Student Calendar For 1980-81

Winter Quarter, 1980

January 3-4 (Thursday-Friday)
January 7 (Monday)
February 11 (Monday)
March 12-15 (Wednesday-Saturday)
March 15 (Saturday)
March 16 (Tuesday)

Spring Quarter, 1980

March 24-25 (Monday-Tuesday)
March 26 (Wednesday)
April 4-5 (Friday-Saturday)
April 29 (Tuesday)
June 2-5 (Friday-Tuesday)
June 5 (Thursday)
June 9 (Monday)

Summer Quarter, 1980

June 12-13 (Thursday-Friday)
June 16 (Monday)
July 3 (Thursday)
July 4 (Friday)
July 18 (Friday)
July 21 (Monday)
July 21 (Monday)
August 7 (Thursday)
August 22 (Friday)
August 25 (Monday)

Fall Quarter, 1980

September 22-24 (Monday-Wednesday)
September 25 (Thursday)
October 29 (Wednesday)
October 31 (Friday)
November 1 (Saturday)
November 27-29 (Thursday-Saturday)
December 5-9 (Friday-Tuesday)
December 9 (Tuesday)
December 12 (Friday)

Winter Quarter, 1981

January 5-6 (Monday-Tuesday)
January 7 (Wednesday)
February 10 (Tuesday)
March 13-17 (Friday-Tuesday)
March 17 (Tuesday)
March 20 (Friday)

Registration
Classes Begin
Change of Registration Deadline
Alternative Period
Classes End
Commencement

Registration
Classes Begin
Easter (No Classes)
Change of Registration Deadline
Alternative Period
Classes End
Commencement

Registration, First or Both Terms
Classes Begin
Change of Registration Deadline, First Term
Independence Day (No Classes)
Classes End, First Term
Registration, Second Term
Classes Begin, Second Term
Change of Registration Deadline, Full Term
Classes End
Change of Registration Deadline, Second Term
Classes End
Commencement

Registration
Classes Begin
Change of Registration Deadline
East. Tenn. Educ. Assoc. (No Classes)
Homecoming (No Classes)
Thanksgiving (No Classes)
Alternative Period
Classes End
Commencement

Registration
Classes Begin
Change of Registration Deadline
Alternative Period
Classes End
Commencement
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Graduate School Office Hours
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Telephone - (615) 974-3251

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Marvin Goodman, B.S., M.S., Director, Kingsport Graduate Program
Alexander Hollaender, A.B., A.M., Ph.D., Director, Archival Center for Radiation Biology
James A. Spencer, B.A., M.C.P., Director, Graduate School of Planning
W. Edgar Barnett, B.S., M.S., Ph.D., Director, UT-Oak Ridge Graduate School of Biomedical Sciences
William F. Brandes, M.S., P.E., Director, Water Resources Research Center
Lynn Russell, Ph.D., Director, Chattanooga Graduate Engineering Program
Jerry D. Westbrook, B.E., M.S., Ph.D., Director, Nashville Graduate Engineering Program
Ann E. Prentice, A.B., M.L.S., D.L.S., Director, Graduate School of Library and Information Science
William A. Goodwin, B.S., M.S., Interim Director, Transportation Center
Robert A. Bohn, A.B., A.M., Ph.D., Acting Director, Energy, Environment, and Resources Center

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Membership January 1, 1979

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L. Evans Roth, Vice Chancellor
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Elected Members

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<tr>
<th>College or Unit</th>
<th>Elected Members</th>
<th>Date of Expiration</th>
<th>Proxy</th>
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<tbody>
<tr>
<td>Col. of Agriculture</td>
<td>Dr. Gary Lessman</td>
<td>Dec. 31, 1980</td>
<td>Dr. Luther Wilhelm</td>
</tr>
<tr>
<td>Col. of Bus. Admin.</td>
<td>Dr. H. Dudley Dewhirst</td>
<td>Dec. 31, 1979</td>
<td>Dr. Norman E. Dittrich</td>
</tr>
<tr>
<td>Col. of Communications</td>
<td>Dr. Jan R. Williams</td>
<td>Dec. 31, 1981</td>
<td>Dr. Sherry Ziegler</td>
</tr>
<tr>
<td>Col. of Education</td>
<td>Dr. Jerry J. Bellon</td>
<td>Dec. 31, 1979</td>
<td>Dr. Woodrow Wyatt</td>
</tr>
<tr>
<td>Col. of Engineering</td>
<td>Dr. John Peters</td>
<td>Dec. 31, 1981</td>
<td>Dr. Paul C. Burns</td>
</tr>
<tr>
<td>Col. of Home Economics</td>
<td>Dr. Madge M. Phillips</td>
<td>Dec. 31, 1980</td>
<td>Dr. Charles B. Garrison</td>
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<tr>
<td>Col. of Liberal Arts</td>
<td>Dr. John Ray</td>
<td>Dec. 31, 1981</td>
<td>Dr. Sherilyn Ziegler</td>
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<tr>
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<td>Dr. Gerald Ubben</td>
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<td>Dr. Bruce R. Dewey</td>
<td>Dec. 31, 1981</td>
<td>Dr. Paul C. Burns</td>
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<td>Dr. Pietro F. Pasqua</td>
<td>Dec. 31, 1980</td>
<td>Dr. Charles Hargis</td>
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<td>Dr. David B. Eastwood</td>
<td>Dec. 31, 1979</td>
<td>Dr. A. Montgomery Johnston</td>
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<tr>
<td>Col. of Engineering</td>
<td>Dr. Jeffrey Becker</td>
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<td>Dr. Peyton Z. Peebles</td>
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<td>Dr. Dale Cleaver</td>
<td>Dec. 31, 1981</td>
<td>Dr. David W. Goodpasture</td>
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<tr>
<td>Col. of Home Economics</td>
<td>Dr. Otsi Stephens</td>
<td>Dec. 31, 1979</td>
<td>Dr. Betty L. Beach</td>
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<tr>
<td>Col. of Liberal Arts</td>
<td>Dr. Patricia L. Walne</td>
<td>Dec. 31, 1981</td>
<td>Dr. William Bull</td>
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<tr>
<td>Col. of Nursing</td>
<td>Mr. Mike Thompson</td>
<td>Apr. 30, 1980</td>
<td>Dr. Mildrad Fenske</td>
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<tr>
<td>Col. of Social Work</td>
<td>Mr. Thomas Walden</td>
<td>Apr. 30, 1980</td>
<td>Ms. Ann Wachter</td>
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<tr>
<td>UT Space Institute</td>
<td>Dr. Gideon Fryer</td>
<td>Dec. 31, 1980</td>
<td>Dr. Robert Bonovich</td>
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<td>Dr. Roger M. Nooe</td>
<td>Dec. 31, 1981</td>
<td>Dr. Maurice A. Wright</td>
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John J. McDow, B.S., M.S., Ph.D., Dean of Admissions (Undergraduate) and Records
## Majors and Degrees Available

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<thead>
<tr>
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<th>Letters of Recommendation</th>
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<td>Agricultural Biology</td>
<td>M.S.</td>
<td>G.R.E.</td>
<td>3-Departmental Rating Forms</td>
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<tr>
<td>Agricultural Economics</td>
<td>M.S., PH.D.</td>
<td>G.M.A.T.</td>
<td>3-Departmental Rating Forms</td>
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<td>Agricultural Engineering</td>
<td>M.S., PH.D.</td>
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<td>3-Former Professors</td>
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<td>Agricultural Extension</td>
<td>M.S.</td>
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<td>Agricultural Mechanization</td>
<td>M.S., PH.D.</td>
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<tr>
<td>Animal Science</td>
<td>M.S.</td>
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<tr>
<td>Food Technology and Science</td>
<td>M.S.</td>
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<td>Forestry</td>
<td>M.S.</td>
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<td>Ornamental Horticulture and Landscape Design</td>
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<td>Plant and Soil Science</td>
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<td>Wildlife and Fisheries Science</td>
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<th>Letters of Recommendation</th>
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<tr>
<td>*Accounting</td>
<td>M.ACC.</td>
<td>G.R.E.</td>
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<td>*Economics</td>
<td>M.A., M.S., PH.D.</td>
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<td>*Management Science</td>
<td>M.S., PH.D.</td>
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<td>*Statistics</td>
<td>M.S.</td>
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<td>*Communications</td>
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<td>Elementary Education</td>
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<td>Industrial Education</td>
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<td>Instructional Media and Technology</td>
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<td>Music Education</td>
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<td>Special Education</td>
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<td>Vocational-Technical Education</td>
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<th>Degree</th>
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<tr>
<td>*Aerospace Engineering</td>
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<td>G.R.E.</td>
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<tr>
<td>*Chemical Engineering</td>
<td>M.E., M.S., PH.D.</td>
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<td>Civil Engineering</td>
<td>M.E., M.S., PH.D.</td>
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<td>*Nuclear Engineering</td>
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<td>*Polymer Engineering</td>
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<th>Degree</th>
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<td>*Child and Family Studies</td>
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<td>G.R.E.</td>
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<tr>
<td>*Consumer Studies and Housing: Public Policy</td>
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<td>G.M.A.T.</td>
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<td>Food Science</td>
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<td>*Food Systems Administration</td>
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<td>*Nutrition</td>
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<td>Textiles and Clothing</td>
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* denotes Ph.D. applicants must obtain special forms from the Graduate School.
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<th>ADMISSION TEST REQUIRED</th>
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<td>*Industrial and Organizational Psychology</td>
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<td>3-Departmental Rating Forms</td>
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College of Liberal Arts

| Anthropology                                        | M.A., PH.D.             |                         |          | 3-Former Professors       |
| Art                                                 | M.A.                    |                         |          | 3-Former Professors       |
| *Audiology                                          | M.A.                    |                         |          | 3-Former Professors       |
| Biochemistry                                         | M.A.                    |                         |          | 3-Former Professors       |
| *Botany                                             | M.A.                    |                         |          | 3-Former Professors       |
| Chemistry                                            | M.A.                    |                         |          | 3-Former Professors       |
| Computer Science                                    | M.A.                    |                         |          | 3-Former Professors       |
| *English                                            | M.A.                    |                         |          | 3-Former Professors       |
| French                                              | M.A.                    |                         |          | 3-Former Professors       |
| Geography                                            | M.A.                    |                         |          | 3-Former Professors       |
| *Geology                                            | M.A.                    |                         |          | 3-Former Professors       |
| *German                                             | M.A.                    |                         |          | 3-Former Professors       |
| German Language and Literature                       | M.A.                    |                         |          | 3-Former Professors       |
| *History                                            | M.A.                    |                         |          | 3-Former Professors       |
| *Mathematics                                         | M.A.                    |                         |          | 3-Former Professors       |

Microbiology

| Music                                               | M.A.                    |                         |          | 3-Former Professors       |
| Philosophy                                          | M.A.                    |                         |          | 3-Former Professors       |
| *Physics                                            | M.A.                    |                         |          | 3-Former Professors       |
| *Political Science                                  | M.A.                    |                         |          | 3-Former Professors       |
| *Psychology                                         | M.A.                    |                         |          | 3-Former Professors       |

Public Administration

| *Radiation Biology                                  | M.A.                    |                         |          | 3-Former Professors       |
| Romance Languages                                   | M.A.                    |                         |          | 3-Former Professors       |
| Sociology                                           | M.A.                    |                         |          | 3-Former Professors       |
| Speech and Hearing Science                          | M.A.                    |                         |          | 3-Former Professors       |
| *Speech Pathology                                   | M.A.                    |                         |          | 3-Former Professors       |
| Speech and Theatre                                  | M.A.                    |                         |          | 3-Former Professors       |
| Zoology                                             | M.A.                    |                         |          | 3-Former Professors       |

College of Nursing

| Nursing                                             | M.S.N.                  |                         |          | 1-Letter of Recommendation|
|                                                    |                         |                        |          | and Personal Data Form    |

School of Biomedical Sciences

| Biomedical Sciences                                 | M.S., PH.D.            |                         |          | Obtain Forms              |
|                                                    |                        |                        |          | from School               |

School of Library and Information Science

| Library Science                                      | M.S.L.S.               |                         |          | 3-Obtain Forms from Department|

School of Planning

| Planning                                            | M.S.P.                 |                         |          | 2-Letters of Recommendation|
|                                                    |                        |                        |          | and Personal Statement    |

School of Social Work

| Social Work (Memphis, Nashville and Knoxville)       | M.S.S.W.               |                         |          | Obtain Special Forms       |
|                                                    |                        |                        |          | from Department            |

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

*Offered only at UT Space Institute.

*Offered also at off-campus locations.

*Department doctoral option offered under the major of home economics.

*Interdisciplinary option offered in each department.

*Ph.D. applicants only.

*American applicants only.

*Ed.D. applicants only.

*Ed.S. applicants only.

*International applicants only.

*Interdisciplinary Ph.D. applicants only.
The mission of the University of Tennessee, Knoxville, is to offer instruction on all levels of higher education, engage in and train for research, and provide extended services of great variety. The obligations of this mission are reinforced by the fact that the University of Tennessee is both the State University and the official Land-Grant Institution of Tennessee.

Advanced Graduate Work and Research

The University of Tennessee has some obligations not shared in the same degree by other public colleges and universities of the state, although these specialized functions are common to most major state universities and land-grant institutions. For instance, the University must develop and maintain advanced instruction and research in the basic arts and sciences and in professional and occupational areas dependent upon the fundamental fields of learning, especially (but not exclusively) those of substantial importance to the state. It is the business of such a state university to advance the frontiers of knowledge in all areas of human concern, to discover facts previously unknown, to present new theories, and to test hypotheses and theories not previously established. The augmentation of the intellectual heritage of the human race, particularly in basic research, is a major function of this and all other universities. So far as publicly-supported higher education is concerned, the University of Tennessee, Knoxville, is the center of advanced graduate training and research in Tennessee. As of 1979 the University provides Master's level work in 122 fields of knowledge and doctoral work in 47, enrolling more than 6,700 graduate students.

The search for new knowledge and its application to the changing needs of society is a major aim of the University of Tennessee. In graduate instruction, through research programs, and by public service, the University and its faculty constitute a major resource for contributions to state, national and international problems. In addition to typical departmental units of administration, numerous interdisciplinary programs, institutes, and centers have been developed in the locations and the scholarly areas needed. Beyond those described below, numerous other organizations exist and are described within the appropriate department or college descriptions.

Energy, Environment, and Resources Center

R. A. Bohm, Acting Director, Ph.D.
Washington (Missouri)

The Energy, Environment, and Resources Center was created to encourage and support UT faculty and students' involvement in interdisciplinary studies to provide alternative solutions to problems related to energy and the environment. The Center provides assistance to faculty interested in developing research and public service projects, manages research and development projects that involve several disciplines, and assists Tennessee government and industry in specific problems related to energy and environment. It also participates in the Statewide Consumer Education Program, especially in developing materials for the program.

Current research includes environmental and human costs of coal production, solar energy utilization in buildings, energy conservation in buildings and industry, and regional solid waste management and resource recovery.

The Center is operated through the Office of the Vice Chancellor for Graduate Studies and Research.

Transportation Center

Knoxville:
W. A. Goodwin, P.E., Interim Director, M.S., Kentucky
R. A. Mundy, Ph.D., Pennsylvania State; M. S. Bronzini, P.E., Ph.D., Pennsylvania State, Associate Directors

Nashville:
D. H. Jones, P.E., M.S., Tennessee; P. R. Tutt, P.E., M.S., Texas, Assistant Directors

The Transportation Center performs four main functions: (1) managing interdisciplinary transportation projects for the University, (2) managing transportation projects for the Tennessee Department of Transportation, (3) managing highway safety projects for the Governor's Highway Safety Program, and (4) providing public service activities in transportation throughout the state. In performing these functions, the Transportation Center works extensively with various colleges and departments, organizations, and campuses of the University of Tennessee.

The Center conducts research in all modes of transportation. Current research includes transportation management, railroad and waterways, urban goods movement, airport ground transportation, transportation brokerage, social service transportation, ridesharing, transit, legislation, diagnostic vehicle inspection, highway safety, tunnel construction and ventilation, archaeological exploration, highway construction, and environmental impacts.

The Center is operated through the Office for Graduate Studies and Research. The Center's main office is at UT, Knoxville with a satellite office in Nashville.

The University of Tennessee
Space Institute

C. H. Weaver, Dean, Ph.D. Wisconsin
A. A. Mason, Assistant Dean, Ph.D. Tennessee

The Space Institute was originated to interface University faculty research with the Arnold Engineering Development Center of the United States Air Force. Located at Tullahoma, Tennessee, the Space Institute offers graduate degree programs with majors in Aerospace Engineering, Aviation Systems, Computer Science, Electrical Engineering, Engineering Administration, Engineering Science, Mathematics, Mechanical
Engineering, Metallurgical Engineering, and Physics. In addition to the fundamental academic work characteristic of each discipline, research opportunities and supporting interdisciplinary course work are available to permit specialization in many areas of advanced and space flight such as subsonic to hypersonic aerodynamics, aerospace vehicle design, control and guidance, modern materials and structures, propulsion systems, aircraft noise and sonic boom, flight simulation, avionics, plasma dynamics, flow diagnostics including spectroscopic and electrooptic means, and systems management. Work is also in progress in remote sensing and magnetohydrodynamic power generation of coal utilization. Course and research work in related areas of environmental pollution control, earth resources, energy conversion, materials and systems and simulation are also available. The research personnel and facilities of the Institute and those available at the Arnold Center through appropriate contractual arrangements provide an outstanding opportunity for meaningful research in these characteristic areas. Students who enroll at UTI must be admitted to the Graduate School, University of Tennessee, Knoxville. Further information concerning the Institute may be obtained from the Dean, The University of Tennessee Space Institute, Tullahoma, Tennessee 37388. The Institute is operated by The University of Tennessee in close cooperation with numerous departments at The University of Tennessee, Knoxville and the office of the Vice Chancellor for Graduate Studies and Research.

Water Resources Research Center

W. F. Brandes, P.E., Director, M.S. Illinois

The Water Resources Research Center 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 programs addressed to areas of concern to the state; (2) to provide 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 resources and to encourage the entry of promising students into careers in these fields. The Center is operated through the office of the Vice Chancellor for Graduate Studies and Research.

Off-campus Graduate Centers

Kingsport University Center: The University of Tennessee, Knoxville offers at Kingsport research graduate programs in science, engineering, and business at both the Master's and doctoral levels. The program is operated with the assistance of the Graduate Council of the University of Tennessee, Knoxville and is administered by the Vice Chancellor for Graduate Studies and Research. It is coordinated with the graduate and undergraduate programs of East Tennessee State University.

