis of consumer in business and built environment.

630 Advanced Directed Study in Interior Design (3) Individual study in aspect of interior design culminating in scholarly paper. May be repeated. Maximum 6 hrs.

**Retail and Consumer Sciences**

**GRADUATE COURSES**

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

502 Registration for Use of Facilities (3-15) Required for students not otherwise registered during an 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 Retail Strategy and Decision Making (3) Strategy, strategic management and strategic process in retail sector. Analytical decision-making skills in retailing. Retail industry structure. International differences in retail systems. Prereq: Retail Management or equivalent. Sp


540. Socio-Psychological Aspects of Apparel (3) Apparel and human behavior in social situations. Prereq: 6 hrs or equivalent from sociology and psychology.


552 Economics of Textile Complex (3) Economics consideration of U.S. textile complex. Quantitative approaches to industry structure, production, marketing, distribution and institutions within both global and domestic settings. Current and future international issues and implications. Prereq: Calculus III or equivalent; micro economics. F,A

562 Research Methods (3) Fundamentals of science methodology, advancement of science, methodology and method of research, issues and concepts of basic and applied research. Prereq: Statistics 531 or equivalent. Sp

590 Research Seminar (1) Research topics in retail and consumer sciences. May be repeated. S/NC only, F,Sp

593 Directed Study (1-3) Individual problems in retailing and directing applicants. Applicants for admission to M.F.A. design/technology program are required of all applicants. Cothran, R. M. Assistant Professors: Custer, M., M.F.A	 Florida State

Knoxville.

Cothran, R. M., Ph.D	 Tulane

DeCuir, L. J., M.F.A	 Wisconsin

Mashburn, Robert R., Ph.D	 Tennessee

Harris, Al J., Ed.D	 Michigan State

Field, R. C., M.A	 Miami (Ohio)

Fields, J. Fred (Emeritus), M.A	 Ohio State

Garvie, Peter, M.A	 Cambridge

Soper, Paul L. (Emeritus), Ph.D	 Cornell

Tate, G. (Emeritus), M.F.A	 Knox

DeCuir, L. J., M.F.A	 Tulane

Schmitt, P., Ph.D	 Wisconsin

Adjoint Faculty:

Arnout, P., M.A	 Catholic

Parris-Bailey, L., B.F.A	 Howard

The Department of Theatre offers the Master of Fine Arts degree in Theatre with an emphasis on acting, directing, playwriting, dramaturgy, scene design, costume design, lighting design and theatre technology. Not all fields of concentration are available to all applicants. Applicants must complete an undergraduate degree approximately equivalent in requirements to those specified for degrees conferred by The University of Tennessee, Knoxville.

The Graduate Record Examination, three letters of recommendation and interviews with appropriate faculty are required of all applicants. Applicants for admission to M.F.A. design/technical theatre and playwriting/dramaturgy programs must submit samples of their work. Auditions are required of M.F.A. degree acting and directing applicants.
For detailed information about the graduate program, contact the Director of Graduate Studies, Department of Theatre.

THE MASTER OF FINE ARTS PROGRAM

At least 60 semester hours, 40 of which must be at the 500 level or above, are required for the degree of Master of Fine Arts with a major in Theatre, which is normally to be completed in three consecutive years of full-time residence. Theatre 501 is required the first semester of required coursework. Theatre 401, 310-311, and at least 3 hours in dramatic theory and criticism, 310-11 may be waived by proficiency examination. Students passing this examination must complete 3 hours in advanced theatre history and 3 hours in dramatic theory/criticism.

Students in the M.F.A. degree program are evaluated annually by juried performance or portfolio submission. Continuance in the program is with the approval of the faculty committee for the M.F.A. degree program. Satisfactory completion of the comprehensive exam is prerequisite to entry into the third year. Projects in Literature (Theatre 599, 6 hours) and oral defense 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 two hours each in voice and dance.

Directing

Required courses are 430 Directing, 520-21 Master Class for first year acting candidates and 9 hours of 536 Projects in Play Directing.

Playwriting

Required are 470-71 Playwriting, at least 12 hours of 573 Playwriting Seminar, and at least 3 hours of 585 Production Workshops.

Dramaturgy

An additional two courses in dramatic theory and criticism are required as are Theatre 570 Dramaturgy: Theory and Practice, at least 6 hours of 565 Production Workshops, 430 Play Directing, 3 hours of 536 Projects in Directing, and 12 hours of 573 Seminar and Projects. In addition, students must select an arts and humanities specialization comprising at least one year of language study plus 6 hours in the selected area.

REQUIREMENTS FOR SECOND MASTER'S DEGREE

Students admitted to the MFA program who have already earned a Master's or a doctoral degree may apply up to 12 credit hours from the previous graduate program to the MFA degree with approval of the student's committee, the Dean of the College of Liberal Arts, and the Dean of The Graduate School.