Students who enroll in this program must be admitted to the Graduate School of The University of Tennessee, Knoxville. Information on application forms may be obtained from Marvin K. Goodman, Director, Kingsport University Center, The University of Tennessee, University Boulevard, Kingsport, Tennessee 37660. Oak Ridge Resident Graduate Program: The University of Tennessee, Knoxville offers graduate study programs at Oak Ridge with work leading to Master's degrees in Business Administration with a concentration in management, industrial education, and statistics; the Master's and doctoral degrees are available in engineering, mathematics, and physical and biological sciences. Conferences are held at Oak Ridge, evenings, and Saturdays, with research facilities provided by and used in cooperation with the Oak Ridge Associated Universities and the Union Carbide Corporation, Nuclear Division.

This program is supported under a subcontract with Oak Ridge Associated Universities with principal support coming from Union Carbide Nuclear Division. The University of Tennessee 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 the Director, UT-Oak Ridge Graduate School, Post Office Box 117, Oak Ridge, Tennessee 37830.

Chattanooga Graduate Engineering Program: The University of Tennessee, Knoxville offers a program of graduate work leading to the Master's degree in the areas of engineering. Courses are given at The University of Tennessee at Chattanooga in the late afternoons and evenings. Students who enroll in this program must be admitted to the Graduate School of The University of Tennessee, Knoxville.

Information concerning this program may be obtained from Lynn D. Russell, Director, Chattanooga Graduate Engineering Program, The University of Tennessee at Chattanooga, Chattanooga, Tennessee 37403.

Nashville Graduate Engineering Program: Opportunities for graduate study leading to the degree of Master of Science in Civil Engineering, Engineering Administration, and Industrial Engineering are offered by The University of Tennessee, Knoxville and are administered by the Vice Chancellor for Graduate Studies and Research.

Students who enroll in these programs must be admitted to The University of Tennessee, Knoxville Graduate School. Information and appropriate forms may be obtained from the Director, Nashville Graduate Engineering Program, Tenth and Charlotte, Nashville, Tennessee 37203.

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 to do research in conjunction with the Biology Division of the Oak Ridge National Laboratory.

For complete information concerning the program, see page 141.

School of Social Work: The University of Tennessee, Knoxville offers a fully accredited two-year program leading to the degree of Master of Science in Social Work through the School of Social Work, with programs in Nashville, Knoxville, Memphis, and Chattanooga. For complete information concerning the program, see page 148.

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. The minimum grade point average of 2.5 out of a possible 4.0, or 3.0 for the senior year, is considered a satisfactory grade point average. A minimum B average is required for international students. Meeting the minimum grade point average does not insure acceptance into a degree program since other factors may affect admission in some areas.

An application must be accompanied by the $10 fee (payable to The University of Tennessee).

If permission to enter The University of Tennessee Graduate School is given prior to graduation, this admission is automatically withdrawn if the Bachelor's degree is not awarded before the date of registration.

The file is destroyed after one year if an applicant does not enter Graduate School the quarter in which admission is requested. Permission is not granted to enter in a future quarter. To reapply after a file is destroyed, applicants must submit a new application and fee.

Types of Admissions

Admission to a Graduate Degree Program: Master's degree—Admission to a degree program requires a minimum grade point average of 2.5 out of a possible 4.0 or 3.0 during the senior year. However, many departments require a higher average. (Refer to pages 8-9 for items required for admission.)

Doctoral degree—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 Master's level studies, achievement on aptitude tests for graduate studies, letters of recommendation from professors familiar with the applicant's capabilities, and similar evidences of scholarly achievement. (Refer to description of doctoral programs for specific requirements for admission.)
Non-Degree Admission: Applicants may apply for non-degree status who, for example:
1. do not desire to pursue a degree program
2. have received an advanced degree
3. need additional time to fulfill application requirements for a degree program.
In this status, the student may enroll in the number of graduate credits which may be accumulated. However, only 18 quarter hours (or the number of courses allowed may be obtained from the specific program). Permission for registration may be obtained from the Graduate Office or the appropriate department.

Admission of international Students: The Graduate School accepts only students who have outstanding records. An international student must have the equivalent of at least a B average on undergraduate coursework and a B+ on all previous graduate work. On various grading scales, this would indicate:
- 3.0 and 3.5 on 4.0 scale
- 14.0 from Indian institutions
- 80.0 from Chinese institutions
- 1st Class or Division from Indian
- 2nd Class Honors on various British systems

Eligibility of Seniors: A senior in the University of Tennessee undergraduate program who, for example:
1. has been a student for at least two years
2. has completed at least 30 hours of graduate coursework
3. has completed at least 15 hours of graduate coursework during the last 24 months

Admission of Faculty Members: Faculty members at the University of Tennessee, Knoxville:
- may register for graduate courses, without being admitted to the Graduate School, under the following conditions:
  1. The student's advisor must approve in writing by the student and endorsed by the appropriate department.
  2. The student may not enroll in a total of more than 15 quarter hours of graduate courses.

Enrollment of Veterinary Students in Graduate Courses: A student in good standing in the professional (D.V.M.) curriculum of the College of Veterinary Medicine may enroll in University of Tennessee graduate courses, without being admitted to the Graduate School, under the following conditions:
1. The student’s advisor must approve in advance the student’s enrollment in each such course.
2. The student may not enroll in a total of more than 15 quarter hours of graduate courses.
3. Approval of the Vice Chancellor for Graduate Studies and Research must be obtained each quarter at registration through the Graduate Office.

Admission of Faculty Members: Faculty members may be admitted to the Graduate School through established procedures. However, the following persons may not receive doctoral degrees from The University of Tennessee, Knoxville:
- Any member of the instructional, research, library, or administrative staff holding the rank of assistant professor and above or equivalent status at the University of Tennessee, Knoxville;
- Staff in the Institute of Agriculture holding rank of associate professor and above or equivalent status and occupying full-time research and extension positions;
- Any member of The University of Tennessee system administration holding the rank of assistant professor and above or equivalent status, except in the case of Institute of Agriculture personnel as specified in item "b" above.
Admission Procedures

Procedures for admission are as follows: (1) complete the ‘Application for Admission’ form (first page of the catalog); if applying for a degree program or if desired as a non-degree student, select a major from those listed on pages 8-9; (2) return the completed application form along with a $10 application fee as soon as possible; (3) request the registrar of all colleges and universities attended to send two official transcripts to the Graduate School (all documents, including transcripts, submitted for admission become the property of the University and will not be returned); if applying as a provisional student, submit evidence of the Bachelor’s degree; (4) if required, submit scores from the Graduate Record Examination or Graduate Management Admission Test; and (5) request that any reference or rating forms required as part of the application file be sent to the Graduate Office or where indicated.

Any student who has not attended the University for a period of two or more years and whose native language is not English must take the Graduate Record Examination. Foreign Language (TOEFL) unless graduated for the examination results to be valid. If the admission officer has any questions, he/she may contact the Department of Educational Testing Service, Princeton, New Jersey.

Registration Procedures

Dates of registration are listed in the University Calendar (front of catalog). Students should report to the Graduate School to obtain registration materials (scan form and timetable of classes giving details concerning registration procedures) and then see a department advisor to plan a program and obtain a signature. If admitted as a non-degree or provisional student, permission for registration may be obtained from the department or from the Graduate Office.

Registration requires two days. The University holds advanced registration at approximately the middle of a given quarter for the subsequent quarter. Information may be obtained from the Graduate Office. If a student participates in advanced registration, the student should obtain the class schedule and pay fees on the first day of registration.

All graduate students, including graduate teaching assistants, research assistants, and scholarship or fellowship holders, should complete the registering procedure at registration (in Stokely Athletics Center) or afterwards at the Treasurer’s Office, where the assessment of their tuition and fees will be determined. Those who do not report to the Treasurer’s Office before the established deadline for paying fees will be charged the late registration fee. Retroactive registration is not permitted.

Examinations

Applicants for admission to many of the degree programs are required to submit scores from the Graduate Record Examination or the Graduate Management Admission Test. (Refer to pages 8-9 for majors requiring these examinations.) All students whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL) unless graduated from an accredited institution in the United States.

Each applicant is individually responsible for arranging for examination and for transmission of these scores directly from Educational Testing Service to the Vice Chancellor for Graduate Studies and Research. Application forms may be obtained from Educational Testing Service, Princeton, New Jersey 08450, or from the UTK Graduate School Office.

The completed application form and examination fee must reach the proper office at the Educational Testing Service approximately one month in advance of the test date (tests are given four to five times each year). Approximately six weeks should be allowed for the examination results to reach the University.

The University of Tennessee is an approved testing center for all examinations.

Readmissions

A student who has not attended the Graduate School at The University of Tennessee, Knoxville for more than five quarters must apply for readmission. Since readmission is not automatic, a readmissions application should be submitted at least two weeks prior to desired reentry date. A student who has attended another accredited institution for enrollment at the University must submit two official transcripts showing all course work and any degrees earned at that institution. The student will be notified when the application is received and when action has been taken by the department and the Graduate School. If readmission is denied, the student may receive graduate credit for the work taken during the initial quarter; however, future registration will not be permitted until the student is fully readmitted to the Graduate School. Students are urged to reapply well in advance of planned registration.

Tuition

Tuition for the summer quarter will be $18. Part-time students taking 8 quarter hours or less will be assessed at the rate of $1 per quarter hour or fraction thereof; minimum charge $3.

The fee for the summer quarter will be $18. Part-time students taking 8 quarter hours or less will be assessed at the rate of $1 per quarter hour or fraction thereof; minimum charge $3.

Graduate and teaching assistants, as well as fellowship students who may have waiver of fees (tuition and/or maintenance), must pay the appropriate University Programs and Services Fee.

Students enrolled exclusively in Evening School or at off-campus centers will be exempt from the programs and services fee.

Knoxville campus students taking a course load of 6-8 hours may elect to pay the full programs and services fee. This fee is not refundable.

Fees, Fee Classification, and Financial Aid

University Fees

University fees are determined by the Board of Trustees and are subject to change without notice. The general fees in effect for graduate students are as follows:

APPLICATION FEE: $10

Each graduate application for admission must be accompanied by a fee of $10 before it will be processed. (Fee not required if: (1) former UTK graduate student; or (2) graduate application fee previously paid at another UT campus.)

If a student applies but does not enter graduate school within twelve months after date of requested admission it will be necessary for him or her to resubmit the $10 application fee and application. This fee is not refundable.

MAINTENANCE FEE (all students): PER QUARTER $172

Tuition (additional for out-of-state students):

PER QUARTER $334

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

In-State: $25 per quarter hour or fraction thereof; minimum charge $75.

Out-of-State: $58 per quarter hour or fraction thereof; minimum charge $174.

All fees collected at registration are subject to audit for correctness. Adjustments, if needed, will be made after final audit.

UNIVERSITY PROGRAMS AND SERVICES FEE: PER QUARTER $25

All students taking in excess of 8 quarter hours per quarter will be assessed a University programs and services fee of $25 per quarter. Part-time students taking 8 quarter hours or less will be assessed at the rate of $1 per quarter hour or fraction thereof; minimum charge $3.

Each student who has attended another accredited university holds advanced registration at approximately the middle of a given quarter for the subsequent quarter. Information may be obtained from the Graduate Office. If a student participates in advanced registration, the student should obtain the class schedule and pay fees on the first day of registration.

All graduate students, including graduate teaching assistants, research assistants, and scholarship or fellowship holders, should complete the registering procedure at registration (in Stokely Athletics Center) or afterwards at the Treasurer’s Office, where the assessment of their tuition and fees will be determined. Those who do not report to the Treasurer’s Office before the established deadline for paying fees will be charged the late registration fee. Retroactive registration is not permitted.
Doctoral degree candidates... $41

There is no additional charge for diploma, binding, or microfiling. The graduation fee is non-refundable and is valid for three quarters after the quarter in which it is paid.

DEFERRED PAYMENT SERVICE FEE: $53

This fee is applicable when the payment of any quarter's tuition is deferred, including accounts which must be billed to outside agencies, organizations, and institutions. This fee is also applicable when any additional charge (out-of-state tuition, music fee, room and board adjustments) 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.

AUDITORS FEE:

Fees for courses being audited are the same as courses taken for credit. For fee purposes, non-credit seminars are considered as one-hour courses.

REFUND OF FEES FOR WITHDRAWAL:

Withdrawal from school for the quarter after receiving a schedule must be by official notification to the Withdrawal Office, Student Counseling and Services Center, 900 Volunteer Boulevard, whether or not fees have been paid, classes have been attended, or the schedule is incomplete. Failure to attend classes does not automatically withdraw or drop a student from school 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 and before the first official day of classes for the quarter. 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 must not be used to withdraw from school for the quarter. For a regular academic quarter, withdrawal within 7 calendar days beginning with the first day of regular registration permits a 100 percent fee refund. Withdrawal between 8 and 14 calendar days following regular registration permits a 80 percent fee refund. Withdrawal between 15 and 21 calendar days following regular registration permits a 40 percent fee refund. Withdrawal between 22 and 28 calendar days following regular registration permits a 20 percent fee refund. The above refund policy does not apply to the off-campus Graduate Centers. At the Centers, no refund is made after the first 14 days. Refunds, in accordance with the withdrawal refund policy, will be made after the drop deadline.

Part-time students may pay fees computed at the appropriate quarter-hour rate as indicated above. No charge is made for courses dropped during the first 5 calendar days following regular registration. A 40 percent charge is made for courses dropped between 6 and 21 calendar days following regular registration, and a 100 percent charge is made for courses dropped after 21 days. Students who drop courses are eligible for a refund only if the sum of the charges computed at the quarter-hour rate for the hours continued plus the percentage assessed for the hours dropped results in an amount less than that paid. A course on a student's schedule is officially dropped and becomes effective on the date that the drop/add slip is processed and recorded by the Admissions and Records Office. Any refund due for dropped courses will be made after the final audit at the end of the quarter.

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

NOTE: 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 errors in fee or rental payments by appropriate additional charges or refund. Other information on fees, expenses, refunds, and adjustments is given in the Timetable (schedule of classes) for each quarter.

The University is authorized by statute to withhold diplomas, grades, transcripts, and registration privileges until student debts and obligations (other than Student Loan Fund notes) owed to the University are satisfied.

SUMMER QUARTER FEES AND EXPENSES:

Fees and expenses for the summer quarter are the same as for the other quarters during the academic year with the exception of the University programs and services fee as noted above.

Although the summer quarter is divided into terms of varying lengths, tuition and fees are assessed at the regular quarter-hour rate up to the maximum charge for a complete regular quarter.

The refund policy covering withdrawals and dropped courses for the summer quarter 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 day for the course(s) involved.

WAIVER OF FEES:

Graduate assistants, teaching assistants, and others whose fees are billed, prepaid, or 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 waiver.

NOTE: All fees are subject to change.

Fee Classification for the Purpose of Paying University Fees

Shortly after a student applies to the Graduate School, notification of the receipt of the application, application fee, and residency classification for fee purposes is sent.

If a student has any questions concerning the residency status, he/she should contact the Residency Clerk at the Graduate School Office.

If a student is classified as out-of-state, but resides in Tennessee, is a full-time employee in the state, or at Fort Campbell, Kentucky, and elects to attend the University on a part-time basis (5 hours or less), he/she must apply for a waiver of the out-of-state portion of the fees prior to the date of registration each quarter. Forms are available from the Residency Clerk at the Graduate School Office.

Rules for Determination of Status:

(1) Every person having his/her domicile in this state shall be entitled to classification as an in-state student for fee and tuition purposes. No person having domicile elsewhere than in this state shall be eligible as an in-state student for tuition purposes.

(2) The domicile of an unemancipated person is that of the parent.

(3) Unmarried for whom, at the time of application, an emancipated person who provides persuasive evidence of domicile may apply for in-state classification for said person's unemancipated children; and provided that said person has continued to reside in the state as a full-time student, the unemancipated children may at once be so classified, and may continued to be so classified so long as said person remains domiciled in this state.

(4) Any person who remains in this state when the parent, having theretofore been domiciled in this state, removes from this state, shall be entitled to classification as an in-state student so long as attendance at a school or schools in this state shall be continuous.

(5) An unmarried person whose parent is a member of the armed forces and stationed in this state or at Fort Campbell, Kentucky, pursuant to military orders shall be classified as an out-of-state student but shall not be required to pay out-of-state tuition. The student, while in continuous attendance toward the degree for which he/she is currently enrolled, shall not lose his/her residence when the parent thereafter is transferred on military orders.

(6) Part-time students who reside in the state or at Fort Campbell, Kentucky, pursuant to military orders and who will be classified out-of-state in accordance with other provisions of these regulations, will be classified out-of-state but will not be required to pay out-of-state tuition while enrolled as part-time students. (Students must apply for this status each quarter).

Presumption. Unless the contrary appears from clear and convincing evidence, it shall be presumed that:

(1) No emancipated person shall be deemed to have gained residence while attending any education institution in this state as a full-time student, as such status is defined by the governing board of such institution.

(2) The domicile of a married person shall be determined by the provisions of these regulations independent of the residence of the spouse.

(3) A person does not gain or lose in-state status for reason of his/her presence in any state or country while a member of the Armed Forces of the United States, provided that a member of the armed forces may obtain in-state status for the member and dependents by establishing domicile in this state.

Establishment of Domicile. If a student asserts that he/she has established domicile in another state, or at Fort Campbell, Kentucky, the appropriate additional charges or refund.
in Tennessee, the student has the burden of proving such assertion.

Appeal. The student who wishes to appeal his/her initial residency classification should contact the Residency Clerk in the Graduate Office.

Effective Date for Reclassification. If a student classified nonresident applies for in-state residency classification at the beginning of a quarter or semester and is subsequently so classified, the in-state residency classification shall be effective at the beginning of the quarter or semester in which application for reclassification was submitted.

Student Financial Aid

The University of Tennessee offers a comprehensive program of financial aid for full-time students who otherwise would not be able to attend the University. Through this financial aid program an eligible student may receive one or more types of assistance to help pay college expenses.

Financial need is defined as the difference between family resources and the total expenses of attending the University. If there is a deficit, the student is considered to be in need of financial assistance. To assist in determining the need for financial aid, the University of Tennessee utilizes the need analysis system of the College Scholarship Service (CSS). Through the use of the CSS Financial Form the Financial Aid Office determines the amount the parents and students can be expected to contribute toward meeting educational expenses. For more detailed information on the determination of need, please refer to the brochure entitled, "Financial Assistance for Students."

The University of Tennessee has two basic types of financial aid for graduate students—loans and part-time employment. These may be awarded individually or in combination according to the needs of the student.