Any such credits approved 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 (2) Problems in make-up design and application, character analysis, physiognomy and chiaroscuro. Prereq: 100

410 Dramatic Theory and Criticism (3) Theatre aesthetics from Aristotle to present.

420 Special Studies in Acting (3) Content varies. Exercises in selected concentrated areas such as stylists, techniques, approaches, e.g., Shakespeare, movement, humor. Prereq: Advanced Acting and consent of instructor. May be repeated. Maximum 9 hrs.

425 Applied Phonetics (3) Development of skills in transcription and reproduction of principal varieties of English Language in North America and Great Britain and selected foreign dialects in North America. Prereq: Consent of instructor.


445 Advanced Costume Construction (3) Advanced studies in construction technique, tailoring, vacuum forming, plastic molding, and cobbing. Prereq: 345 or consent of instructor.

446 Costume Patternting (3) Draping patterns for period costumes. Corestry and study of historic patterns 1500-1800. Prereq: 345 or consent of instructor.

450 Advanced Scenery Technology I (3) Study and practice of theatre woodworking; production participation required. Prereq: 250. Graduate credit to theatre M.F.A. students only.

451 Advanced Scenery Technology II (3) Study and practice of metalworking and plastics for theatrical productions; production participation required. Prereq: 250. Graduate credit to theatre M.F.A. students only.

452 Advanced Scenery Technology III (3) Study and practice of theatre scenic production; production participation required. Prereq: 250. Graduate credit to theatre M.F.A. students only.

454 Scenery Painting (2) Introduction to materials, techniques, and principles of craft. Gaining skill and understanding through studio experience. Prereq: Consent of instructor.


461 Special Effects in Lighting and Sound (4) Projects in special effects, creative application of technology. Projects soliciting, drafting, and execution of effects for production. 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: 382 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 plays. Final projects mixed, edited, and cued 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 of plays. Prereq: Consent of instructor.

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

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


500 Thesis (1-15) PrN 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.


536 Projects in Play Directing (3) Practical work in play direction 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.


546 Millinery for the Stage (2) Pattern making and construction techniques for hats from antiquity to present. Prereq: Consent of instructor.

546 Advanced Costume Patternng (3) Advanced studies in patterning period costume. Development of historic 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.


563 Projects in Scene Design (1-3) Conception and completion of major projects, both hypothetical and actual, in scene design. May be repeated. Maximum 9 hrs.

554 Studies in Scene 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 hypothetical 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 Broadway production and touring. Prereq: 462 or consent of instructor.

563 Projects in Sound Design (1-6) Production assignment as sound designer on approved play and/or relevant projects in faculty supervised laboratory. Prereq: 483 or approval of instructor. May be repeated. Maximum 9 hrs.

570 Dramaturgy: Theory and Practice (3) Methods and materials. Prereq: Consent of instructor.
Transportation
See Marketing, Logistics and Transportation

Urban Practice
(“College of Veterinary Medicine”)

MAJOR DEGREE
Veterinary Medicine D.V.M.
D. J. Krahwinkel, Head

Professors:
Brace, J., D.V.M. California (Davis)
Bright, R. M., D.V.M. Ohio State
Dorn, A. S., D.V.M. Illinois
Krahwinkel, D. J., D.V.M. Auburn
Legendre, A. M., D.V.M. Auburn

Associate Professors:
DeNoVo, R. C., Jr., D.V.M. Illinois
Gompf, R. E., D.V.M. Ohio State
Paddleford, R. R., D.V.M. Missouri
Seiler, R. R., D.V.M. Texas A&M
Schmeitzel, L. P., D.V.M. Auburn
Sims, M. H., Ph.D. Auburn
Wiegel, J. P., D.V.M. Colorado State

Assistant Professors:
Adams, W. H., D.V.M. Florida
Bright, J. M., D.V.M. Purdue
Daniel, G. B., D.V.M. Auburn
Harvey, R. C., D.V.M. Tennessee
Jenkins, C. C., D.V.M. Tuskegee
Klebanow, R. R., D.V.M. Florida
Laratta, L. J., D.V.M. Michigan State
Pardo, A. D., D.V.M. California (Davis)
Ward, D. A., D.V.M. Tennessee

Research Associate Professor:
Panjehpour, Masoud, Ph.D. Toledo

Clinical Associate:
Ageris, S., D.V.M. Tennessee
Shull, E. A., D.V.M. Tennessee

Clinical Research Associate:
Sackman, J. E., D.V.M. Michigan State

Residents:
Arrington, K. A., D.V.M. Tennessee
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
McCrackin, M. A., D.V.M. Georgia
Okrasinski, E., D.V.M. Georgia
Purvis, D. V.M.D. Pennsylvania
Ross, W., D.V.M. Tuskegee

Interns:
Greek, J. S., D.V.M. Wisconsin
McGhee, J., D.V.M. Tuskegee
Means, T. L., D.V.M. Michigan State

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

VETERINARY MEDICINE
(“College of Veterinary Medicine”)

MAJOR DEGREE
Veterinary Medicine D.V.M.
Comparative and Experimental Medicine M.S., Ph.D.