Fellowships and Assistantships

The Hilton A. Smith Graduate Fellowships for full-time studies at The University of Tennessee Knoxville are awarded on the basis of ability and without regard to the field of study of the candidate. Monthly stipends are provided, and tuition and maintenance fee are paid by the University. Successful applicants need better than an overall 3.2 grade point average and high scores on the Graduate Record Examination or the Graduate Management Admission Test.

Application packets are available in the Graduate Office from November 1 through February 1. Completed applications, including all required supporting material, must be submitted to the Assistant Director of Graduate Admissions by February 15. Awards will be announced March 15.

Graduate assistantships and additional fellowships are offered through many departments of the University. The stipends usually provide for payment of tuition and maintenance fee by the University. Information concerning these types of assistance may be secured by writing to the head of the department in which the student expects to study.

Student Loans

National Direct Student Loans. Long-term loans are available primarily through the National Direct Student Loan Program. Proven need for financial assistance determines eligibility.

- Loan repayment and interest payments on National Direct Student Loans are deferred until after graduation if the individual remains in at least half-time attendance at an accredited institution of higher education in the United States.
- Repayment may also be deferred for a period of 2 years while the borrower is serving in the Armed Forces, Peace Corps, or Vista. Interest is 3 percent per year on the unpaid balance. The maximum repayment period is 10 years with the current minimum annual repayment of $300 or 10 percent of the accumulated loan, whichever is greater.
- If upon graduation the student becomes a full-time teacher in a public or non-profit school which is designated by the commissioner as having a high enrollment of low-income families or becomes a teacher of the handicapped, 15 percent of the total principal plus interest is cancelled for the first year, 20 percent for the third and fourth years, and 30 percent for the fifth year. If after graduation the student becomes a staff member in a preschool program which is operated for a period comparable to a full school year, 15 percent of principal plus interest will be cancelled for each year of service. Cancellation for up to 50 percent of the loan will also be given at the rate of 12½ percent of the total principal plus interest for each year of Armed Forces service in an area of hostility.
- Graduate level students may be extended annual loans of $2,500 to a maximum accumulated (undergraduate and graduate) loan total of $10,000. The above regulations and provisions of the National Direct Student Loan Program are subject to change by federal legislative action.

The University of Tennessee Student Loans. Student loans from University sources are available to currently enrolled students with a 2.0 or above cumulative grade point average. A loan of up to $250 per quarter is required for each promissory note and a new promissory note one surety or cosigner is required for each year of service. A loan of up to $250 per quarter is required for each year of Armed Forces service in an area of hostility.

- Graduates level students may be extended annual loans of $2,500 to a maximum accumulated (undergraduate and graduate) loan total of $10,000. The above regulations and provisions of the National Direct Student Loan Program are subject to change by federal legislative action.

Veterans' Benefits

Students applying for veterans' benefits should contact the Veterans Affairs Office, Room 209, Student Services Building.

General Information

Housing

Single Men and Women: Single graduate students are provided excellent accommodations in both traditional and
modern facilities which are conducive to academic achievement and personal development. Single graduate students have the same priority as other single students and may be assigned to any residence hall. Some units of the residence halls and of the student apartment building have been designed specifically for single graduate students. In Melrose Hall the graduate section offers community living units for groups of six to ten students with personal responsibility emphasized. The Holt Avenue Apartment Residence Hall accommodates, on a graduate floor, students in groups of four. It is the responsibility of each resident to maintain the apartment by University standards. Further information can be obtained from the Office of Residence Halls, 405 Student Services Building.

Assistant Head Resident positions are available for single graduate students. The Assistant Head Resident is responsible to and assists the Head Resident in coordinating and supervising assigned aspects of the operation of the hall to which the assignment is made. The position is a part-time live-in position during the academic year on a 9 1/2-month basis. Summer employment may be possible. Further information can be obtained from the Office of Residence Halls, 405 Student Services Building.

Married Students: The University has provided excellent apartment facilities in several locations for married students. Information and application for these facilities may be secured from the Office of Rental Properties, Stadium Hall.

Services to the Physically Disabled

Services relating to academic programs for students with physical disabilities, whether permanent or temporary, are coordinated by the Office of the Dean of Admissions and Records, 305 Student Services Building. In conjunction with the Physical Plant Office, the UT Bookstore, the Student Activities Office, and the academic departments, efforts are made to insure that attendance at The University of Tennessee in Knoxville is as convenient as possible for students with physical disabilities.

These services include assistance during registration (preregistration, collection of completed forms, payment of fees, drop and add); the securing of special parking permits, elevator keys, tickets for special events; and similar efforts to relieve the special mobility problems of the student. 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.

The Office of the Dean of Admissions and Records assists students in the scheduling of special class sections in order to respond to the particular needs of the physically handicapped.

Vehicle Operation And Parking

The University of Tennessee endeavors to provide adequate facilities for the increasing number of vehicles being operated by students and staff. However, the areas available for parking are necessarily limited. In an effort to provide parking facilities and to reduce the traffic congestion within the campus area, large student parking areas are located on the perimeter of the campus. The University provides an intracampus bus system connecting parking areas with the main campus for a minimal fee. Staff parking areas are located throughout the campus.

Each person who operates a motor vehicle in connection with attendance or employment at the University must register that vehicle with the traffic section of the Security Department. A University Traffic and Parking Authority determines the parking policy, traffic regulations, and fees, and this information is published each year in the "University Traffic and Parking Regulations." The large volume of vehicles operated in and around the University campus necessitates strict adherence to the "University Traffic and Parking Regulations"; consequently, a system of fees for violations of these regulations is established by the University Traffic and Parking Authority with the cooperation of the University's Department of Security.

Any staff member or student who has failed to pay traffic citations is subject to disciplinary action up to and including termination or dismissal from the University. Students with unpaid traffic citations will not be permitted to register at the beginning of each quarter until indebtedness is cleared. A member of unpaid traffic citations will not be allowed to register the vehicle or purchase a parking permit. If a traffic citation is not paid or appealed within 10 working days after issuance, a penalty of 50 percent of fee will be assessed. This penalty does not apply to fire lane and handicapped violations. For these violations, a fee of $25 is assessed, plus the $20 impoundment fee.

Computing Center

The University of Tennessee Computing Center (UTCC) supports facilities and services for the University's teaching, research, public service, and administrative activities. UTCC maintains close contact with the UT academic community by supporting research activities and offering services to users with professional computer staff.

UTCC is principally located in the Stokely Management Center and in Andy Holt Tower. From the Stokely location, UTCC supplies computing services to all campuses in the UT System through job entry facilities located on each campus. At UTK, UTCC maintains six job entry stations for batch work and eight sites for interactive computer work.

UTCC's equipment consists of an IBM 360/65, an IBM 370/3031 and a DECsystem-10 which are used in research, instruction and administrative work. UTCC also has an IBM 360/40 used exclusively for administrative work. The IBM 360/65 has 2.75 million bytes of memory, and the IBM 370/3031, four million bytes. The DECsystem-10 is a 16090 configuration with 512K words of memory. UTCC supports remote job entry stations (card reader/line printer) with the IBM 360/65 and 370/3031-DECsystem-10 combination and CalComp plotters. The IBM 360/65 runs under OS/360 MVT with HASP II. The IBM 370/3031 runs under S/370 with HASP II. The DECsystem-10 runs under TOPS-10. Time sharing features include ATLAS, Coursewriter III, APL, FORTRAN, BASIC, COBOL, MACRO, and other special purpose application programs.

UTCC publishes a User's Guide which describes the use of the IBM 360/65-370/3031 and the DECsystem-10 User's Guide which describes the use of the DECsystem-10. The guides are available at the UT Book and Supply Store. UTCC also publishes a monthly Newsletter which announces systems, equipment and procedural changes and contains other items of interest to users. Program writers and special user's guides are also available.

UTCC periodically offers intensive training seminars of several days duration in computer utilization on the IBM 360/65-370/3031 and the DECsystem-10. These seminars are primarily for faculty, staff and graduate students who use or plan to use UTCC facilities. UTCC offers non-credit short courses each residency in topics such as programming languages and special purpose programs. These courses are announced in the Newsletter and in the UT Notes section of the UT Daily Beacon.

Computing services can be requested via the request for services form available from the receptionist, 200 Stokely Management Center. All users of UTCC facilities are assigned a consultant to provide user assistance.

Office of International Student Affairs

This office, located at 201 Alumni Hall, assists students from other countries with the many matters that are of particular concern to them during their stay in the United States. International Student Affairs serves as the official University representative in all matters involving immigration authorities, international educational organizations, and foreign governments.

The office maintains the student's official immigration records and handles questions regarding immigration regulations. It coordinates such projects as a community volunteer program for international students and activities for student spouses. To aid the international student's understanding of American life, the Center's staff serves as advisors on personal and related problems.

Orientation programs are held at the beginning of each term, and international students are urged to attend them.

International students applying for admission should contact the Office of International Student Affairs, the House is a social and recreational center where
domestic and international students meet to relax and discuss matters of mutual interest. The small library at "I" House contains books and periodicals from all over the world. The library's membership in the Association of Research Libraries indicates the University's emphasis on research and graduate instruction at the doctoral level and the support of large, comprehensive collections of library materials on a permanent basis. Interlibrary loan service augments the UTK Library's search and information retrieval capabilities to students and faculty by making accessible many Tennessee political figures, and the Radiation Biology Archives, comprising the files of a group of internationally renowned scientists. Special Collections materials are of particular interest to scholars in the fields of history, political science, social sciences, biological sciences, and the arts.

The libraries located on the statewide campuses in Chattanooga, Martin, Memphis, Nashville, and Tullahoma are individually administered; all libraries of The University of Tennessee are accessible to all students and faculty in the system.

The University Library

The University of Tennessee, Knoxville Library owns approximately 1,436,000 volumes, 2,000,000 manuscripts, 60,000 microfilm reels and 1,100,000 items of other microtext, plus recordings, tapes, United States and United Nations documents, and more than 20,000 periodicals and other serial titles, which are received annually. The library's membership in the Association of Research Libraries indicates the University's emphasis on research and graduate instruction at the doctoral level and the support of large, comprehensive collections of library materials on a permanent basis. Interlibrary loan service augments the UTK Library's search and information retrieval capabilities to students and faculty by making accessible many Tennessee political figures, and the Radiation Biology Archives, comprising the files of a group of internationally renowned scientists. Special Collections materials are of particular interest to scholars in the fields of history, political science, social sciences, biological sciences, and the arts.

The Special Collections section, located in the Main Library, is a repository of regional and local materials, Tennessean, and other specialties, including legislative papers and mementoes of many Tennessee political figures, and the Radiation Biology Archives, comprising the files of a group of internationally renowned scientists. Special Collections materials are of particular interest to scholars in the fields of history, political science, social sciences, biological sciences, and the arts.

Library holdings in Knoxville are housed in the James D. Hoskins (Main) Library and its four branches: Agriculture-Veterinary Medicine, Humanities, Science-Engineering, and the John C. Hodges Undergraduate Library. The Special Collections section, located in the Main Library, is a repository of regional and local materials, and Tennessean, and other specialties, including legislative papers and mementoes of many Tennessee political figures, and the Radiation Biology Archives, comprising the files of a group of internationally renowned scientists. Special Collections materials are of particular interest to scholars in the fields of history, political science, social sciences, biological sciences, and the arts.

The libraries located on the statewide campuses in Chattanooga, Martin, Memphis, Nashville, and Tullahoma are individually administered; all libraries of The University of Tennessee are accessible to all students and faculty in the system.

General Regulations of the Graduate School

Responsibility

A graduate student must assume full responsibility for knowledge of rules and regulations of the Graduate School and departmental requirements concerning the individual degree program. A statement on Graduate Students' Rights and Responsibilities is printed on the back of the student's Admission Status Form. Additional copies are available at the Graduate Office.

Requirements

The Graduate School requirements are minimal, and, in many cases, are exceeded by those of the individual departments. In some cases, departments have brochures describing in detail their programs and requirements.

Graduate School News

The Graduate School News is published quarterly and is available to all graduate students. Calendars, schedules, and new requirements for degrees are published in order for students to have access to the latest information, some of which may supersede this catalog.

Advisors

The Vice Chancellor for Graduate Studies and Research is the general advisor for all graduate students, but so far as particular courses are concerned, a student is counseled by an advisor from the major department. A new student seeking an advisor should go to the office of the department or program in which the student is major. At the time of each registration, the advisor must approve the program of study for a student. If the student is pursuing a collateral area of study, the advisor, in approving the student's program, should secure the advice of the department representing the collateral area.

Graduate Credit

No student may receive graduate credit for a course unless properly admitted to the Graduate School. It is expected that students will be so admitted prior to registration for courses carrying graduate credit. In some instances, however, students who appear to meet the criteria for admission are allowed conditional registration for graduate credit after filing an application for admission to the Graduate School and paying the application fee. Transcripts (two official copies) and additional materials required must then be filed with the Graduate Office at once if seeking admission to a degree program or non-degree. If applying for admission in the provisional status, proof of the Bachelor's degree is the only requirement. The student must be admitted to the Graduate School within seven weeks after the last official day of registration. No future registration will be permitted nor a copy of the transcript obtained until the student is properly admitted.

Explanation of Course Listings

Each course listing in the Graduate Catalog contains much valuable information in an abbreviated form. The course number indicates the level at which the course is taught. All 5000-6000 level courses are graduate courses. The 3000-4999 level courses are upper division courses available for graduate credit if listed in the Graduate Catalog and if a "G" is indicated on the registration materials at the time of registration for upper division courses. (A "G" will also be placed on the transcript beside the hours credit.)

The official course title appears in bold-faced type following the course number. Numbers in parentheses following the course title indicate the quarter hours credit. If the credit is variable, to be determined in consultation with the instructor, the minimum and maximum are shown (2-3). The course description follows indicating the content to be covered in the course.

Prerequisite courses may be stated indicating that these courses must be taken prior to the course in question. Corequisite courses may be taken prior to or concurrently with the specific course, and recommended prerequisites should be taken previously but are not required.

Many courses may be repeated for a maximum number of hours which may be used toward a degree program and which is stated. Students are not to concrwt with the exception of Thesis 5000 and Dissertation 6000. Courses may be cross-listed with two or more departments, an arrangement that is indicated by a parenthetical statement. (Same as Psychology 5432). Information concerning the course is given only under the primary department.

"S/NC only" indicates that the course may only be taken for Satisfactory/No Credit grading. Absence of such statement indicates a letter grade. Refer to section on Grades. At the end of each course description is a symbol indicating the quarter or frequency that courses are normally offered.

F-Fall  S-Summer
W-Winter  E-Every quarter
Sp-Spring  A-Alternate years

These codes are indicated only for Knoxville campus classes and are subject to change without notice. The Timetable of Classes, published several weeks prior to each quarter, is the only official notification indicating the courses offered for the specific quarter. Students are encouraged to consult with the appropriate department/program head concerning courses to be offered in future quarters.

Prerequisites

Graduate work in any department must be preceded by sufficient undergraduate work in the major area and related ones to satisfy the department that the student can successfully do graduate work in the chosen field. All prerequisites are not listed in the Graduate Catalog since undergraduate records are examined and evaluated by the appropriate department before admission to a degree program.

Maximum Load

The maximum load for a graduate student is 15 hours, and 9 to 12 hours is considered a full load. Registration for more than 15 hours during any quarter including the summer quarter is not permissible without prior approval of the Vice Chancellor for Graduate Studies and Research, who may allow registration of up to 18 hours if the student has achieved an average of 3.6 or better in at least 9 hours of graduate work. Graduate students are urged to register each quarter for no more hours than they can successfully complete; at the same time,
students should register for a number of hours that is compatible with credit utilization of faculty time and University facilities. The formula on which state funds are appropriated to the University recognizes 12 hours per quarter as the full-time registration for undergraduate students. Full-time students who hold fellowships and research assistantships and do not have teaching responsibilities should consider 12 hours to be the minimum full-time registration for each quarter. Full-time benefits are paid by the Veterans Administration on registrations of 9 or more hours in each quarter.

**Change of Registration**

A student's permanent record card will show all courses for which registration has been completed except those from which the student withdraws during the first 5 consecutive instructional 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 their spaces available to other students. Students have the responsibility to assure that they have been dropped; otherwise, they are liable for a grade of F in the course.

The deadline for change of registration (from credit to audit, audit to credit, graduate to undergraduate, undergraduate to graduate, withdrawal, etc.) is set at midquarter, approximately 35 calendar days after the first day of classes each quarter. A student may change registration from a course at any time up to and including this date by executing a change of registration slip and submitting this to the Graduate Office. The advisor's signature is not required. The instructor's signature is required to add a course two weeks after classes begin and/or to add a course that is closed. If withdrawal from a course or from the University occurs after the first 5 days of classes and before the withdrawal deadline, the grade of W will automatically be entered on the student's record and on the final class roll sent to the instructor in the course. A student withdrawing from a course, or from the University, after the withdrawal deadline will receive the grade of F unless the student can clearly demonstrate that the request for withdrawal is based on circumstances beyond the student's control. Examples of circumstances beyond the student's control are:

a. illness or injury of the student (verified by the Student Health Service or private physician);

b. necessary change in work schedule occurring after the drop deadline (verified by the student's employer).

Examples of circumstances which are within the student's control and which would not be acceptable to grant withdrawal permission are:

a. improper registration on the part of the student;

b. failure to achieve academically.

A student wishing to withdraw from a course, or from the University, after the withdrawal deadline, or change his or her registration shall present the request, together with evidence of extenuating circumstances to the Graduate Office. If the request is approved, the Graduate Office will notify the Office of Admissions and Records, which will enter the grade(s) of W or the appropriate change on the student's permanent record.

**Grades**

Grades in the Graduate School have the following meanings:

A—(4 quality points per quarter hour); indicates superior work.

B+—(3.5 quality points per quarter hour); indicates above satisfactory work.

B—(3 quality points per quarter hour); indicates satisfactory work.

C+—(2.5 quality points per quarter hour); indicates work with borderline quality. This grade represents work below the standard expected of graduate students.

C—(2 quality points per quarter hour); indicates work of borderline quality and cannot be used in a graduate program.

D—(1 quality point value); indicates clearly unsatisfactory work and cannot be used in a graduate program.

F—(no quality point value); indicates extremely unsatisfactory work and cannot be used in a graduate program.

I—(no quality point value); indicates that the student has not done satisfactory work in the course, but—because of circumstances beyond control—has been unable to finish all requirements. It is not to be given to enable a student to do additional work to bring up a deficient grade. All incompletes must be removed within two quarters. If a supplementary grade report has not been received by the Graduate Office at the end of the second quarter, the I will be converted to an F. The incomplete will not be counted in the cumulative average until a grade is awarded. A student may graduate with an I on the record.