THE PROFESSIONAL PROGRAM

Admission Requirements
To qualify for admission to the professional program of the College of Veterinary Medicine, a candidate must have completed at least the minimum pre-veterinary requirements listed below. These may be completed at any accredited college or university that offers courses equivalent to those at The University of Tennessee, Knoxville, and must be completed by the end of spring term of the year in which the student intends to enroll. Biochemistry requirements must have been satisfactorily completed within five years of the time the student wishes to enter the program.

Subject Area Semester Hours
English 6
Humanities and Social Sciences* 18
Physics 8
General Chemistry 8
Organic Chemistry 8
Biochemistry** 4
General Biology 8
Genetics 3
Cellular Biology*** 3
TOTAL 66

*May include, for example, courses in English literature, speech, music, art, philosophy, religion, language, history, economics, anthropology, political science, psychology, sociology and geography.
**Exclusive of laboratory.
***It is expected that this requirement will be fulfilled by a course in cellular or molecular biology. 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 Office of Computer Assisted Registration Services, 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 transcript, Veterinary College Admission Test (VCAT) results from a test taken with 24 months of the January 15 application deadline date, and letters of reference must arrive not 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. Also included in this first year are subjects such as physical diagnosis and anesthesia. Considerable integration of subject matter is incorporated during this year. The second and third years include the study of diseases, their causes, diagnosis, treatment and prevention and are team-taught on an organ system basis. The final year (three semesters) is devoted to intensive training in the solving of animal disease problems, including extensive clinical experience in the Veterinary Teaching Hospital. Each student will rotate through a series of clinical blocks.
An innovative feature of this curriculum is the designation of semester six as one in which the individual student may select his or her courses of study. This format allows selected students who have specific educational goals (such as advanced or dual degree programs) to enroll in all, some, or none of the regularly scheduled courses during that semester. Students are required to complete at least 16 credit hours and these hours will be credited toward the D.V.M. degree. This semester of elective study offers a unique educational alternative for select students in the College of Veterinary Medicine and is intended to enhance professional growth, concentration and career opportunities.

In addition to education in the sciences and art of veterinary medicine, students receive instruction in paramedical subjects such as animal behavior, medical communication, professional ethics, jurisprudence, economics, and practice management.

The curriculum requires successful completion of 154 semester credits.

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. Because of the interdisciplinary departmental administration of the College of Veterinary Medicine, the faculty has opportunities in the graduate programs of other instructional units, including Animal Science (nutrition, physiology, genetics and animal management), Microbiology (bacteriology, virology and immunology), Ecology (environmental toxicology), Public Health, and Comparative and Experimental Medicine. (Refer to other sections of this catalog for a full description of these programs.) The majority of the graduate students and graduate faculty of the College of Veterinary Medicine are involved in the Comparative and Experimental Medicine program. This program provides a wide spectrum of interdisciplinary training that prepares graduates for teaching and/or research careers in the health sciences.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of 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

811-12 Microbiology I (5,4) Pathogenesis of bacterial, fungal and viral diseases. Study relating microbial structure, metabolism and genetics to patterns of disease. Includes laboratory techniques in antimicrobics, antigens and antibodies. Immunology, study of mechanisms of immunity, diagnostic immunology, and role of immune response.

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 I (4,4) Gross and applied anatomy: neural structures of common domestic animals: dog, cat, horse, Dissection of embalmed specimens, prosections, slide tour, and living animals.
**THE MASTER'S PROGRAM**

Special requirements in Zoology are as follows:
1. completion of core requirements as determined by the candidate's faculty committee, including a course in biostatistics;
2. achievement of a 3.0 or better GPA in all courses taken for graduate credit;
3. completion of a thesis.

**THE DOCTORAL PROGRAM**

Special requirements in Zoology are as follows:
1. courses as determined by the candidate's faculty committee, including a course in biostatistics;
2. oral and comprehensive written examination in zoology and allied fields in which the candidate has had training;
3. reading knowledge of at least one foreign language in which there exists a sizeable amount of literature relevant to the major field of study. The student has the option of demonstrating a reading knowledge of this foreign language by (a) passing the official reading examination given by the language department or (b) earning a grade of at least a B in the second semester of a special language reading course for graduate students. This foreign language requirement must be fulfilled before a student can take the comprehensive examination.

**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 Zoology 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.

**GRADUATE COURSES**

- 504 Toxicology (3) Principles of toxicity, molecular mechanisms, and pathologic processes and clinical features of animal diseases caused by common toxic agents. Prereq: Consent of instructor. F
- 508 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. Prereq: Consent of instructor. Sp.
- 509 Zoology (College of Liberal Arts)
  - MAJOR DEGREES Zoology M.S., Ph.D.
  - Arthur C. Echternacht, Head

**Zoology**

**Professors:**
- Bagby, R. M., Ph.D. Illinois
- Bunting, Dewey L., Ph.D. Oklahoma State
- Carlson, J. G. (Emeritus) (Distinguished Prof.), Ph.D. Pennsylvania
- Chen, T. T., Ph.D. Florida
- Echternacht, Arthur C., Ph.D. Kansas
- Eitner, D. A., Ph.D. Minnesota
- Handel, Mary Ann, Ph.D. Kansas State
- Hochman, B. (Emeritus), Ph.D. California
- Jeon, 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)
- McCracken, G. F., Ph.D. Cornell
- 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
- Vaughan, G. A., Ph.D. Duke
- Weich, H. G. (Emeritus), Ph.D. Florida
- Whiston, G. L., Ph.D. Iowa

**Associate Professors:**
- Burnham, K. D. (Emeritus), Ph.D. Iowa
- Fox, David J., Ph.D. Johns Hopkins
- Greenberg, Neil, Ph.D. Rutgers
- McKee, B. D., Ph.D. Michigan State
- Pan, M. L., Ph.D. Pennsylvania

**Research Associate Professors:**
- Ashley, T., Ph.D. Florida State
- Tindall, R., Ph.D. Penn State

**Assistant Professors:**
- Boake, C. R. B., Ph.D. Cornell
- Drake, J. A., Ph.D. Purdue
- Ganguly, R., Ph.D. Nebraska
- Gittlerman, 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.

**REQUIREMENTS FOR ADMISSION**

Applicants for graduate study are expected to have a background no less extensive than that required of undergraduate majors in this department. This includes a knowledge of the basic principles of cell biology, genetics, and ecology. Other requirements for admission are:
1. one year of general zoology or biology;
2. 18 semester hours of upper division zoology or biology;
3. two years of chemistry including one year of general inorganic chemistry;
4. one year of mathematics including calculus;
5. one year of physics;
6. Graduate Record Examination scores (general and biology); and
7. a grade-point average of 3.0 out of 4.0. Otherwise superior students, deficient in one or more of the above requirements, may be admitted at the discretion of the department's Graduate Affairs Committee.
521 Advanced Mammalian Physiology I (4) (Same as Animal Science 521.)
522 Advanced Mammalian Physiology II (4) Respiratory, renal, gastrointestinal, and reproductive physiology. 4 hrs. Prereq: 521.
523 Physiology of Hormones (3) Cellular and organ- 2 hrs and 1 lab. Prereq: Biochemistry 410.
524 Physiological Ecology of Animals (3) Adaptive physiological response of animals to natural changes in 2 hrs and 1 lab. Prereq: Consent of instructor.
525 Physiological Ethology (3) Behavioral endo- 2 hrs and 1 lab. Prereq: Consent of instructor.
526 General Vertebrate Neuroanatomy (3) (Same as Psychology 526.)
540 Insect Taxonomy I: Major Orders (3) Survey of 2 hrs and 1 lab. Prereq: Consent of instructor.
541 Insect Taxonomy II: Minor Orders (3) Survey of 2 hrs and 1 lab. Prereq: 540 or consent of instructor.
542 Insect Structure and Function (3) Integrated study of morphology and physiology at tissue and cellular 2 hrs and 1 lab. Prereq: Consent of instructor.
543 Aquatic Insects (3) Taxonomy and biology of 2 hrs and 1 lab. Prereq: Consent of instructor.
544 Fresh Water Invertebrate Zoology (3) Ecology 3 hrs lab and field study. Prereq: 360.
545 Advanced Animal Behavior (3) Second-level course in ethology, stressing evolution, genetics, physiology, ecology, and human behavior. 4 hrs combined lecture and lab. Prereq: 540 or equivalent. (Same as Psychology 545.)
555 Seminar in Quaternary Studies (3) (Same as Paleontology 555.)
560 Biometry (3) Statistical methods in analysis of 2 hrs and 1 lab. Prereq: Consent of instructor.
573 Population Biology (3) Genetics and ecology of 2 hrs and 1 lab. Prereq: Statistics course or consent of instructor.
583 Zoogeography (3) Processes determining geographic distribution of animals and distribution and composition of animal communities. 2 hrs and 1 lab. Prereq: Ecological course or consent of instructor.
591 Foreign Study (1-15) See page 31.
592 Off-Campus Study (1-15) See page 31.
593 Zoology Seminar (1) Advanced topics in zoology. 2 hrs and 1 lab. Prereq: Consent of instructor.
595 Independent Study (1-15) See page 31.
600 Doctoral Research and Dissertation (3-15) 2 hrs. Prereq: Consent of instructor.
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.
FACILITIES FOR RESEARCH AND SERVICE
Facilities for Research and Service

Bureau of Educational Research and Service
(College of Education)

Timothy J. Pettitbone, Director

Four major types of activities—research, development, educational services, and publications—are channelled 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 International Education
(Office of Associate Vice Chancellor/Student Affairs)

James Gehlhar, 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 sponsored by the College of Engineering, the Instrumentation and Controls Division of Oak Ridge National Laboratory, and the National Science Foundation. The Center's program combines education, research, and technology transfer. Graduate assistantships are available for qualified students. 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.
Center sponsored research is carried out in the fields of process control, pattern recognition, process diagnostics, and sensor development. Research in process control concentrates in the areas of process analysis, process modeling, control system design, and real-time expert systems. Pattern recognition research deals with the development of techniques for the automatic detection of flaws in both continuous and piece-part produced products. Process diagnostics research involves the application of signal validation and sensor fault monitoring techniques to modern process control systems. Finally, fiber optic sensor systems development is underway for monitoring and control of chemical 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 the state surplus to a new Centers Program to provide $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 Keefer, Director
UT Space Institute
Tullahoma, TN 37388-8897
(615) 455-0631 Ext. 475