S/N—(carries credit hours, but no quality point value); S is equivalent to B or better, and NC means no credit earned. NC grades may be repeated for an S. S/N grading is allowed only where indicated in the Graduate Catalog. The number of S/N courses to be allowed in a student's program of study shall be limited to one-fourth of the course work hours required (a student may be allowed to graduate with dissertation only). This would be 9 hours in a 45-hour Master's thesis program or 12 hours in a 48-hour non-thesis program or 18 hours in a doctoral program of 72 hours excluding dissertation hours.

S/N is used for courses which culminate in a thesis, dissertation, or preliminary examination. The N grades take on the value of the S when the thesis or dissertation is accepted by the Graduate School.

Graduate students are required to make an overall minimum grade average of B in courses taken for graduate credit. No graduate student will be allowed to repeat a course for the purpose of raising a grade already received. Transferred work will not be counted in computing the grade average on courses completed in the Graduate School.

A student receives an I after finishing the course work for the Master's degree but has not received the degree, he/she may graduate with an I with the approval of the Vice Chancellor for Graduate Studies and Research.

**Proficiency Examination**

A proficiency examination may be given in any academic course offered for graduate credit. To be eligible, a student must be regularly admitted to the Graduate School, and the examination must be recommended by the head of the department offering the course. Students applying for this privilege must present evidence that they have developed the knowledge and abilities expected of graduate students who have taken the same courses. Upon passing such an examination with a minimum grade of B, the student will receive regular graduate credit. A maximum of three graduate courses may be completed by this method. A fee must be paid before administration of 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.

**English Proficiency**

Any student whose native language is not English must present a TOEFL score of at least 525 unless he/she has received a Bachelor's or Master's degree from an accredited institution in the United States. The student must also pass an English proficiency examination prior to initial registration. The regulations concerning this examination are described under Admission of International Students.

**Law Courses**

Law courses are not available for graduate credit; however, a graduate student may be allowed to take up to 8 quarter hours of law courses and receive credit toward a degree upon approval of the College of Law and the major chairperson. The graduate student must register for the law course during regular registration at the College of Law requesting an S/NC grade only. A 2.0 or above is obtained in a law course, an S will be recorded on the transcript. If a student earns below a 2.0, an NC will be recorded and the course cannot be used toward meeting degree requirements. Grades for law courses will not be reflected in the cumulative average.

Different rules apply to the student enrolled in the Dual J.D.-MBA Program. Graduate credit must be earned according to the grading system of the respective college, e.g. numerical grades for law courses, letter grades for graduate courses. Refer to page 57 for the grading scale acceptable toward meeting degree requirements. Cumulative GPA for law courses only will be carried until graduation, at which time both the graduate and the law cumulative will be shown on the permanent record.

**Auditors**

Persons who wish to attend certain classes regularly, without taking examinations or receiving grades or credit, may do so by completing a graduate application, paying the application fee, registering as auditors, and paying regular fees. Auditors are not permitted to participate in examinations and recitations, or use laboratory equipment and materials.
Correspondence Study

No graduate credit is allowed for work done by correspondence study with this or any other university.

Transfer Credits

A maximum of 9 quarter hours (6 semester hours) may be transferred into a student's Master's program from work taken at accredited institutions. (Extension courses at other universities are not applicable.) One-half of a student's program may be transferred from within The University of Tennessee System.

Such work must have been taken for graduate credit and passed with a grade of B or better, be part of an otherwise satisfactory graduate program (B average) but not used toward another degree, and be listed on the Admission to Candidacy Form approved by the committee members and the Vice Chancellor for Graduate Studies and Research. Ordinarily, course work from foreign institutions is not transferred since these institutions have not been accredited. This course work must be completed within the six-year period prior to the receipt of the degree. The same rule applies also to the Specialist in Education degree. Courses transferred into a student's Master's program may consist of a combination of University of Tennessee System courses and courses from other institutions so long as the total accepted does not exceed one-half the total program, and courses accepted from outside The University of Tennessee System do not exceed 9 quarter hours. Transfer credits will be placed on The University of Tennessee transcript record only after the student has been admitted to candidacy.

Courses taken for graduate credit at another institution and passed with a grade of B or better for the same Master's or Specialist in Education graduate program (B average) may be accepted in a student's doctoral program. The number of hours a student may include will be determined by the doctoral committee. They must be listed on the Admission to Candidacy form and approved by the committee members. Although the hours may be used as part of the requirements for the degree, the courses will not appear on The University of Tennessee transcript record.

Official transcripts must be received by the Vice Chancellor for Graduate Studies and Research directly from appropriate institutions before any transfer of credit will be approved.

Credits accepted in either the Master's or doctoral program will not affect the minimum residence requirements, nor will they be counted in determining the student's grade average. Neither will they count toward meeting 5000- or 6000-level requirements for an advanced degree.

Revision of Program

A student who wishes to revise a major program of study must complete a "Request for Revision of Graduate Program" form which can be obtained from the Graduate Office. It is necessary to obtain the signature of the head of the department in which admission was previously granted.

signature is needed if a student is requesting a change from non-degree or provisional to a degree program or from one degree to another in the same department.

Time Limit

The time limit for the use of graduate credit toward a Master's degree is six years from the beginning date of the earliest course applied toward the degree. The last 45 hours of credit for the Specialist in Education degree must also be earned within a period of six years prior to the award.

Normally, these time limits may not be extended. However, in exceptional cases, courses taken beyond these periods may be recognized after special examination or other means recommended by the department and given prior approval of the Vice Chancellor for Graduate Studies and Research. The doctoral program must be completed within a period of five years after passage of preliminary examinations.

Residence Requirements

There is no residence requirement for any Master's program.

The Specialist in Education Degree requires one quarter of full-time study if the student has a Master's degree. A student without a Master's degree is required to have two consecutive quarters of full-time residence.

The minimum residence for any doctoral degree is one academic year of three consecutive quarters of full-time study (minimum of 9 hours) in the resident graduate program. A student in residence is devoting essentially all energies to graduate study on campus. Part-time enrollment does not count toward this requirement.

Consecutive quarters include the summer quarter.

Theses and Dissertations

All theses and dissertations are submitted to the Graduate School Thesis Consultant for approval before they are officially accepted for the Graduate Council. A student may confer with the Thesis Consultant regarding any problems or questions encountered during the preparation of the final copy of the thesis or dissertation. Students should also consult the Graduate School Thesis and Dissertation Manual as a guide to the correct format for the thesis or dissertation.

Before a thesis is deposited in the Library, it is the responsibility of the Thesis Consultant to examine the materials and to make sure that the report is mechanically accurate and attractively presented, is free of technical errors in format, is suitable for binding, and reflects credit upon the University and its graduate program. If the form of the thesis is not thus approved, the student must make whatever corrections are necessary and submit the materials again.

A one-hour Thesis Workshop is held each fall and summer quarter for all interested students. The date for the Workshop is announced in the Graduate School News.

Academic Termination

Continuous registration is not automatic. Graduate education (particularly at the doctoral level) requires continuous evaluation of the student. This evaluation includes not only the student's academic achievements but also the overall appraisal by the faculty of the student's progress and potential. The determination to dismiss a student for academic reasons requires various indicators both objective and subjective: a student may be terminated from a program regardless of his or her grade point average. Although a B average is required for graduation, the determination of whether a student is making satisfactory progress toward the degree does not depend solely on his or her grade point average but reflects the appraisal of the student's total record and potential.

Departments (programs) may develop requirements for graduation or continuation in addition to the minimum requirements set forth in this Catalog. Such additional requirements must be in writing and on file in the Office of the Dean for Graduate Studies. It is the student's responsibility to become familiar with any additional requirements of his/her department (program).

Appeals Procedure

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 Vice Chancellor for Graduate Studies and Research, then to the Graduate Council and then to the Chancellor. The By-Laws of the University (Article V, Section 7) provide that any individual may ultimately appeal to the Board of Trustees, through the President. A copy of the detailed procedure is available in the Graduate Office and in each department.

Requirements for Advanced Degrees

Master's Degrees

Master's degree programs offered in the Graduate School are listed under "Majors and Degrees Available" on pages 8-9. See also chart, page 22, for a summary of procedures for these degrees.

Non-Thesis Programs: Some departments offer optional non-thesis programs for the Master's degree. Departmental announcements indicate whether the option is available.

Course Requirements: A candidate for a Master's degree must present a total minimum credit of 45 quarter hours of approved graduate courses. These hours may be entirely in one major subject or may include one or two minors, if approved by the student's faculty advisory committee and the
Vice Chancellor for Graduate Studies and Research. The major subject must include at least 18 quarter hours of credit course work except in the MBA degree program. A minor shall consist of not less than 9 or more than 18 quarter hours of course work.

All courses for which a student registers must be completed (unless officially dropped) before the end of the quarter in which the total hours in the graduate program must be at or above the 5000-level, of which no more than 9 may be thesis hours. These courses at the University of Tennessee. (5000- and 5000-numbered courses are open to graduate students only; 3000- and 4000-numbered courses may be taken for graduate credit if listed in the Graduate School Catalog.)

The Master of Arts in College Teaching requires 60 quarter hours, 9 hours of which must be devoted to the preparation of a thesis (some departments permit the student to take additional courses in lieu of a thesis—see departmental requirements). In the two-year program, the candidate also spends six quarters as a part-time teaching intern. The emphasis in the program will be on teaching productive graduate courses. Participating departments are indicated in the list of "Majors and Degrees Available" on pages 8-9.

Master's Committee: A committee for the Master's degree is formed at or before the time the student applies for admission to candidacy. The responsibility of this committee is to assist the student in planning a course of study and carrying out research, and to test for the achievement of degree requirements. The student should consult with the major professor concerning the composition of a committee. This committee consists of a minimum of three members, with the rank of assistant professor or above. If a student does not have a minor, all members may be from the major department. If a student does have a minor, one member of the committee must be from the minor department. A student should consult with the advisor or department head concerning the Master's committee after one quarter of graduate-level work.

Admission to Candidacy: Application for admission to candidacy for the Master's degree is made as soon as possible after the student completes any required prerequisite courses and 15 hours of graduate course work with a B average in all courses taken for graduate credit. Approval of the Vice Chancellor for Graduate Studies and Research is required. The student must submit the Admission to Candidacy form, with appropriate signatures, to the Graduate Office no later than commencement day of the quarter in which he/she plans to graduate. The deadline for submission of this form is given each quarter in the Graduate School News.

Thesis Registration: A minimum of 9 quarter hours and, in some approved programs, a maximum of 12 quarter hours of credit (course number 5000 which is variable credit) in the major may be earned in the preparation of an acceptable thesis, representing original, independent work. A student must be registered for a thesis course each quarter work is being pursued on the thesis. If the thesis is not completed during the quarter in which the student registers for the last 3 hours of 5000, the candidate shall continue to register for a minimum of 3 hours of 5000 each quarter until the candidate is actually working on the thesis and research and thesis through the quarter in which the thesis is accepted by the Graduate School. Similar rules apply when problems are used in lieu of the thesis.

Non-Thesis Registration: The non-thesis students using university facilities or faculty time must be registered for course 5002 if not registered for other courses. Students taking the final examination but not otherwise registered must pay a fee of $50. Final exams will not be scheduled until one of the above is met.

Final Examination for Thesis Students: A candidate presenting a thesis must pass a final oral (or oral and written) examination on all work offered for the degree. The examination is not merely a re-examination over course work, but it is a test of the candidate's ability to integrate material in the major and related fields, including the work presented in the thesis. This examination must be scheduled through the Graduate Office shall be held at least 10 days before the final date for submission of theses to the Graduate School. The complete thesis, in a form approved by the major professor, shall be distributed to all committee members at least one week before the date of the final oral examination. This examination will be conducted by a committee of not fewer than three faculty members, with the student's major professor as chairperson. (Members of the University faculty may attend the examination.) In case of failure of the final examination, the candidate may not appear for reexamination until the following quarter. The result of the second examination is final.

Final Examination for Non-Thesis Students: A non-thesis student must pass a final written examination on all work offered for the degree. The department may or may not follow this examination with an oral examination.

The examination is not merely a reexamination of course work but is a test of the candidate's ability to integrate material in the major and related fields. It must be scheduled through the Graduate Office in accordance with the Graduate School News deadlines and will be conducted by a committee of not fewer than three faculty members, with the student's major professor as the chairperson. In case of failure of the final examination, the candidate may not appear for reexamination until the following quarter. The result of the second examination is final.

Thesis: The thesis represents a culmination of an original research project completed by the student. The organization, method of presentation, and research value of the thesis are important in conveying to others the results of such research. Two copies of the thesis must be submitted to and approved by the Graduate School on or before the dates specified by the Graduate School. Each copy of the thesis must include an approval sheet, signed by the members of the committee, which certifies to the Vice Chancellor for Graduate Studies and Research that the committee has examined the final copy of the thesis and found its contents to be satisfactory. The student should check with the department head concerning additional required copies of the thesis. The thesis must be prepared according to the Graduate School Thesis and Dissertation Manual.

Specialist in Education Degree

The Specialist in Education (Ed.S.) degree is offered in Curriculum and Instruction, Educational Administration and Supervision, Educational Psychology and Guidance, Safety Education and Service, and Vocational-Technical Education. Students in the Graduate School who become candidates for the Ed.S. must have a minimum of one year of teaching experience or its equivalent. Admission to the Specialist in Education program requires formal application for admission to Graduate School, followed by processing and recommendation by the department or area in which the student is majoring, and is dependent upon final approval by the Vice Chancellor for Graduate Studies and Research.

The formulation of the student's program superson of program development, recommendation for admission to degree candidacy, direction of research, and qualifying and terminal examinations are executed by a committee of not fewer than three faculty members. This committee is appointed upon request from the department head by the Vice Chancellor for Graduate Studies and Research and shall include a minimum of two members from the department or area of specialization. See chart, page 23 for summary of procedures.

Course Requirements: Each student's program involves a minimum of six quarters of study totaling not less than 90 quarter hours. A student with a Master's degree is required to have at least one quarter of full-time residence. A student without a Master's degree is required to have two consecutive quarters of full-time residence. A minimum of 12 quarter hours from collateral fields in professional education (outside the major department or area) and 12 quarter hours from fields outside of the College of Education is required for each individual program.

Credits earned in a Master's degree may meet course requirements in the student's Specialist in Education program to which they are specifically comparable. Nine hours of work beyond the Master's degree may be transferred from approved institutions and may be used to meet the student's course requirements. (See Transfer Credits, page 19).

For a student admitted to the program with a Master's degree or appropriate work beyond the Master's degree, program requirements may be satisfied by recommendation of the student's committee and approval of the Vice Chancellor for Graduate Studies and Research, except that no modifications shall be permitted with respect to the following: (1) examination requirements, research requirements, and the minimum of 24 quarter hours of course credit outside the department or area in which the student is majoring, if any are met; and (2) all graduate course work completed prior to admission accepted as part of the
student's program must be appropriately related to the student's objectives. Undergraduate courses required for certification at The University of Tennessee in the student's field of specialization may not be taken for graduate credit as part of the program. At least 22% of the last 45 hours of coursework in the student's field of specialization, problems, must be in 5000- or 6000-level courses.

Admission to Candidacy: Admission to candidacy is established by formal application to the Vice Chancellor for Graduate Studies and Research, normally during or immediately following the quarter in which the student's course credit totals or exceeds 45 hours and upon the recommendation of the student's committee. Approval of the full faculty committee for Graduate Studies and Research is required. The student must submit the Admission to Candidacy form, with appropriate signatures, to the Graduate Office no later than commencement day of the quarter preceding the quarter in which the student plans to graduate. A qualifying examination is required if the student's Master's degree was earned six or more years prior to admission to the doctoral program. The examination may be written, oral, or both written and oral.

Thesis: The thesis represents a culmination of an original research project completed by the student. The organization, method of presentation, and subject matter of the thesis are important in conveying to others the results of such research. A minimum of 9 hours of research credit (5180, 5190, and 5200) is required. If the student does not complete the research during the first quarter registered for 5200, the student must continue to register for this course (minimum of 3 hours) each quarter as long as active work on the thesis continues or until the thesis is accepted by the Graduate School. The thesis is to be prepared according to the instructions in the Graduate School Thesis and Dissertation Manual. It should be approved by the committee prior to submission and must be submitted by the appropriate date to the student's department. The applicant wishes to graduate.

Final Examination: The final step in the program is an oral examination covering the student's research and course of study. This examination must be scheduled through the Graduate School in accordance with the dates given in the Graduate School News. In case of failure, the student may not appear for reexamination until the following quarter. The result of the second examination is final.

Doctoral Degrees

Three doctoral degree programs are available: Doctor of Philosophy, Doctor of Education, and Doctor of Business Administration. Doctoral programs are listed under "Majors and Degrees Available" (see pages 8-9). The doctoral degree, the highest in-course degree, is awarded in recognition of distinctive scholarship and the completion of a research project and is a significant contribution to knowledge.

Doctoral programs include a field of specialization and often study in one or more collateral fields. A collaborative thesis is defined as a minimum of 9 quarter hours of graduate courses in a given area outside of the department of the student's major field. The selection of specific courses must be determined by each student's faculty committee, subject to regulations of the Graduate School and approval by the Vice Chancellor for Graduate Studies and Research. The dissertation is approved by the Vice Chancellor for Graduate Studies and Research, preferably before beginning the second year of graduate study. This committee shall consist of at least one member from outside the major department. Three of the four members, including the chairperson, must be approved by the Graduate Council to direct doctoral research. This committee has the primary responsibility, subject to Graduate Council policies and special requirements adopted by the faculties of individual areas of study, for the degree work of the student. The committee should plan and must approve all course work, the dissertation defense, the results of the doctoral dissertation, and the dissertation for approval.

Continuous Registration: Registration for course 6000 is necessary whenever a student is working on a dissertation. A minimum registration of 36 hours of course 6000 is required of all doctoral candidates before the dissertation will be accepted. The student will continuously register for course 6000 (minimum of 3 hours) from the time that the doctoral dissertation research proposal is approved. Admission to candidacy is accepted, or registration for course 6000 is begun, whichever comes first, including the quarter in which the dissertation is accepted by the Graduate School. (NOTE: Continuous registration is interpreted to include the summer quarter.) A student must be away from the University during the doctoral study, the student must be in good standing in the department head and approval of the Vice Chancellor for Graduate Studies and Research, but may be granted a leave of absence from the requirement for periods not exceeding eight quarters.