Center for Livestock Diseases and Health
Dr. G. M. H. Shires, Director
College of Veterinary Medicine
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) 974-7608

Science Alliance
Dr. Lee Riedinger, Director
101 South College
UT Knoxville
Knoxville, TN 37996
(615) 974-6765

Waste Management Research and Education Institute
Dr. E. William Colglazier, Jr.
327 South Stadium Hall
UT Knoxville
Knoxville, TN 37996-0710
(615) 974-4251

Child Development Laboratories
(College of Human Ecology)
Carol E. Catron, Director
The Child Development Laboratories, operated by the Child and Family Studies department within the College of Human Ecology since 1927, currently offer child care programs for young children ages six weeks to five years. The Child Development Laboratories serve three purposes: to promote observation, participation, and research activities of the department and other university faculty and students to prepare undergraduate and graduate child development professionals for working effectively with young children; to provide a model early childhood education program for children, families and early childhood professionals.

The programs are equipped with a telecommunication laboratory that features unique videotaping capabilities in all classrooms, small group research rooms, and observation booths that facilitate teacher training and research. A variety of research projects, such as the development of creativity in young children, parental listening behaviors, children's political socialization, mainstreaming, and peer interactions, involves students and faculty in the college and many departments on campus. Graduate Assistants in the Laboratories participate in teaching, assessment, administrative, supervisory and research activities while working with children and families under the guidance of faculty and staff. The Child Development Laboratories are accredited by the National Academy of Early Childhood Programs, a division of the National Association for the Education of Young Children.

Communications Research Center
(College of Communications)
Michael Singletary, Director
The Communications Research Center, 426 Communications Building, 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
Faculty Associates:
Art: Susan E. Metros; Computer Science: David W. Straight; Engineering: Osama Soliman; Physics: William E. Blass; Statistics: John Philipot.

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 instructor through the CAFE system. Each account is for use in coursework only. 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 user who is responsible for answering 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 throughout the year. Topics include programming languages, job control language, vector processing, the use of graphics, word processing, and the statistical and mathematical programs available at UTCC. Many courses are available on videotape in Audiovisual 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 Tennessee This Week. During the break following each academic term, UTCC consultants conduct a four-day seminar for faculty, staff, and graduate students on the use of either the IBM or DEC VAXcluster computers.

UTCC maintains online and printed documents describing the availability and use of system hardware and software. The IBM User's Guide and the VAXcluster User's Guide are available at the UT Book & Supply Store. The monthly UTCC Newsletter announces changes to systems, equipment, and procedures and contains other items of interest to users.

The UTCC computing network connects mainframe computers, workstations, microcomputers and video terminals through Ethernet, fiber optic cable, or one of more than 1200 direct or 60 dialup lines. Hardware and software from Racal-Milgo Information Systems is connected to the Ethernet through a terminal port selection and multiplexing system which is connected to a similar system at the Oak Ridge National Laboratory. Ethernet and fiber optics connect many buildings on the Knoxville campus in a multivendor, heterogeneous network that provides rapid access to data in remote locations and supports several protocols including TCP/IP, DECnet, and LAT. Mainframe computers operated by UTCC include an IBM 3090-300E with three vector processors, an IBM 3081-D, two DEC VAX 8800 processors, one DEC VAXvector 6000-440, and one DEC VAX 6000-440 processor in
Supercomputing Applications at the University of Illinois, and the Cornell National Supercomputer Facility. Consulting services are provided by UTCC on those systems.

UTCC is also a member of BITNET, a network of more than 2,100 computers located at educational and research institutions throughout North and South America, Europe, and Asia. It allows the rapid exchange of messages and files associated with university work.

*UNIX is a trademark of AT&T.

Continuing Education and Public Service

Sam C. Bills, Acting Dean

The Division of Continuing Education, Knoxville, is the administrative unit of UT Knoxville that extends academic courses, educational services, and other programs to the non-traditional student. While most people who participate in the programs are adults, persons of all ages and academic levels enroll in the credit and non-credit offerings of the Division.

Programs and courses are based upon student needs and desires, whether for self-motivated learning; for leisure and recreational programs; or for professional promotion, certification, licensure, relicensure, or mid-career changes. The Division provides these educational opportunities through program coordination and development of the five departments: the University Evening School, Non-Credit Programs, Department of Conferences, Department of Independent Study, and English Language Institute.

UNIVERSITY EVENING SCHOOL

Sam C. Bills, Director

The University Evening School, in conjunction with academic colleges and departments, administers credit programs for those students attending classes on and off campus in a variety of nontraditional formats. Support services are provided to assist students in their educational pursuits.

On-Campus Evening Program

Classes are offered during late afternoon and evening hours for those students who work or have other commitments during the day. Some departments within the Colleges of Business Administration, Education, and Engineering offer all courses required for an advanced degree during the evening. The College of Business Administration offers all courses required for the MBA degree with a concentration in Management and Venture Analysis. For other majors, consult the appropriate academic department.