Preliminary Examination: A comprehensive preliminary examination which is an indication of the student's fitness for completing the program is required of each person working toward the doctorate. This examination must be written but may also include an oral examination by the student's committee. The nature and time of the examination will be determined by the student's major department or faculty committee. The preliminary examination must be passed prior to admission to candidacy and at least three quarters in advance of the date of the degree. The doctoral program must be completed within a period of five years after passage of preliminary examinations.

Language Requirements: Usually candidates for the Ph.D. degree must possess a reading knowledge of at least one foreign language, and must present a significant body of literature relevant to their major field of study. Some programs require two languages and some none. Language requirements must be met at The University of Tennessee or, if transferred from another institution. Refer to thedepartmental descriptions of each Ph.D. program. The student's faculty committee will determine, with an advisor from the Graduate School, the specific language (or languages) required. When the student feels adequately prepared to take a language examination, he or she should notify the language representative in the department. The appropriate forms to schedule the examination may be obtained from the Graduate Office. The dates and times of the examinations are printed in the Graduate School News.

Satisfactory completion (B grade or better) of an appropriate 3030 course in a language department may be substituted for the actual language examinations. (The student cannot repeat this course if a grade of C or below is received when used in lieu of language examination.)

Admission to Candidacy: A student may be admitted to candidacy after passage of the preliminary examinations, fulfillment of the language requirements, and the required time and maintenance of at least a B average in the courses. (Each doctoral student must plan to take an appropriate number of 6000-level courses, usually a minimum of 9 quarter hours, which are designed expressly for doctoral students at The University of Tennessee, during the program of study. These courses cannot be transferred from another institution.) Admission to candidacy must be secured at least three quarters prior to the date the degree is to be conferred. Each student is responsible for filing the application for admission to candidacy, which must be signed by the committee members and approved by the Vice Chancellor for Graduate Studies and Research. The student will be notified when admission to candidacy has been approved.

Research Requirements: Research is an essential part of the program of every candidate for the doctoral degree. For the Doctor of Philosophy and Doctor of Business Administration degrees, original research forms the basis of the dissertation. The research for the Doctorate of Education degree requires demonstration of proficiency in at least two types of research techniques. These techniques may include foreign languages, historical research methods, statistics, experimental design, sociological research methods, survey design and analysis, philosophical research methods, or machine data processing. The candidate's faculty committee shall determine the research techniques to be included in the candidate's program.

Final Examination: A final examination (oral or written) on the student's dissertation, special field, and such other fields as the student's faculty committee may specify, will be administered by the candidate for approved committee after completion of the dissertation and all course requirements. This examination must be passed at least ten days before the date for submission of the dissertation to the Graduate Office. The examination must be scheduled through the Graduate Office and oral examinations not
properly scheduled must be repeated. The dissertation, in the form approved by the major professor, must be distributed to the committee at least two weeks before the examination. The date of the examination is announced publicly and the examination is open to all faculty members.

**Dissertation:** The dissertation represents a 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 major research.

A student should be registered for the number of dissertation hours representing the appropriate fraction of effort devoted to this phase of the candidate's program. A minimum registration of 36 quarter hours of course 6000 is required of all doctoral candidates before the dissertation will be accepted. The student shall continue to register for course 6000 (minimum of 3 hours) for the entire period during which the person is actually working on research and dissertation, including the quarter in which the dissertation is accepted by the Graduate School. The number of hours registered each quarter should be at full-time levels (12 hours) if the facilities and faculty are being utilized at full-time levels.

Two copies of the dissertation (prepared according to the regulations given in the Graduate School Thesis and Dissertation Manual) must be submitted to and approved by the Graduate School. These copies must include an approval sheet, signed by all members of the faculty committee, which certifies to the Vice Chancellor for Graduate Studies and Research that they have examined the final copy and found that its contents demonstrate scholarly achievement. 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.

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**Summary of Procedures for Master's Degrees**

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<tr>
<th>PROCEDURE</th>
<th>UNDER DIRECTION OF</th>
<th>DATE</th>
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<tbody>
<tr>
<td>Admission as a potential candidate (if previously admitted non-degree)</td>
<td>Major departmental advisor and Vice Chancellor for Graduate Studies and Research</td>
<td>Prior to completing 18 hours of course work</td>
</tr>
<tr>
<td>Formation of faculty committee</td>
<td>Major departmental advisor</td>
<td>Prior to application for admission to candidacy</td>
</tr>
<tr>
<td>Submission of application for admission to candidacy (forms at Graduate Office)</td>
<td>Faculty committee</td>
<td>At least one quarter prior to Commencement*</td>
</tr>
<tr>
<td>Approval of admission to candidacy</td>
<td>Faculty committee and Vice Chancellor for Graduate Studies and Research</td>
<td>Prior to Commencement</td>
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**GRADUATION REQUIREMENTS**

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<tr>
<th>PROCEDURE</th>
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<tr>
<td>Placement of name on graduation list</td>
<td>Student</td>
<td>Indicate on registration material</td>
</tr>
<tr>
<td>Application for diploma</td>
<td>Vice Chancellor for Graduate Studies and Research</td>
<td>See deadline notice available at registration*</td>
</tr>
<tr>
<td>Scheduling of oral or written examination</td>
<td>Major professor, student, and Vice Chancellor for Graduate Studies and Research</td>
<td>Not later than one week prior to oral or written examination*</td>
</tr>
<tr>
<td>Submission of thesis to faculty committee</td>
<td>Faculty committee</td>
<td>At least one week prior to oral examination</td>
</tr>
<tr>
<td>Oral examination</td>
<td>Major professor and committee</td>
<td>Not later than ten days before thesis deadline*</td>
</tr>
<tr>
<td>Removal of incompletes</td>
<td>Instructor of course</td>
<td>Not later than one week before Commencement*</td>
</tr>
<tr>
<td>Submission of final copy of thesis and thesis card</td>
<td>Major professor, candidate's committee, and Vice Chancellor for Graduate Studies and Research</td>
<td>After oral examination and no later than two weeks before Commencement*</td>
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*Dates are printed in Graduate School News quarterly.*
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<td>Major departmental advisor and Vice Chancellor for</td>
<td>Prior to completing 18 hours of course</td>
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<td>admitted non-degree)</td>
<td>Graduate Studies and Research</td>
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<td>Formation of faculty committee</td>
<td>Major departmental advisor</td>
<td>Prior to application for admission to</td>
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<tr>
<td>Submission of application for admission to candidacy</td>
<td>Faculty committee</td>
<td>At least one quarter prior to</td>
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<td>(Forms at Graduate Office)</td>
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<td>commencement*</td>
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<tr>
<td>Approval of admission to candidacy</td>
<td>Faculty committee and Vice Chancellor for Graduate Studies</td>
<td>Prior to Commencement</td>
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<td>and Research</td>
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<tr>
<td>Application for diploma</td>
<td>Vice Chancellor for Graduate Studies and Research</td>
<td>See deadline notice available at registration*</td>
</tr>
<tr>
<td>Scheduling of oral or written examination</td>
<td>Major professor, Vice Chancellor for Graduate Studies and Research, student</td>
<td>Not later than one week prior to oral or written examination*</td>
</tr>
<tr>
<td>Submission of thesis or problems to faculty committee</td>
<td>Faculty committee</td>
<td>At least one week prior to oral</td>
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<td>examination</td>
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<td>Major professor and committee</td>
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<td>thesis/problems deadline*</td>
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<tr>
<td>Removal of incompletes</td>
<td>Instructor of course</td>
<td>Not later than one week before</td>
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<td>Commencement*</td>
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<tr>
<td>Submission of final copy of thesis and thesis card</td>
<td>Major professor, candidate’s committee, and Vice Chancellor for Graduate Studies and Research</td>
<td>After oral examination and no later than two weeks before Commencement*</td>
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*Dates are printed in Graduate School News quarterly.
## Summary of Procedures for Doctoral Degrees

<table>
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<th>PROCEDURE</th>
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<tr>
<td><em>Appointment of faculty committee</em></td>
<td>Vice Chancellor for Graduate Studies and Research on recommendation of major department</td>
<td>Preferably before the second year of graduate study, but at the latest, prior to admission to candidacy</td>
</tr>
<tr>
<td><em>Preliminary examination</em></td>
<td>Major department</td>
<td>Prior to admission to candidacy</td>
</tr>
<tr>
<td><em>Foreign Language examination(s)</em>**</td>
<td>Major department and language department jointly</td>
<td>Prior to admission to candidacy</td>
</tr>
<tr>
<td>Submission of application for admission to candidacy (forms at Graduate Office)</td>
<td>Faculty committee</td>
<td>At least three quarters prior to Commencement**</td>
</tr>
<tr>
<td>Approval of admission to candidacy</td>
<td>Faculty committee and Vice Chancellor for Graduate Studies and Research</td>
<td>At least three quarters prior to Commencement</td>
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### GRADUATION REQUIREMENTS

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<tr>
<td>Application for diploma</td>
<td>Vice Chancellor for Graduate Studies and Research</td>
<td>See deadline notice available at registration**</td>
</tr>
<tr>
<td>Scheduling of oral examination</td>
<td>Faculty committee and Vice Chancellor for Graduate Studies and Research</td>
<td>When approved by faculty committee and at least one week prior to oral examination**</td>
</tr>
<tr>
<td>Submission of dissertation to faculty committee</td>
<td>Faculty committee</td>
<td>At least two weeks prior to oral examination</td>
</tr>
<tr>
<td>Oral examination</td>
<td>Faculty committee</td>
<td>Not later than ten days before dissertation deadline**</td>
</tr>
<tr>
<td>Removal of incompletes</td>
<td>Instructor of course</td>
<td>Not later than one week before Commencement**</td>
</tr>
<tr>
<td>Submission of final copy of dissertation, doctoral forms, and thesis card</td>
<td>Faculty committee and Vice Chancellor for Graduate Studies and Research</td>
<td>After oral examination and no later than two weeks before Commencement*</td>
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*The order of these items varies with individual programs.

**Dates are printed in Graduate School News quarterly.

***Not required in some programs.
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 three main divisions: Agricultural Experiment Station, Agricultural Extension Service, and College of Agriculture.

In 1974 the College of Veterinary Medicine was established within the Institute. The college is developing research and graduate programs in veterinary medical sciences in addition to the professional curriculum leading to the degree, Doctor of Veterinary Medicine.

Agricultural Experiment Station

D. M. Gossett, Dean  
T. J. Whatley, Associate Dean  
J. I. Sewell, Assistant Dean

The Agricultural Experiment Station was established by the University’s Board of Trustees on June 8, 1882, five years before the passage of the Hatch Experiment Station Act by the U.S. Congress. The University was one of the first five institutions in the U.S. to establish an Agricultural Experiment Station. Since its beginning the Station has given first attention to investigations of concern to the agriculture of Tennessee. The investigations of the Station follow a systematic method of gaining and applying knowledge efficiently to the biological, physical, and economic phases of producing, processing, and distributing farm and forest products; to the social and economic aspects of rural living; and to consumer health and nutrition. Both farm and urban populations gain from the accomplishments of the Agricultural Experiment Station. Examples of some of these accomplishments are new and improved varieties of crops, new and better methods of controlling crop and livestock pests, more efficient production of crops and pasture through improved fertilization and mechanization, and more efficient feeding and management of livestock.

The program is designed and administered through sixteen subject matter departments located at Knoxville. A number of the staff have teaching responsibilities in addition to their research. To assist in the research program the Station supports a large number of graduate students. To serve Tennessee’s diverse agriculture, branch stations are operated at Jackson, Spring Hill, Springfield, Lewisburg, Crossville, Greeneville, and Martin. In addition, field stations are located at Grand Junction, Milan, Wartburg, Tullahoma, and near Chattanooga. Professional and technical staff are in residence at these locations.

The UT-DOE Comparative Animal Research Laboratory is located about twenty miles west of Knoxville near Oak Ridge, where a program of radiobiological research in the field of agriculture is carried out by the Agricultural Experiment Station under contract to the Department of Energy. The program includes research with farm and laboratory animals, with soils, and in applied radiobotany and plant breeding.

Agricultural Extension Service

M. L. Downen, Dean  
T. W. Hinton, Associate Dean  
B. G. Hicks, Assistant Dean  
M. F. Clarke, Assistant Dean

The Agricultural Extension Service was established in 1914. Its purpose is to extend through various educational means agricultural and home economics information to farm families and others in the state who do not have the opportunity to enroll in resident courses of instruction at colleges.

The educational program is carried on through offices in each of the ninety-five counties of the state. Education emphasis includes work in four major program areas: agriculture and natural resources, community resource development, home economics, and education of young people through 4-H Clubs. County Extension staff members working directly with local people are supported in the various information fields by a specialist staff, members of which are stationed either in Knoxville, Nashville, or Jackson.

The Agricultural Extension Service operates administratively as one of four units of the Institute of Agriculture. For administration the state is divided into five districts with supervisors located in their respective districts. District headquarters are maintained in Knoxville, Chattanooga, Cookeville, Nashville, and Jackson.

The Agricultural Extension Service operates as a three-way partnership among county, state, and federal governments. The University of Tennessee represents state and federal government and a County Agricultural Extension Committee represents county government in this partnership.

College of Agriculture

O. Glen Hall, Dean

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

The graduate student is expected to demonstrate a thorough knowledge of the subject matter in his/her specialized field of study and its relationship to the sociological, economic, and environmental impact on society. The student must demonstrate the ability to plan, conduct, analyze, and report original research. More importantly, emphasis is given to intellectual growth and to the development of scholarly habits of
study, reasoning and analysis to the end 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 of the College of Agriculture. The general rules of the Graduate School apply to all graduate work in the college. The graduate program may be entirely in one major subject or may include matters relating to two majors.

Both majors and minors are available in Agricultural Biology, Agricultural Economics, Agricultural Engineering, Agricultural Extension, Agricultural Mechanization, Animal Science, Entomology, Forestry, 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 the latter departments in the College of Agriculture. The minor in General Agriculture requires 18 hours of course work. A complete listing of majors is shown on pages 8-9.

For admission to a graduate degree program, the student must have a satisfactory academic average and have completed the substantial requirements for an undergraduate major in his/her field of study or have completed sufficient undergraduate work in related areas to satisfy the department that he/she can successfully pursue graduate study in the chosen field. Prerequisite courses may be required when the student's preparation is deemed to be inadequate.

Each program of course work and thesis research is planned by the major professor and faculty members in consultation with the student and will depend upon the student's background, interests, and professional objectives. For example, a student majoring in Agricultural Biology may pursue work with an emphasis either in the area of plant pathology or economic entomology.

Normally, graduate programs will include the thesis requirement. There is, however, a non-thesis option in the Department of Agricultural Economics and Rural Sociology and the Department of Forestry, Wildlife and Fisheries. The non-thesis option with a major in Agricultural Economics has the following requirements: 48 hours of course work which 24 hours must be at the 5000-level; 18 hours in agricultural economics; 9 hours of economic theory; 6 hours in quantitative methods in agricultural economics; and dissertation. The specific program of a candidate for the degree of Doctor of Philosophy in Animal Science will depend upon the interest and previous training of the candidate. Each candidate will be under the immediate supervision of a faculty advisory committee in planning his/her program. The major professor will serve as chairperson of the faculty advisory committee and will direct the research and preparation of the dissertation.

Animal Science

The Department of Animal Science, with support from the Department of Food Technology and Science, offers programs leading to the Doctor of Philosophy degree in the following areas of specialization:

1. Animal nutrition
2. Animal breeding
3. Animal physiology
4. Animal products

Supporting studies are required in related biological and physical sciences fundamental to the training of the candidate.

3. The program of each candidate shall consist of a major and supporting studies in one or more additional areas. The major shall consist of a minimum of 24 quarter hours exclusive of research and dissertation. A minimum of 24 quarter hours in the Department of Agricultural Engineering will depend upon the interest and previous training of the candidate.

Animal science includes:

1. Minimum of 108 quarter hours credit in courses beyond the Bachelor's degree, exclusive of credit for the Master's thesis. Of this number, students are required to complete a minimum of 36 quarter hours in 6000 Doctoral Research and Dissertation.
2. At least 36 quarter hours credit in courses numbered 5000 and 6000, exclusive of Doctoral Research and Dissertation.
3. A minimum of 24 quarter hours credit must be completed in related fields outside of animal science.

The specific program of a candidate for the degree of Doctor of Philosophy in Animal Science depends upon the interest and previous training of the candidate. Actual course content of the program is planned with each student in consultation with a faculty advisory committee to meet requirements in the various areas of concentration.

Plant and Soil Science

The Department of Plant and Soil Science offers programs leading to the Doctor of Philosophy degree in the following areas of specialization:

1. Soils
2. Plant Breeding and genetics
3. Crop physiology and ecology

Supporting studies are required in related sciences fundamental to the training of the candidate.

Some of the specific requirements for the degree are:

1. Minimum of 108 quarter hours credit beyond the Bachelor's degree, exclusive of credit for the Master's thesis. Of this number, students are required to complete a minimum of 36 quarter hours in 6000 Doctoral Research and Dissertation.
2. A minimum of 30 quarter hours credit in courses numbered 5000 and 6000, exclusive of Doctoral Research and Dissertation.
The specific program of a candidate for the degree of Doctor of Philosophy in Plant and Soil Science will depend upon the interest and qualifications of the candidate. The program of courses and research will be planned with the student in consultation with a faculty advisory committee. The major professor will serve as chairperson of the faculty advisory committee and will direct the research and the preparation of the dissertation.

Departments of Instruction

Agricultural Biology

**MAJOR**

**DEGREE**

Agricultural Biology

M.S.

**PROFESSORS**

C. J. Southard (Head), Ph.D. North Carolina State; J. W. Hildreth, Ph.D. Ohio State; L. F. Johnson, Ph.D. Louisiana State; C. D. Pless, Ph.D. Clemson.

**ASSOCIATE PROFESSORS**


**ASSISTANT PROFESSORS**

E. C. Bernard, Ph.D. Georgia; M. R. McLaughlin, Ph.D. Illinois.

1310 Introductory Plant Pathology (4) Principles of plant pathology illustrated by diseases of common agricultural crops plants. Prereq: Introductory botany or zoology. Graduate credit for non-majors only. (Same as Botany 3130.) 3 hrs and 1 lab.

1310A Advanced Plant Pathology (4) Structure, life history, habits and principles of control of important insect pests of farm, garden, orchard, and household. 3 hrs and 1 lab.

2200 Apiculture (3) Biology of the honey bee, with emphasis on beekeeping equipment and apiary management practices relative to pollination of crops and production of honey and bee products. 3 hrs.

4010 Biology of Soil Microorganisms (4) Morphology and physiology of soil organisms, decomposition of organic matter, chemical transformations, and interactions between soil organisms and higher plants. Prereq: Introductory microbiology or 3130. 3 hrs and 1 lab.

4030 Forest and Shade Tree Entomology (3) Identification, biology, ecology, and control of forest and shade tree pests. Prereq: 3210 or equivalent. 2 hrs and 1 lab.

5000 Thesis (1-15) E

5010 Research Methods and Instrumentation in Plant Pathology and Entomology (3) Techniques for laboratory, field, and greenhouse research in plant pathology and entomology. 1 hr and 2 labs.

5100 Plant Disease Diagnosis (3) Diagnosis of plant diseases, disease symptoms, causal agents and control measures. Prereq: 3130.

5120 Insect Diagnostic Clinic (3) Identification of insects and insect damage to crops, livestock, and residences. Obtaining of insects and damaged specimens, diagnostic characteristics, and control measures. Prereq: 3210 or Zoology 3110.

5210 Plant Parasitic Nematodes (4) Morphology, physiology, taxonomy, and ecology of plant parasitic nematodes with emphasis on host-parasite relationships. Prereq: 8 hrs biological science or consent of instructor. (Same as Zoology 5210.) 2 hrs and 2 labs.

5220 Plant Disease Control (3) Basic problems and principles involved in controlling plant diseases. Prereq: 3130.

Agricultural Economics and Rural Sociology

**MAJOR**

**DEGREE**

Agricultural Economics M.S., Ph.D.

**PROFESSORS**

J. A. Martin (Head), Ph.D. Minnesota; M. B. Badenhop, Ph.D. Purdue, D. R. Brown, Ph.D. Iowa State; C. L. Cleland, Ph.D. Wisconsin; I. Dubov, Ph.D. California (Berkeley); L. K. Kellison, Ph.D. Kentucky; F. O. Leuthold, Ph.D. Wisconsin; B. R. McManus, Ph.D. Purdue; C. B. Sappington, Ph.D. Illinois.

**ASSOCIATE PROFESSORS**

J. R. Brooker, Ph.D. Florida; C. M. Cuskaden, Ph.D. Michigan State; T. H. Klimkos, Ph.D. Kentucky; D. L. McLemore, Ph.D. Clemson; S. D. Murray, Ph.D. Tennessee; R. T. Orr, Ph.D. Illinois; R. W. Todd, J. D. Tennessee; B. J. Trenera, Ph.D. Tennessee; O. N. Walker, Ph.D. Oklahoma State.

The department has programs for the Doctor of Philosophy degree and the Master of Science degree with a thesis or non-thesis option.

Agricultural Economics

4210 Farm Management (3) Principles of farm organization and operation; allocating land, labor, capital and operating costs. Emphasis on planning, production decision-making and use of credit. 3 hrs and 1 lab.

4240 World Agriculture and Trade (3) Economic bases of world agricultural production and trade; resource location, land tenure systems, international trade and commercial policy. Prereq: Agricultural Economics 1110 and Economics 2120. W

4420 Agricultural and Rural Planning (3) Decision-making, control, and implementation of local, state, and federal policies. Case examples from the U.S. and other countries. Prereq: Agricultural Economics 1110 and Economics 2120, or consent of instructor.

4530 Agricultural Finance (3) Nature and source of capital, credit problems of farmers, kinds and sources of farm credit, agricultural insurance and taxation. Prereq: Agricultural Economics 1110 and Economics 2120, W

4320 Agricultural Policies (3) Meaning of agricultural policy in democratic society; relationship of farm groups to political processes; government's role in agricultural policy; agricultural policy and appraisal of results; policy problems. Prereq: Agricultural Economics 1110 and Economics 2120. W

4330 Land Economics (3) Problems and policies of land use, conservation, development, taxation, and tenure; population growth and demand for land; principles of land evaluation, land tenure, and land income. Prereq: Agricultural Economics 1110 and Economics 2120. F

4610 Management of Farm Supply and Marketing Firms (3) Operation of firms selling farm supplies and marketing agricultural products. Emphasis on accounting data and economic theories for decision making. Prereq: Agricultural Economics 1110 and Economics 2120. Sp

4630 Advanced Agricultural Marketing (3) Theory of production organization and costs. Application of economic theory to the economic and financial structures and control of marketing and marketing problems. Prereq: Agricultural Economics 1110 and Economics 2120. W

4710 Economic Entomology (3) Survey of the major kinds of economic entomological problems and studies. Prereq: Agricultural Economics 1110 and Economics 2120. W

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise regulated during the major, and for those students who have completed the student's degree requirements. May not be used toward degree requirements. May be repeated. S/NC only. E

5011 Special Problems in Lieu of Thesis (3) E


5130 Advanced Agricultural Production Economics (3) Theory and practical application of agricultural production economics. Prereq: Agricultural Economics 3120 and Statistics 4310 or equivalent. W

5210 Seminar : Agricultural Policies (3) Sp

5220 Seminar : Methodology of Research (3) W

5230 Seminar : Adjustments to Industrialization (3) F

5310 Research (3) Special research problems in agricultural economics and rural sociology. Gathering, tabulating and interpreting data and report writing. May be repeated. Maximum 9 hrs. S/NC only. E

5410 Agricultural Marketing Analysis (3) Application of tools of economic analysis and measurement to problems at all levels of marketing system for agricultural commodities. Prereq: 4630 or equivalent. Sp

5420 Advanced Land Economics (3) Problems in land tenure, land use, and conservation in United States and selected foreign countries. Prereq: 4330 or equivalent. F

5440 The Economics of Agricultural Development (3) Role of agriculture in overall economic development: economic nature of traditional agriculture, and influence of local, state, and federal policies and practices; factors influencing agricultural development under conditions of economic change. Prereq: 4240 or consent of instructor. F

5450 Quantitative Methods in Agricultural Economics (3) Analytical techniques useful in estimating economic functions—supply, demand and product prices. Measurement and prediction of economic variables. Emphasis on application of multiple regression model specification, estimation technique using computer and interpretation of results. Prereq: Mathematics 3410 or Economics 5510 or consent of instructor. W

5710 Quantitative Methods in Agricultural Economics (3) Linear programming techniques with-
Agricultural Engineering

4320 Selected Topics in Agricultural Engineering (3) Develop new topics as required by current trends and problems in agricultural engineering.

4610 Design of Water Control and Waste Utilization Systems (3) Earth dams, irrigation, drainage, land grading, hydraulic transport of wastes, and applications on agricultural land. Prereq: 3610 or consent of instructor. 1 hr and 2 labs. W

4620 Design of Structures for Production, Processing, and Environmental Control (3) Functional planning of structural design of agricultural buildings; emphasis on complete design of structure or system, functional, structural, and environmental aspects. Prereq: 3620. 1 hr and 2 labs. Sp

4640 Design of Agricultural Machinery (3) Functional requirements of agricultural machinery. Elements of machine design component; synthesis of mechanisms, mechanical and hydraulic drives. Team effort in completing machine design project. Prereq: 3640 or consent of instructor. 1 hr and 2 labs. Sp

5210 Electromechanical Systems in Agriculture (3) Integration of electric power, mechanical equipment, instrumentation, and control considerations; calibration, selection and management of materials, and disposal methods. 2 hrs and 1 lab. Sp

5210 Agricultural Machinery and Tractors (4) Agricultural machinery and power units. Adaptation to agricultural practices, field and greenhouse, and environmental systems and plant production and processing, and materials handling. Prereq: 3220 and 3510, 2 hrs and 1 lab. F

5410 Agricultural Machinery Systems Analysis (3) Analysis of current field machinery. Machine design, adaptation planning for sequential operations, machinery for unique and alternate production and harvesting systems; operational management. Prereq: 4210. 2 hrs and 1 lab. Sp

6510 Selected Topics in Agricultural Mechanization (3) Research problems related to recent developments and current practices in agricultural mechanization. Prereq: 4210. 2 hrs and 1 lab. Sp

6510 Selected Topics in Agricultural Machinery (3) Lecture, group discussion, and individual study on specialized developments in power and machinery, soil and water, structures, and processing. May be repeated. Maximum 9 hrs.

Agricultural Mechanization

4180 Equipment and Techniques for Application of Agricultural Chemicals (3) Equipment for application of liquid and gaseous chemicals; system components; operational characteristics; safety considerations; calibration and management of materials, and disposal methods. 2 hrs and 1 lab. Sp

4210 Agricultural Machinery and Tractors (4) Adaptation to agricultural practices, field and greenhouse, and environmental systems and plant production and processing, and materials handling. Prereq: 3220 and 3510, 2 hrs and 1 lab. F

5410 Agricultural Machinery Systems Analysis (3) Analysis of current field machinery; adaptation planning for sequential operations; machinery for unique and alternate production and harvesting systems; operational management. Prereq: 4210. 2 hrs and 1 lab. Sp

5410 Agricultural Machinery Systems Analysis (3) Analysis of current field machinery. Machine design, adaptation planning for sequential operations, machinery for unique and alternate production and harvesting systems; operational management. Prereq: 4210. 2 hrs and 1 lab. Sp

5410 Agricultural Machinery Systems Analysis (3) Analysis of current field machinery. Machine design, adaptation planning for sequential operations, machinery for unique and alternate production and harvesting systems; operational management. Prereq: 4210. 2 hrs and 1 lab. Sp

5410 Agricultural Machinery Systems Analysis (3) Analysis of current field machinery. Machine design, adaptation planning for sequential operations, machinery for unique and alternate production and harvesting systems; operational management. Prereq: 4210. 2 hrs and 1 lab. Sp

6510 Selected Topics in Agricultural Mechanization (3) Research problems related to recent developments and current practices in agricultural mechanization. May be repeated. Maximum 9 hrs.

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6510 Selected Topics in Agricultural Mechanization (3) Research problems related to recent developments and current practices in agricultural mechanization. May be repeated. Maximum 9 hrs.
5120 Long-range Extension Program Planning (3) Development of county extension program based on research, on current local, state, and national agricultural economic characteristics of areas. Prereq: 3110 or consent of instructor.

5220 Seminar (3) Review of literature and development of personal educational extension methods. Prereq: 3110 or consent of instructor.

5230 Evaluation in Programs of Agricultural Extension (3) Principles, instruments, and techniques of individual gathering, analyzing and using data to appraise planning and teaching and to determine progress of clientele. Prereq: 5210 or consent of instructor.

5310 History, Philosophy and Objectives (3) Historical and philosophical foundations of informal adult education in American agriculture from the agricultural societies (1785 to present). Key figures, issues, legislative movements, farmer organizations and programs. Emphasis on agricultural extension service, its origin, legislation and growth and nature of present day objectives and programs. Prereq: 3110 or consent of instructor.

5320 Volunteer Leadership in Agricultural Extension Programs (3) Theory, principles and procedures in development of volunteer leadership for small groups in rural communities through agricultural extension programs. Emphasis on analysis of problems and techniques of successful leadership instruction, techniques of effective leadership in small groups and methods of developing volunteer leadership in extension work. Prereq: 5310 or consent of instructor.

5330 Supervision of Agricultural Extension Programs and Personnel (3) Theories of human effective group behavior of successful supervision applied to various parts of county, district and other extension programs; and planning for elective office management. Prereq: 5210 or 5220 or consent of instructor.

Animal Science

MAJOR

DEGREES

M.S., Ph.D.

Professors:
R. R. Johnson (Head), Ph.D. Ohio State; K. M. Barth, Ph.D. Rutgers; M. C. Bell, Ph.D. Oklahoma State; J. K. Bletner, Emeritus, Ph.D. Ohio State; C. C. Chamberlain, Ph.D. Iowa State; S. L. Hansard (Emeritus), Ph.D. Florida; H. M. Jamison, Ph.D. Tennessee; J. B. McLarence, Ph.D. Auburn; G. M. Merriman, D.V.M., D.V.M. Michigan State; D. C. Shemin, Ph.D. Wisconsin; R. L. Murphy, Ph.D. Wisconsin; D. O. Richardson, Ph.D. Ohio State; H. M. Shirley, Ph.D. Illinois; R. R. Snodell, Ph.D. Iowa State; E. W. Swanson, Ph.D. Missouri; R. A. Tisdale, A. & M.; C. E. Wylie (Emeritus), A. M. Missouri.

Associate Professors:

Assistant Professors:

3210 Anatomy and Physiology of Farm Animals (4) Structure, function and metabolism of muscles, blood and microcirculation, and the nervous, cardiovascular, respiratory, digestive and endocrine systems; description and mechanisms of normal and pathological phenomena. Prereq: Biology 1210 or Agriculture 1130. 3 hrs and 1 lab. F, W, Sp.

3220 Physiology of Reproduction (3) Comparative anatomy and physiology of reproductive systems of higher vertebrates; gametogenesis, fertilization, implantation, prenatal growth, parturition and initiation of lactation; emphasis of reproductive system phenomena. Prereq: 3210 or consent of instructor. (Same as Zoology 3220.) 2 hrs and 1 lab. F, W, Sp.


3340 Feeds and Feeding (3) Feedstuffs, additives, feeding standards, nutrient requirements and ration formulation for beef and dairy cattle, hogs, poultry and laboratory animals. Prereq: 3320. 2 hrs and 1 lab. F, Sp, Su.

3410 Heredity in Animals (3) Basic chromosomal mechanism of heredity with emphasis on Mendelian principles and exceptions such as linkage and cytoplasmic inheritance. Introductions to the biochemical basis of heredity and to quantitative inheritance. Illustrations of principles related to species familiar to agriculture students. Prereq: Agriculture 1130. 2 hrs and 1 lab. F, W, Sp.

3420 Principles of Animal Breeding (3) Genetic principles in the breeding of economic species. Genetic basis of variation. Partitioning of variance according to various kinds of causative differences such as those in genetic makeup and environment. Selection for desired traits, selective breeding, and studies and their effects on populations. Planning breeding programs. Prereq: 3410 or equivalent. 2 hrs and 1 lab. F, Sp.

3510 Animal Hygiene and Sanitation (4) Parasitic, viral and bacterial organisms in farm animals; immunization; control and protection against disease; veterinary regulations and quarantine; herd health programs. Prereq: Microbiology 2510-11 or 2510-19 or consent of instructor. 3 hrs and 1 lab. F, W, Sp.

3520 Avian Diseases (3) Major diseases, characteristics, prevention, management practices and systems for domestic birds, upland game birds, and water fowl. 2 hrs and 1 lab. Sp.

3810 Nutrition and Management of Laboratory Animals (3) Principles of feeding, breeding, and handling of animals in scientific investigations; specific species' requirements, peculiarities, and re- search for which best fitted; laws governing use and handling of laboratory animals. Prereq: Agriculture 1130 and consent of instructor. 2 hrs and 1 lab. W.

4210 Physiology of Lactation (3) Development, anatomy, and function of mammary glands; endocrine interactions for mammary development and milk secretion; factors affecting yield and composition of milk. Prereq: Physical Education 1110. 2 hrs and 1 lab. F.

4220 Avian Physiology (3) Anatomy and physiology of avian species with emphasis on poultry. Prereq: 3210. 2 hrs and 1 lab. Sp.

4230 Applied Reproduction in Farm Animals (3) Application of scientific and technical principles in collecting, evaluating, processing, and preserving semen; insemination of females; pregnancy determination; gestation and reproduction; female infertility. Prereq: 3220. 1 hr and 2 labs. F, Sp.

4330 Feeding Applications for Farm Animals (3) Detailed application of feeding principles designed to allow student to discover and explore feeding options available to producers through problem solving. Prereq: 3330. 1 hr and 2 labs. Sp.

4340 Experimental Animal Nutrition Laboratory (2) Laboratory techniques to demonstrate basic animal nutrition concepts including principles and preparation of experimental diets. Prereq: 3330. W.

4410 Beef Cattle Production and Management (4) Principles of nutrition, physiology and breeding in a complete beef cattle management program. Structure of industry, enterprise establishment, systems of production, production practices, herd improvement programs, alternatives in terms of production responses and economic returns. Prereq: Completion of animal science sophomore and junior core courses or consent of instructor. 3 hrs and 1 lab. F, W.

4420 Dairy Cattle Production and Management (4) Principles of nutrition, physiology and breeding in a complete dairy cattle management program. Structure of industry, enterprise establishment, systems of production, production practices, and herd improvement programs, alternatives in terms of production responses and economic returns. Prereq: Completion of animal science sophomore and junior core courses or consent of instructor. 3 hrs and 1 lab. F, W.

4430 Pork Production and Management (4) Integration of principles of selection, nutrition, breeding, physiology and marketing in a complete pork production and management system. Structure of industry, enterprise establishment, systems of production, production practices and herd improvement programs. Alternatives in terms of production responses and economic returns. Prereq: Completion of animal science sophomore and junior core courses or consent of instructor. 3 hrs and 1 lab. W.

4480 Poultry Production and Management (4) Structure of poultry industry, organization and management of poultry enterprises including rearing, housing, feeding, processing and marketing. Prereq: Completion of animal science sophomore and junior core courses or consent of instructor. 3 hrs and 1 lab. W.

4481 Light Horse Production and Management (4) Integration of principles of nutrition, physiology and breeding into light horse production and management system. Structure of industry, systems and practices of production, individual animal and herd improvement programs; tack, nutrition, marketing and the role of horse owner and commercial producers. Alternatives in terms of pleasure, recreation and economy. Prereq: Completion of animal science sophomore and junior core courses or consent of instructor. 3 hrs and 1 lab. Sp.

4486 Lamb and Wool Production and Management (4) Integration of principles of nutrition, breeding, physiology and marketing into complete lamb and wool production and management program. Structure of industry, enterprise establishment, systems of production responses and economic returns. Prereq: Completion of animal science sophomore and junior core courses or consent of instructor. 3 hrs and 1 lab. W.

5201 Endocrine Relations in Animal Production (4) Endocrine glands and their functions; endocrine regulation of reproduction; hormone preparation for altering growth and reproductive rate of farm animals. Prereq: 3210 or consent of instructor. 3 hrs and 1 lab. W, A.

5230 Advances in Mammalian Reproduction (3) Germ cell development, maturation, transport, metabolism, and preservation; fertilization and embryonic mortality. Prereq: 3220 or 4420. 2 hrs and 1 lab. W, A.

5320 Advanced Studies of the Secretion of Milk (3) Effect of endocrine and nutritional factors on mammary gland development; initiation and maintenance of lactation. Prereq: 4210. 2 hrs and 1 lab. Sp, A.

5311 Analytical Techniques in Animal Nutrition (3) Physical and chemical analyses of feeds, ingre- dients, and by-products. Prereq: completion of nutrition research, 1 hr and 2 labs. F, Su.