Mini-Term

The University Evening School offers a Mini-Term during May. Students may enroll in one concentration credit course during the Mini-Term period.

Courses and instructors listed for the Mini-Term are carefully selected to reflect a broad academic base of individualized offerings suited to an intensive program of study. Courses cover material and information included in regular semester offerings.

Off Campus Programs

The Evening School makes arrangements for departments to conduct undergraduate and graduate courses in many locations away from the Knoxville campus. The courses are scheduled in response to requests and identified needs of adult part-time students who live some distance from the UT Knoxville location. All course offerings and instructors are approved by the appropriate academic departments, and the credit awarded is resident credit.

The College of Education offers the following graduate degree programs: Doctor of Education with a major in Educational Administration and Supervision (Chattanooga); Specialist in Educational Administration with a major in Educational Administration and Supervision (Chattanooga); Master of Science with a major in Technological and Adult Education (Statewide).

The Evening School administers an off-campus center at Oak Ridge where courses leading to advanced degrees in science and engineering are offered (see listing under Off-Campus Graduate Centers).

Workshops

Credit workshops are coordinated through various academic departments of the University and give students the opportunity to participate in short periods of intensive study.

Workshops offer flexibility of timing, location, and content. Summer workshops are particularly popular with teachers and school administrators. Although most workshops are held on the UT Knoxville campus, geography is not a limiting factor.

Student Services

A comprehensive program of services including academic, administrative, and financial aid information is provided by the University Evening School for both on- and off-campus students.

Registration

Registration by mail is offered as a convenience to former Evening School students. Secondary registration at both on- and off-campus locations is also available.

For information, contact the UT Evening School, 451 Communications Bldg, University of Tennessee, Knoxville, TN 37996-0341, or telephone (615) 974-5361 or 1-800-334-1724.

NON-CREDIT PROGRAMS

Gayle D. Cooper, Director

The Department of Non-Credit Programs provides a comprehensive array of courses and seminars designed and planned to serve the needs or demands of individuals in Knoxville and surrounding communities, as well as those of businesses and industry throughout Tennessee. Most courses are offered on a quarterly basis in the evening on the University campus and at selected off-campus locations. Courses are taught by University faculty when possible and citizen faculty of the community who have gained a reputation for certain competencies or technical skills. Business seminars are offered to the public in the major cities of Tennessee. These can also be delivered "on-site" for business or industrial clients, with instructional services tailored to the needs of each individual group.

Courses offered by the department range from developing personal skills, such as communications, computer literacy, and
management development, to human interest courses, such as gardening, exercise and fitness. There are also courses which meet certain requirements of the state or other agencies for certification in given fields, such as real estate, aviation, CEBS (Certified Employee Benefit Specialist) and CCA (Certified Credit Administrator). The department co-sponsors the Smoky Mountain Field School with the Great Smoky Mountains National Park.

Continuing Education Units (CEU's) are awarded to students satisfactorily completing courses and seminars offered by the department. A permanent record of CEU's is maintained. A transcript of all CEU's earned at The University of Tennessee, Knoxville, may be obtained upon written request.

Non-Credit information may be obtained at the Hess Building, 600 Henley Street, Suite 105, Telephone (615) 974-0150.

DEPARTMENT OF CONFERENCES

UT Conferences, housed in the new Conference Center in downtown Knoxville, provides management services to individuals or groups who desire to hold a high quality convention, conference or meeting anywhere in the state of Tennessee.

Utilizing the new Conference Center, state-wide University system facilities, major hotels and convention centers across Tennessee, the department designs programs to meet the needs of the participants. The staff provides professional guidance and management for small group meetings as well as for major conventions of several thousand delegates. Consulting services range from planning and budgeting to lodging, food services, speakers, promotional material, meeting rooms, and all details to assure a successful event. Programs which meet appropriate criteria qualify for Continuing Education Credits. The Division of Continuing Education maintains a record of CEU's earned and provides a transcript upon written request.

The Department cooperates with UT Educational Video and Photography to provide teleconferencing services for the University and community. University departments and interested individuals may arrange to receive (downlink) satellite programming at the UT Conference Center or to transmit (uplink) to earth stations around the world.

Additional information may be obtained from UT Conferences, P.O. Box 2648, Knoxville, TN 37901, or by calling (615) 974-0250. FAX (615) 974-0264.

DEPARTMENT OF INDEPENDENT STUDY

David F. Holden, Director

The UT Knoxville Department of Independent Study administers the program by correspondence for all campuses of the University. This includes undergraduate credit courses, high school courses (for credit or for college entrance requirements), and non-credit courses. The courses utilize videotapes and audiotapes as well as traditional print materials.

The department also serves as the Tennessee state office for Elderhostel, an educational and recreational program for people over 60. One-week, non-credit Elderhostel programs are available throughout Tennessee, the U.S., and many countries overseas.