5333 Nonruminant Animal Nutrition (4) Physiological development and changes in digestive system of nonruminants during the life cycle. Concepts and methodology concerning nutrient require- ments, interrelationships, availability and deficien- cies of nutrients. Nutritional toxicants, digestion, poisons, and disease effects; nutritional effects on products. Prereq: 3210, 3330 or consent of instructor. 3 hrs and 1 lab. W.
6811 Advanced Topics in Animal Products (1-6) Recent advances and concepts, research techniques, current problems. May be repeated. Maximum 6 hrs.


Food Technology and Science

MAJOR

Food Technology and Science

DEGREE

M.S.

Professors: J. T. Miles, Ph.D. Wisconsin; J. L. Collins, Ph.D. Maryland; H. O. Jaynes, Ph.D. Illinois; C. M. Melton, Ph.D. Kansas State; W. W. Overholt, Ph.D. Iowa State.

Associate Professors: B. J. DeMott, Ph.D. Michigan State; S. L. Melton, Ph.D. Tennessee.

Assistant Professors: M. P. Davidson, Ph.D. Washington State; G. W. Davis, Ph.D. Texas A & M; F. A. Draughon, Ph.D. Georgia; J. R. Mount, Ph.D. Ohio State.

Lecturers: G. W. Davis, Ph.D. Georgia; J. R. Mount, Ph.D. Ohio State.

Forestry, Wildlife and Fisheries

MAJORS

Forestry

Wildlife and Fisheries Science

Professors: J. T. Miles, Ph.D. Wisconsin; J. L. Collins, Ph.D. Maryland; H. O. Jaynes, Ph.D. Illinois; C. M. Melton, Ph.D. Kansas State; W. W. Overholt, Ph.D. Iowa State.

Assistant Professors: B. J. DeMott, Ph.D. Michigan State; S. L. Melton, Ph.D. Tennessee.

Emeritus

G. Schneider (Head), Ph.D. Michigan State; J. W. Barrett, Ph.D. Syracuse; H. A. Core, Ph.D. Georgia; J. R. Mount, Ph.D. Ohio State.
Forestry

*3200 Forest Environments and Ecology (3) Environments and ecology of forests and associated lands; emphasis on application of ecological principles to contemporary problems. Prereq: 8 hrs of biology, botany, or zoology. F

*3404 Dendrology and Silvics of Woody Angiosperms (3) Classification, nomenclature, identification, and silvical characteristics of the more common woody angiosperms native to North America; natural history, distribution patterns, and habitat requirements; regeneration requirements and life history, place in succession; ecological significance and commercial importance. Weekly field trips during scheduled lab period plus one weekend field trip. Prereq.: 8 hrs basic biology or botany. 2 hrs and 1 lab. W

*3505 Dendrology and Silvics of Gymnosperms (3) Classification, nomenclature, identification, and silvical characteristics of the major North American conifers. Distribution patterns, habitat, and common relationships including classification: life history, regeneration requirements, place in succession, and importance. Prereq: 8 hrs basic biology or botany. 2 hrs and 1 lab. W

*3110 Forest Measurements and Biomentry (4) Measurements of individuals in animal and plant populations; linear regression; sampling of forest populations; growth and potential production. Prereq: Plant and Soil Science 3610 and Computer Science 1410 or equivalent. 3 hrs and 1 lab. W

*3120 Wood Technology (4) Wood properties; identification of commercial woods by macro and micro characteristics. Prereq: 3040, 3650. (3050 may be taken concurrently.) 2 hrs and 2 labs. W

*3210 Forest Resource Economics (4) Allocation of forest resources via market and institutional systems. Application of economics to forest resource decision making in private and public sector. Prereq: 3110. W

*3220 Forest Products and Utilization (3) Harvesting, processing, marketing factors in stand conversion, intermediate and harvest cuts. Prereq: 3120. Sp

*3320 Principles of Silviculture (3) Influence of site factors on reproduction, growth, development, and character of forest vegetation; classification of forest structure, silvicultural laws. Prereq: 3200, 3650 and Math 1730 or Math 1330. W

*3730 Conservation (3) Forest resources of state, nation, and world; forests in soil and water conservation; wildlife management and recreation; conservation programs.

4002 Utilization (3) Wood-using industries; processing forest products—sawmills, tree-log-lumber grading; pulpwod operations, flooring plants, treatment plants; plant layout, flow diagrams. Prereq: 3120. Sp

4003 Field Methods of Timber Inventory (4) Field measurements of forest trees; timber cruising; determining appropriate sample design for specific purposes; tree and stand growth; site evaluation; field problems. Prereq: 3110 and Agricultural Mechanization 3140. Sp

4004 Forest Practice (3) Management of forest lands by public and private organizations; "multiple-use" concept as it influences management decisions; impact of public pressure for outdoor recreation on management decisions; management prescriptions. Prereq: 4006. S/NC only, Sp

4006 Silvicultural Methods (4) Methods and application of intermediate and regeneration cuttings; site preparation, stand development, modifications of cutting methods to obtain desired goods and benefits. Prereq: 3320, 4002, 4003. Sp

4020 Forest Watershed Management (3) Water as a forest resource; role of forests in the hydrologic cycle; consideration of forest use and management of forest regimes; watershed planning. Prereq: 3320 or consent of instructor. Two overnight field trips. W

4210 Forestry Organization and Administration (3) Planning, organizing, and leadership concepts and cases; problem analysis and decision making in forest resource management. Prereq: Consent of instructor. W, A

4220 Forest-Resource Management Plans (4) The forest as an integration of resource uses; review of traditional timber-management concepts; the multiple-use concept; valuation of forest resources for decision making and planning; taxation of forest firm. Prereq.: 4210. W

4230 Forest-Resource Management Plans (4) Field problems and case studies in forest-resource management; the forest as a system; management of forest enterprises as a producer of timber, recreational services, watershed services, and wildlife; producing multiple services; preparation of a complete plan based on optimizing forest uses. Prereq: 4210. A

4240 Interpreting Forest Resources (3) Principles and techniques of interpreting forest resources; importance of environmental interpretation to management of forest resources; development and administration of interpretive services. Possible overnight field trips required. Prereq: 3240 or equivalent. 2 hrs and 1 lab. W

4330 Forest Policy (3) History of forestry in the United States with emphasis on development of forest resource policies; current policies influencing development and management of forest resources; brief survey of policy implications of forest resource organizations in private and public sectors. Prereq: 4004. W

4340 Aerial Photography in Forest-Resource Management (3) Use of conventional aerial photographs in forest-resource management; interpretation of detail, aerial inventories, preparation of cover-type maps, uses of other remotely sensed imagery. Prereq: Forestry 3110 or equivalent. 1 hr and 2 labs. Sp

4420 Forest Tree Improvement (3) Forest tree improvement related to silviculture; nature and purposes of tree improvement and forest genetics; principles of tree cytolology and population genetics; importance of wood species; forest genetics, selection of superior phenotypes and development of seed orchards; hybridization; seed production and seed certification. Prereq: 4006 or consent of instructor. 2 hrs and 1 lab. Sp

4430 Regional Silviculture of the United States (3) Factors that influence silviculture management of important tree species in North America. Importance of forests and forests in the forest industry. Prereq: 3320 or Consent of instructor. W

4440 Forest Recreation (3) Forest lands as a recreation resource; the interrelationships of forest recreation and other forest management activities; development and management of forest recreation areas; sociological studies of recreation resource development and management. Prereq: 6 hrs sociology and/or economics. 2 hrs and 1 lab. Sp

4450 Recreational Behavior in Forest Environments (3) Review of sociological and psychological theories relevant to forest recreation planning, management, and administration; implication and application of these theoretical concepts to forest recreation problems; review of methodologies for assessing recreational behavior. Prereq: 3320 and 6 hrs in behavioral psychology and/or sociology, or consent of instructor.

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a 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

5011 Problem Analysis in Forest Resources (3) Problem oriented, team approach to forest resource management. Identify, analyze, and prepare written report on a problem. Topic and requirements to be negotiated with instructor. Two overnight field trips. Formal presentation to faculty and students. Available only to students in the non-thesis option for the M.S. in Forestry.

5110 Special Problems in Forestry (1-6) May be repeated. Maximum 9 hrs. E

5220 Seminar in Forest Tree Biology (3) Growth, reproduction, and physiology of forest trees; forest ecology, variability and taxonomy of forest trees. Prereq: 3320 or Botany 4310, F, A

5230 Seminar in Forest Management (3) Newly developed systems in forest organization and regulation; financial and operational planning in forest management. Prereq: 4230 or equivalent. W, A

5240 Seminar in Forest Genetics (3) Population genetics and speciation, variation patterns and heritability in forest trees; gains with different breeding methods; planning and conducting forest genetics research. Prereq: 4420, Biology 3110, and consent of instructor. W

5250 Recreation Planning for Forests and Associated Lands (3) Planning process for recreation development on forests and associated lands; assessment and critical analysis of recreation plans. Overnight field trips may be required. 2 hrs and 1 lab. F

5260 Industrial Forestry (3) Structure and analysis of forest industries and firms. Management of industrial forestry; land tenure and wood procurement alternatives. Development and application of forestry planning models. Prereq: 4230 or consent of instructor. W

5270 Topics in Forest Industries Management (3) Current problems of industrial forestry. Experiences from public and private business sector (concerned with forest industry) conduct classes in selected topics. Prereq: 4230 or consent of instructor. F

5280 Seminar in Forest Biometry (3) Theory and application of forest measurements and sampling: tree, log and lumber quality; volume estimation techniques, growth and yield prediction. Prereq: 4003 or consent of instructor. Sp, A

5310 Seminar (1) Current developments in forestry. Required of each graduate student in residence Winter Quarter. May be repeated. Maximum 2 hrs. S/N only. W

Wildlife and Fisheries Science

*3200 Wildlife Management (3) Lives and ecological roles of other game and nongame species and economic aspects of their management. 2 hrs and 1 lab. F

*4440 Game Birds (4) Biology, classification, identification, distribution, and management of game birds in North America. Prereq: 3320 or 1 yr of zoology. 2 hrs and 2 labs.

4450 Fisheries Management (4) Methods of warm and cold water fisheries management including techniques of biological assessment, public relations, habitat manipulation, and stocking. Prereq: Biology 3130 or consent of instructor. 3 hrs and 1 lab or field period. Sp

5000 Thesis (1-15) E

*Graduate credit for non-forestry majors only.
Ornamental Horticulture and Landscape Design

MAJOR DEGREE

Ornamental Horticulture and Landscape Design

M.S.

Professors:

D. B. Williams (Head), Ph.D. Pennsylvania State; L. M. Callahan, Ph.D. Rutgers.

Associate Professors:

tions of chemical properties to plant nutrient availability. Prereq: 2130 and Physics 1210. 3 hrs and 1 lab. F.

4120 Principles of Crop Breeding (4) Genetic principles and techniques used in crop improvement. Prereq: 8 hrs biological science or consent of instructor. 3 hrs and 1 lab. W.

4250 Agricultural Chemicals and the Environment (4) Characteristics, use, mode of action, degradation, and environmental impact of chemicals used in agriculture, forestry, and related areas with emphasis on agricultural pesticides; environmental safeguards imposed by federal and state regulations on chemical development and use. Prereq: 1 yr biological science and 1 yr chemistry. 3 hrs and 1 lab. F.

4320 Soil Formation, Morphology, and Classification (4) Soil formation; properties, distribution, and classification of soils; interpretation of morphology; use of soil surveys. Prereq: 2130. 3 hrs and 1 lab. Sp.

4400 Problems in Plant and Soil Science (1-6) May be repeated. Maximum 9 hrs. E.

5000 Thesis (1-15) E

5100 Special Problems in Plant and Soil Science (1-6) May be repeated. Maximum 9 hrs. E.

5200 Soil Crop Relationships (3-6) May be repeated. Maximum 6 hrs. Su.

5240 Soil Productivity and Management (3) Concepts of soil productivity and management; quantitative evaluation of factors and their interaction affecting soil management decisions, cropping systems, water control and management, tillage and fertility management. Planning and evaluation of specific soil management programs. Prereq: 3220 and 4110 or consent of instructor. Sp. A.

5250 Pedology (4) Factors and processes of formation as related to physical, chemical, and mineralogical properties of soils; soil in an ecosystem; classification of soils. Prereq: 4320 or consent of instructor. 3 hrs and 1 lab. W, A.

5310 Design and Interpretation of Experiments (3) Experimental design and procedures; effect of different variables on precision of experiments; problems dealing with the analysis of data. Prereq: 3610 or equivalent. W.

5340 Soil Physics (3) Chemical and physical relationships among solid, liquid, and gaseous phases of soil mass; relation to plant growth and soil management. Prereq: 4410. 2 hrs and 1 lab. W, A.

5370 Advanced Soil Fertility (3) Fundamental concepts and soil chemistry as they relate to nutrient absorption by plant roots; interrelation of these concepts in soil fertility and management. Prereq: 4110. W, A.

5390 Soil Physical Chemistry (3) Structural properties of soil minerals determining physicochemical reactions, ion exchange, Donnan Equilibrium, double layer theory. Prereq: 4110; Chemistry 4110 or equivalent. W, A.

5600 Seminar (1) May be repeated. Maximum 3 hrs. E.

5710 Advanced Plant Genetics (3) Importance of polyploidy in plants; detailed study of genome relationships, genetic recombination, mutation, heterosis, quantitative inheritance, heritability selection, and self-incompatibility systems in relation to genetic principles. Prereq: Basic genetics or consent of instructor. F, A.

5720 Quantitative Genetics (3) Genetic constitution of population and changes in gene frequency; recognition and measurement of continuous variation; estimation of variable components and genetic advance under different breeding procedures. Prereq: Basic genetics or consent of instructor. W, A.

5750 Advanced Plant Breeding (4) Historical development of plant breeding concepts and methods, effects of heterosis, inbreeding, hybridization and self-incompatibility systems affecting crop plants; crop distribution and centers of origin; general and specific climatic, weather, and vegetative systems; microclimatic influences on plant growth. Prereq: 3620, 3040; or Botany 3210, 4310 or consent of instructor. 3 hrs and 1 lab. F, A.

5820 Advanced Crop Physiology and Ecology (4) Historical development of research in crop physiology and ecology. Interrelationships between physiologic processes and environmental factors. Crop adaptation to specific environmental conditions. Prereq: 3020, 3040; or Botany 3210, 4310 or consent of instructor. 3 hrs and 1 lab. W, A.

5950 Mechanisms of Herbicide Action (3) Principles of the uptake, translocation, mode of action and basis of selectivity of herbicides. Effects of herbicides on plant morphology, metabolic systems and enzymatic activities. Prereq: Botany 3210 and Biochemistry 4110 or consent of instructor. Sp. A.

6000 Doctoral Research and Dissertation (3-15) E

6100 Special Topics in Soil Science (3) May be repeated. Maximum 9 hrs. E.

6200 Special Topics in Crop Breeding (3) May be repeated. Maximum 9 hrs. E.

6300 Special Topics in Crop Physiology and Ecology (3) May be repeated. Maximum 9 hrs. E.

6410 Experimental Designs (3) Principles of experimental designs used in agricultural research. Completely randomized, randomized complete block and Latin square designs; factorial experiment and confounding; lattice designs; and covariance. Prereq: 5310. F, A.

6510 Growth Control with Chemicals (3) Character, theories of action and use of auxins, gibberellins, cytokinins and inhibitors. Range of effects on growth. Prereq: Botany 3210 or equivalent. 2 hrs and 1 lab. W, A.

6600 Seminar (1) May be repeated. Maximum 3 hrs. E.
School of Architecture

Roy F. Knight, Dean
William J. Lauer, Associate Dean

Professors:

Associate Professors:

Assistant Professors:

4031 Accelerated Historical Studies I (4) Introduction to evolution of architectural periods with selected illustrations from local examples. Advanced examination of relationship of historical and cultural developments to the built environment from antiquity through Byzantine period with applications to present-day design issues. Independent student projects on topics related to course material. Prereq: 4031 and 4032. Sp

4032 Accelerated Historical Studies II (4) Advanced examination of relationship of historical and cultural developments to the built environment from Romanesque period through neoclassicism with applications to present-day design issues. Independent student projects on topics related to course material. Prereq: 4031. W

4033 Accelerated Historical Studies III (4) Advanced examination of historical and cultural events of Industrial Revolution which gave rise to modern movement in architecture and design with applications to present-day design issues. Changing concepts of ethics, aesthetics, and architectural theory. Independent student projects on topics related to course material. Prereq: 4031 and 4032. Sp

4170 Introduction to Preservation and Restoration (4) History and theory of restoration and preservation. Prereq: consent of instructor. (Same as Architecture 4900.) S

4175 Technology of Preservation (4) History and technology of materials, methods and dating, techniques of preservation. W

4311 Historic Preservation Laboratory (8) Directed studies for buildings of historical significance. Techniques of preservation; research of historic methods of construction; and studies of viable uses. Rehabilitation, restoration, preservation, and adaptive uses. F, W, Sp


4733 Structural Design for Protection Against Extreme Hazards (4) Probability, risk, human values, insurance. Survey of possible hazards: floods, fire, hurricanes, and tornadoes, earthquakes, nuclear effects, internal and external explosions. Building code and engineered design of steel, masonry, concrete, and wood structures to resist extreme effects. Protective construction for human and system needs. Fire protection engineering, fire phenomena, life safety and analysis, high-rise building fires.


4739 Aesthetics of Engineering Structures (4) Architecture in engineering; theory and utilization of space, design, and materials in large structures. Bridges, exhibition halls, power plants.

4850 Elementary Structural Matrix Methods (4) Introduction to generalized matrix methods of analysis of structures. Review of matrix algebra and vectors; development of member stiffness and flexibility matrices; assembly of structure stiffness and flexibility matrices. Prereq: Consent of instructor. (Same as Civil Engineering 4850 and Engineering Science and Mechanics 4850.) Su
Graduate programs of the College of Business Administration are designed to prepare men and women to assume executive, managerial and professional positions in the increasingly complex world of domestic and international business and industry, teaching and research, government and institutional management.

Viewing the business firm as operating in a dynamic social, political and economic environment which demands leaders capable of dealing with innovation and rapid change, the College places central importance on development of students' thought processes rather than on specialized subject matter and courses descriptive of past practices. Emphasis is focused on flexibility of mind, receptivity to new ideas, capacity to adapt one's reasoning powers and judgment to rapid changes, vigor and imagination in using the mind, ability to reason analytically and logically and, above all else, inculcation of an irrepressible desire to continue to learn and grow in knowledge throughout the student's life.