For information and enrollment forms for correspondence courses or Elderhostel contact:

Department of Independent Study, 420 Communications Bldg., The University of Tennessee, Knoxville, TN 37996, Telephone (615) 974-5134.

ENGLISH LANGUAGE INSTITUTE

Dale A. Myers, Director

The English Language Institute (ELI) is a non-credit language-study program of The University of Tennessee, Knoxville. It is designed to assist students in their pursuit of career goals or educational objectives in the U.S.

The ELI offers intensive courses for the improvement of student skills in the English language. International students, visitors, and professionals have successfully learned English through study in the ELI.

The courses emphasize the development of communicative ability in listening, speaking, reading, and writing. Faculty members are trained in teaching English to speakers of other languages with differing national backgrounds and varying proficiency in English.

Classroom instruction is supplemented by pronunciation, test-taking strategies, U.S. culture orientation, and university study skills.

Additional information may be obtained at 907 Mountcastle St., (615) 974-3404.

ELDERLY AND DISABLED PERSONS

Legislation gives Tennessee citizens who are 60 years of age or older, or those who are totally disabled, the opportunity to attend credit and non-credit courses at the University at no charge. Those over 65 or over, or who are totally disabled, and who desire to receive UT credit for their courses, may pay a reduced charge of $7 per credit hour up to a maximum of $75 for a full-time load. Registration for day and evening classes is handled by the Evening School, 451 Communications and University Extension Building on the UT, Knoxville campus (615) 974-5361 or 1-800-334-1724.

Energy, Environment, and Resources Center

E. William Colglazier, Jr., Director

The Energy, Environment, and Resources Center, 329 South Stadium Hall, was created in 1973 to encourage interdisciplinary research directed at solutions to problems related to energy and the environment. The Center involves faculty and students in research and public service projects, manages research and development projects that involve several disciplines, and assists government and industry in specific problems related to energy, environmental, resource, and technology policy issues. The Center has a close working relationship with researchers at the Oak Ridge National Laboratory and the Tennessee Valley Authority. Sponsors include federal and state agencies, industry, and foundations.

Current research involves biotechnology, global environmental problems, risk assessment, and ethical and value issues in technology policy. The Center operates the Waste Management Research and Education Institute, a state-funded Center of Excellence. Current grants and contracts of both centers are approximately eight million dollars per year.

Institute of Agriculture

D. M. (Peter) 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 divisions: Agricultural Experiment Station, Agricultural Extension Service, College of Agricultural Sciences and Natural Resources, and College of Veterinary Medicine.

AGRICULTURAL EXPERIMENT STATION

Don O. Richardson, Dean

John I. Sewell, Associate Dean

Thomas H. Kliint, Associate 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 uses 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 develop 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
Committee represents county government in agriculture and a County Agricultural Extension service as a three-way partnership among county, state, and local governments located in their respective districts. District 

Agriculture is divided into five districts with supervisory and administrative responsibility for one of four units of the Agricultural Experiment Station. Educational emphasis includes work in instruction at colleges.

The UT Knoxville Libraries currently subscribe to more than 18,000 periodicals and other 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: Agriculture-Veterinary Medicine Library, Map Library, Music Library, Special Collections Library, and the University Archives. The Hodges Library has comfortable study space for 3,500 students, 308 graduate student carrels, and 136 faculty studies.

The Special Collections Library in the James D. Hoskins Building is a repository of regional and local materials, Tennesseana, 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 Reference and Information Services and by Interlibrary Loan. Reference and Information Services provides research assistance and access to commercially available databases. In the reference room, users may also 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

(University of Tennessee at Knoxville)

John E. Ribblett, Director

The College of Business Administration's executive management education efforts are facilitated through the Development Center, 709 Stokely Management Center. The mission of the Center is to promote the learning and dissemination of an integrated framework of managerial excellence. The Center defines excellence in terms of competitive world standards of quality, efficiency, and service to the recognized concerns of all constituencies (including customers, employees, suppliers, owners, students, and society in general). The mission statement reflects a broadened view of the Center to include the accepted responsibility for (1) developing close strategic partnerships with a selected set of companies to better facilitate learning and development of the knowledge which is truly external to the recognized concerns of all constituencies and (2) acting as a facilitator in driving this knowledge into the credit curriculum of the College.

The Center has prided itself on the development of long-term relationships with organizations that provide a living laboratory to test and validate the new knowledge of the Center that is disseminated in a variety of forms. Executive and Management Education Programs are one form of dissemination. A staff of 26 designs, develops, and markets fifty yearly offerings for 1500 participants. The Center emphasizes consistent, high-quality programming for small class sizes, outstanding faculty, a highly participatory style of instruction, and an applied orientation. The focus is on longer term, more developmentally oriented programs of one to four weeks in length such as the four-week University of Tennessee Executive Program and one-week Senior Executive Institute for Productivity Through Quality.

Off-Campus Graduate Centers

KINGSPOINT UNIVERSITY CENTER

UT Knoxville offers graduate programs in science and engineering at both the Master's and doctoral levels. The program is open to all disciplines, as the need and resources permit, are offered by UT Knoxville and is coordinated with the graduate and undergraduate offerings of East Tennessee State University.

Students who enroll in this program must be admitted to The Graduate School of UT Knoxville. Information and application forms may be obtained from the Kingsport University Center, The University of Tennessee, University Boulevard, Kingsport, Tennessee 37660.

OAK RIDGE RESIDENT GRADUATE PROGRAM

UT Knoxville offers graduate study programs at Oak Ridge leading to Master's degrees in Business Administration with a concentration in management, and in Statistics. The Master's and doctoral degrees are available in engineering, mathematics, and physical sciences. Courses are given in late afternoons and evenings with research facilities provided and used in cooperation with the Oak Ridge Associated Universities (ORAU).

This program is supported under a sub-contract with ORAU with principal support coming from the Martin Marietta Corporation. UT Oak Ridge is one of the forty-three colleges and universities which sponsor ORAU, a nonprofit education and research management corporation.

Information and applications to The Graduate School may be obtained by writing to the UT-Oak Ridge Graduate School, Post Office Box 117, Oak Ridge, Tennessee 37830.

NASHVILLE GRADUATE ENGINEERING PROGRAM

Opportunities for graduate study leading to the Master of Science in Industrial Engineering and other disciplines, as the need and resources permit, are offered by UT Knoxville.

Students who enroll in these programs must be admitted to The Graduate School of UT Knoxville. Information and appropriate forms may be obtained from Jerry Westbrook, Director, Nashville Graduate Engineering Program, Ten and Charlotte, Nashville, Tennessee 37203.
CHATTANOOGA GRADUATE EDUCATION PROGRAM

UT Knoxville offers a graduate program in education leading to the Specialist in Education and the Doctor of Education degrees with majors in Educational Administration and Supervision and Vocational-Technical Education. Students who enroll in this program must be admitted to The Graduate School of UT Knoxville.

Information and appropriate forms may be obtained from the Director, c/o Dean, College of Education, UTC, Chattanooga, Tennessee 37403.

THE UNIVERSITY OF TENNESSEE-OAK RIDGE GRADUATE SCHOOL OF BIOMEDICAL SCIENCES

The University provides programs leading to the M.S. and Ph.D. degrees in various areas of biomedical sciences. Graduate students have the opportunity to study and do research in conjunction with the Biology Division of the Oak Ridge National Laboratory.

For complete information concerning the program, see Biomedical Sciences under Fields of Instruction.

COLLEGE OF SOCIAL WORK

UT Knoxville offers a fully accredited two-year program leading to the Master of Science in Social Work through the College of Social Work, with programs in Knoxville, Nashville, and Memphis.

The UT Knoxville College of Social Work also offers a Doctor of Philosophy with a major in Social Work.

For complete information concerning the programs, see Social Work under Fields of Instruction.

The Psychological Clinic

(College of Liberal Arts)

Alvin G. Burstein, Director

The Psychological Clinic supports graduate training in clinical psychology. Psychological diagnosis and psychotherapy are offered on an outpatient basis, with medical consultants, to the general public as well as to University students, upon referral by a physician.

Textiles and Nonwovens Development Center

(College of Human Ecology)

Larry C. Wadsworth, Director

The Textiles and Nonwovens Development Center (TANDEC) was officially dedicated in October 1990. TANDEC was made possible through a grant from Exxon Chemical Company.

Nonwovens products loom large in a number of markets and TANDEC looms large in both basic research and nonwoven product development. Nonwovens research programs at UT Knoxville include structure-property-process relationships in melt blowing polyolefins, polyesters, nylon, elastomeric polymer, engineering thermoplastics and recycled plastics; mechanism of melt blown web formation; modeling of the melt blowing and spunbonding processes; development of outline optical measurements for control of the critical properties of melt blown webs; electrical measurement of fiber alignment and bonding in nonwoven webs; thermal bonding and characterization of cotton/synthetic fiber nonwovens; computational analysis of heat transfer behavior in thermal calendering; study of protective apparel for agricultural, industrial and medical uses; and finishing of nonwovens. In addition to the basic research, technology transfer has been accomplished during the past several years by assisting companies in applied projects, primarily in the melt blowing area.

The primary missions of TANDEC are to conduct nonwoven and textile grant research programs and to develop new product applications. The TANDEC facilities further allow production of nonwovens on a limited basis for participating companies while equipment is not being used for research activities. The nonwovens laboratory hosts numerous guests from industry and academic, and the facilities are planned to meet their needs, while safeguarding research confidentiality.

Transportation Center

(Office of Associate Vice Chancellor)

Stephen H. Richards, 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 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 within the Office of the Associate Vice Chancellor 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, comprehensiveness, 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 institute located on a 365 acre lakeshore campus in Middle Tennessee. UTISI 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 in many areas including aerospace engineering, 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 non-linear 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 UTISI 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 for Academic Affairs, The University of Tennessee Space Institute, Tullahoma, Tennessee 37388.

Water Resources Research Center

(Office of Associate Vice Chancellor)

Bruce A. Tischant, Acting Director

The Water Resources Research Center, 422 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 bodies, 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.
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