Graduate Programs

The College of Business Administration offers programs leading to seven advanced degrees: the Doctor of Business Administration, the Doctor of Philosophy with majors in Economics and in Management Science, the Master of Arts and the Master of Science in College Teaching with a major in Economics, the Master of Science with majors in Economics and Statistics, the Master of Accountancy in Accounting, and the Master of Business Administration. The Department of Management participates with the Department of Psychology in the College of Liberal Arts in offering an intercollegiate program in Industrial and Organization Psychology leading to the Master of Science and Doctor of Philosophy degrees. (See page 93.) Also, the department of Management Science offers an intercollegiate program leading to the Master of Science degree. (See page 94.)

The two College-wide programs, the MBA and the DBA, are described below. Descriptions of other degree programs will be found under the appropriate departmental or program headings.

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. A full-time student can complete the program in six academic quarters. Those with degrees in business earned at an institution accredited by the American Assembly of Collegiate Schools of Business (AACSB) should be able to complete the program in five quarters. The complete MBA program with a concentration in management is offered by the regular graduate faculty of the College for part-time students on the Knoxville campus, at Oak Ridge and at the Kingsport University Center. The part-time student carries two courses per term in classes scheduled in the evening hours and, like the full-time student, typically is enrolled in each of the four quarters of the year.

The typical program consists of the MBA core (12 to 17 courses depending upon exemptions based on prior studies) and a concentration/electives block of 8 courses. Unless there is a requirement for the mathematics course and/or the computer science course, the total program would amount to from 60 to 75 quarter hours of graduate credit.

Prerequisites. An entering student must have completed college level mathematics through at least one course in calculus and a course in computer science (preferably FORTRAN) or equivalent, or include these subjects in the MBA program. Those applying for the management science or statistics concentration should have completed the second year of college level calculus before matriculation. Those admitted to the accounting concentration should plan on an additional two quarters for undergraduate course work in accounting which is taken during the first year of the program.

MBA Core. The following courses are required in each student's program unless an exemption from one or more courses is granted as provided below. All courses are 3 credit hours. The core courses are:

Accounting 5010, 5020, 5030; Business Administration 5310; Business Law 5010; Economics 5010, 5020, 5030; Finance 5010, 5020; Management Science 5010, 5020; Management Science 5010, 5020; Statistics 5010, 5020.

1See course description for Mathematics 5051 and 5052 and Office Administration 5050. A student may be required to take a mathematics placement examination prior to the first quarter of enrolment.
The following diagram illustrates the required sequence of core courses in order to satisfy course prerequisites. Matriculating students are expected to plan their programs with their concentration area advisors at or prior to their initial registration.

**Sequence of MBA Core Courses**

Program Prerequisites

- Math. 5051
- Math. 5052
- Comp. Sci. (FORTRAN)

MBA CORE

- Mgmt. 5020
- Stat. 5000
- Mgmt. 5010
- Stat. 5010
- Mgmt. 5020
- Stat. 5020
- Mgmt. 5030
- Mgmt. 5040
- Econ. 5010
- Econ. 5020
- Econ. 5030
- Econ. 5040
- Fin. 5010
- Fin. 5020
- Fin. 5030
- Fin. 5040

**Concentration and Electives.** An applicant for admission must select a concentration area. However, a change to another area may be requested at any time after entering the program. Among the 8 courses in the concentration/electives block, at least 4 but not more than 6 must be in one of the following concentration areas:

- Accounting
- Economics
- Finance
- Forest Industries Management
- Governmental Financial Administration
- Management Science
- Marketing
- Real Estate and Urban Development
- Statistics
- Transportation and Logistics

The remaining elective courses (2 to 4) must be in fields outside the concentration area, normally selected from MBA courses offered in other departments of the College, and may comprise a second concentration area of 4 courses. Up to 2 courses (6 hours) in this block may be taken outside the College of Business Administration. No more than 3 courses numbered below 5000 may be included in this 8-course block. Courses numbered below 4000 normally are not approved for the MBA program. Before beginning the concentration/electives part of the curriculum the student must have his/her program approved by the appropriate faculty advisor.

**Exemptions from Core Courses.** A student may be exempt from taking Economics 5010, Accounting 5010 and/or Business Law 5010 if equivalent undergraduate courses in these subjects have been completed with grades of C or higher at a regionally accredited institution no more than five years prior to matriculation in the MBA program.

In addition to the above, a graduate of an AACSB accredited undergraduate business program may request exemption from one or both of the core courses in the area of higher undergraduate major field, provided at least 30 quarter hours (20 semester hours) of course work were completed in the major area no more than five years prior to matriculation, and a grade average of 3.0 or higher (on a 4.0 scale) was earned for all courses in the major. Students requesting such an exemption must petition the appropriate department head. The department may require the student to pass a proficiency examination over any course for which exemption is requested. (See page 18.)

A student's program may be reduced by as much as 15 hours by exemption described above. A minimum of 60 quarter hours is required to earn the degree. If approval is given for exemption from an additional core course, the department head concerned will recommend to the student's advisor another course in the field to be substituted for the waived course so that the total program includes a minimum of 60 hours.

Students holding degrees from foreign institutions normally may not be exempted from taking core courses.

**Other Requirements.** The Application for Admission to Candidacy (see page 20) must be approved by two faculty members in the student's area(s) of concentration and the Assistant Dean for Graduate Programs in the College of Business Administration, signed by the department head, and submitted to the Vice Chancellor for Graduate Studies and Research.

Not available to students whose undergraduate major was accounting. Such students should choose another area or apply for admission to the Master of Accountancy program. (See page 39.)
To qualify for the degree, the student must achieve a B average (3.0) or above in courses taken in the concentration area(s) as well as in the overall program and pass a written comprehensive examination during the final quarter of the program. If the results of the written examination are not clearly passing or failing, a supplementary written or oral examination will be administered in the same quarter. The complete examination process may be repeated one time, but it may not be taken until the quarter following the first attempt.

Application and Admission. Application materials may be requested from the Graduated Programs Office, College of Business Administration, The University of Tennessee, Knoxville, Tennessee 37916. Applicants whose undergraduate degree is in a field other than business may matriculate in either the summer or fall term. Those with a business degree from an AACSB-accredited institution may matriculate in either the fall or winter term. Application materials, including GMAT scores, should be submitted not later than the following dates:

- Summer matriculation—April 1
- Fall matriculation—January 1
- Winter matriculation—November 1

For admission to the MBA program, consideration is given to the applicant's academic record with particular attention to the last two years of undergraduate work and previous graduate studies, to scores on the Graduate Management Admission Test (GMAT) and the Test of English as a Foreign Language (TOEFL) for those whose native language is not English, to work experience and other activities which demonstrate potential for leadership, and recommendations from professors or 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.

Dual J.D.-MBA Program

The College of Business Administration and the College of Law offer a coordinated dual program leading to the conferment of both Doctor of Jurisprudence and the Master of Business Administration degrees. A student pursuing the dual program may take up to two academic quarters (24 hours) of course work which would be required if the two degrees were to be earned separately.

Admissions. Applicants for the J.D.-MBA program must make separate application to, and be competitively and independently accepted by, the College of Law for the J.D. degree and the Graduate School and College of Business Administration for the MBA degree, and by the Dual Degree Committee. Students who have been accepted by both colleges may apply for approval to pursue the dual program anytime prior to, or after, matriculation in either or both colleges and such approval will be granted, provided, however, that dual program studies be started prior to entry into the last 42 hours required for the J.D. degree and the last 24 hours required for the MBA degree.

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

The College of Law will award credit toward the J.D. degree for acceptable performance in a maximum of 12 quarter hours of approved graduate level courses offered by the College of Business Administration. Three of the 12 quarter hours must be earned in Accounting 5030 or a more advanced accounting course. If College of Law credit is given for such an accounting course, the student may not receive College of Law credit for Legal Accounting (Law College Course 8590).

The College of Business Administration will award credit toward the MBA degree for acceptable performance in a maximum of 12 quarter hours of approved courses offered by the College of Law.

Except while completing the first year courses in the College of Law, students are encouraged to take as many comprehensions of the dual program by taking courses in both colleges each quarter.

Awarding of Grades. For grade recording purposes in the College of Law for graduate business courses, grades awarded will be converted to either Satisfactory or No Credit and will not be included in the computation of the student's grade average or class standing in the college where such grades are so converted. The College of Law will award a grade of Satisfactory for a graduate business course in which the student has earned a B grade higher and a No Credit for any lower grade. The College of Business Administration will award a grade of Satisfactory for a graduate business course in which the student has earned a B grade or higher and a No Credit for any lower grade. The College of Business Administration will award a grade of Satisfactory for a Law School course in which the student has earned a grade of C or higher and a No Credit for any lower grade. Grades earned in courses of either college may be used on a regular graded basis for any appropriate purpose in the college offering the course. The student must pass a final written comprehensive examination to receive the MBA degree.

The DBA Program

The basic objective of the Doctor of Business Administration programs is to provide the student an opportunity to attain the intellectual competence necessary to meet the highest standards for advancement to a professional position in an academic institution, business and industry, or government. The student will develop a sound foundation for expanding knowledge in the student's chosen area of concentration and will contribute through research to advancement of the state of knowledge in this area. Moreover, the student's educational experience should develop perspective toward education for business in a manner which will enable the student to spearhead innovation and change in response to needs.

The DBA program is structured around four major features. First, it recognizes the interdisciplinary thrust of graduate education and provides the student with a sound foundation for expanding the breadth of knowledge related to business systems and their interactions with other socioeconomic systems and environmental forces. Second, the student's program is flexible enough to respond to individual needs and interests yet is formulated within a sound framework to achieve overall objectives. Third, emphasis is placed upon conceptual foundations and analysis of decision-making processes rather than the descriptive aspects of business administration. Fourth, the student does advanced work in the basic disciplines of economic theory, behavioral science and quantitative science to provide the necessary foundations for research.

Foundation Requirements. Although the program is designed for students who have completed an accredited MBA (or equivalent) degree program, prospective students must have outstanding undergraduate records in the areas of accounting, management, finance, and law which would be required if the two programs were pursued separately. Each student is required to take courses in business degree from an AACSB-accredited institution and to have 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 student must pass a final written comprehensive examination to receive the MBA degree.

Course Requirements for the DBA Program

Each student must demonstrate the ability and experience to attain the intellectual competence necessary to meet the highest standards for advancement to a professional position in a business or academic setting. Each student is required, by passing appropriate graduate level courses and/or by examination, an understanding of the business functional areas, the basic disciplines underlying the study of business administration, and the interrelationships between the disciplines. Entering students deficient in any area may be admitted directly to the DBA program and, if they desire, earn the MBA degree in a coordinated program of study. Program requirements include a minimum of 36 semester hours of college mathematics to include a course in calculus, a course in statistics, knowledge of computer programming (FORTRAN IV), and intermediate economic theory (micro and macro). In addition, each student must demonstrate appropriate courses in their programs as approved by their academic committees.

A. Business Functional Areas. One graduate level course in each of the following areas must be completed: managerial accounting, financial management, marketing management, organization theory and behavior, and behavior policy. Students who have completed an MBA degree at an accredited institution probably will have met these requirements. Others may include appropriate courses in their programs as approved by their academic committees.

B. Basic Discipline Courses. Each student must demonstrate proficiency in the following areas by completing course work indicated or by passing appropriate examinations:

- Economics: Economics 5111, 5121.
- Behavioral Science*: Management 5610, 5620.
- Quantitative Science**: 12 quarter hours in one or a combination of two of the following areas: statistics, management science, econometrics, or computer science. Approval of student's committee is required.

C. Concentration Area. This is the focal point of the program and the area in which the student expects to do his/her research and dissertation. A minimum of 24 quarter hours of course work is required, including 9 hours of doctoral seminars taken at this University. A study of research methodology of the discipline is included. Graduate work in the field taken at other institutions is considered by the student's committee in determining additional course work required. Available concentration areas are:

- Accounting
- Finance
- Management
- Marketing
- Transportation and logistics

*Students who choose this field as a supporting area take Management 5170 and 5180.

**MBA core courses in this area may not be included.
D. Supporting Area. A minimum of 12 quarter hours of graduate course work is required in an area outside, but complementary to, the concentration area. The student may choose the supporting area from one of the following: one of the business fundamental areas, additional work in one of the basic disciplines or a related area in another school or college of the University. The program of study should be arranged with an advisor in the discipline chosen and must be approved by the student's committee.

Preliminary Examinations. Comprehensive written preliminary examinations consisting of two sessions of approximately four hours each in the concentration area and one four-hour session in the supporting area are required of each person working toward the DBA degree. The student’s committee may, if they deem it advisable, supplement the written examinations with oral examinations, and may accept the results of oral examination only for supporting areas outside the College of Business Administration. These examinations are scheduled twice a year, in early October and early May. The student may opt to sit for all sessions during a single examining period, or may sit for the concentration sessions and the supporting session in two successive periods. A student who fails an area on the first attempt must, if he/she wishes to continue in the program, retake the examination at the next scheduled administration, the results of which shall be final.

Admission to Candidacy. A student may apply for admission to candidacy for the DBA degree after maintenance of at least a B average in course work, successful completion of preliminary examinations and acceptance of a research proposal for the dissertation by his/her faculty committee. Admission to candidacy must be approved at least three quarters prior to the date the degree is conferred. (Admission in the fall quarter permits graduation in the following spring quarter.) Prior to presenting the research proposal for formal approval, the student must form his/her faculty committee and request the concentration area department head to recommend their appointment by the Vice Chancellor for Graduate Studies and Research. There must be at least three members, one of whom must be from a department (or discipline) outside the concentration area.

Research and Dissertation (minimum of 36 quarter hours). The purpose of the segment is to provide the candidate with a research experience that meets the general standards of the profession. The dissertation is supervised by the candidate’s faculty committee, which must certify its completion and acceptability after the candidate’s oral defense of his/her research effort.

Other Requirements. For information concerning program admission requirements, academic performance standards, fellowships and assistantships, and general rules and regulations of the Graduate School, see other parts of the College of Business Administration section and the first section of the catalog, "The Graduate School."

Minimum Academic Performance Standards. A graduate student in the College of Business Administration whose grade point average at any point after 12 hours is below 3.0 shall be placed on probation. A student on probation shall 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 those course hours of course work attempted which 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 Programs of The College of Business Administration upon recommendation of the student’s faculty committee.

Admission Requirements. General admission requirements for the Graduate School are stated on pages 11-13. MBA and DBA applicants are required to take the Graduate Management Admission Test (GMAT). Applicants for programs in economics, management science, and statistics must take the Graduate Record Examination (GRE) aptitude portion. Applicants for management science must meet the quantitative methods prerequisites stated in the program description.

Applicants whose native language is other than English must submit results of the Test of English as a Foreign Language (TOEFL). Scheduled dates and locations for taking the TOEFL examinations may be obtained from Educational Testing Service, P. O. Box 966, Princeton, New Jersey 08540, and from most colleges and universities.

In addition to procedures required for admission to the Graduate School (pages 11-13), MBA and DBA applicants must submit additional information on forms provided by the College of Business Administration. The application for all programs and supporting materials should be submitted at least three months prior to desired entry date.

The College of Business Administration is associated with other leading graduate schools of business as a member of the Graduate Management Admission Council.

Fellowships and Assistantships. Fellowships. Information concerning nonfellowship assistantships administered by the Graduate School as well as application blanks may be obtained from the office of the Graduate School. Information on College-administered fellowships is available from the Graduate Programs Office of the College of Business Administration.

Assistantships. A limited number of graduate assistantships are available in each of the academic departments and in the Center for Business and Economic Research.

Assistantships which carry remission of tuition and/or fees range up to $4500 per year, while others funded through various sources in the University range up to $5500 per year for half-time service. Awards are generally made on the basis of scholarship and performance on the admission test. Application forms may be obtained in any of the departments or from the Assistant Dean for Graduate Programs. Applications must be received by March 1 for consideration of assistantships to be awarded for the following fall term.

Center for Business and Economic Research. 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 serves the business community, state government, individuals, and the University through dissemination of various kinds of economic and socioeconomic information and supports the faculty of the College in seeking funding for research projects. Staff members conduct research in regional economics, public finance, and areas related to socioeconomic problems in the region. The Center publishes the results of its own 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 periodically the Tennessee Statistical Abstract and quarterly the Survey of Business. The Center is a member of the Association for University Business and Economic Research.

Management Development Programs. The Mangement Development Programs Department offers a wide variety of programs ranging from two- to three-day public seminars and customized "in-plant" programs to the four-week Tennessee Executive Development Program.

The Tennessee Executive Development Program (TEDP) is designed to provide extensive continuing educational opportunities for executives from firms and organizations in Tennessee, the South, and the nation. The major objective of the program is to prepare and develop executives for increasingly higher levels of management responsibility and to sharpen existing executive skills needed for comprehensive decision making and leadership. Other major aims of the TEDP are to teach the fundamentals of analytical thinking and the use of the decision tools, and to examine the economic, political, technological and other environmental factors affecting the firm’s operations.

The TEDP limits enrollment to the first six participants who live on campus for a total of four weeks spread over a three-month period. This arrangement provides executives with extensive opportunities to exchange ideas and operational concepts with contemporaries in other business areas and with TEDP faculty as well. The faculty for the TEDP consists of senior professors who teach business-related subjects in the University’s graduate
Business Core (21 quarter hours)¹:
- Economics 5030: Finance 5010: Management
- Management Science 5010: Marketing
- Programs: 5110, 5120, 5130, 5160, 5190, 5260, 5390

Accounting Core (15 quarter hours):
- Accounting 5110, 5120, 5130, 5140, 5160
- Accounting Electives (Select five) (15 quarter hours)²:

Each student must pass a final written comprehensive examination during the final quarter of study for the degree.

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a 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.

5010 Financial Accounting (3) Introduction to accounting model of firm and accounting information system. Not available to students with credit for 2110-20 or equivalent. F, S

5020 Corporate Reporting Problems (3) Analysis of uses and limitations of accounting model of firm. Emphasis on internal and external uses of general purpose financial reports. Prereq: 5010 or equivalent. F, W


5110 Seminar in Accounting Theory (3) Evolution of accounting theory, concepts underlying financial reporting models, and authoritative accounting literature. Emphasis on measurement of periodic performance and financial position. Prereq: Consent of department head. May not be taken by students with credit for 5120. F, S

5120 Seminar in Advanced Auditing (3) Theory and concepts underlying the philosophy of auditing as related to current auditing issues. Prereq: 4120 or equivalent. F, W

5130-40 Seminar in Current Accounting Topics (3, 3) Critical in-depth consideration of current issues in financial accounting literature. Prereq: 4990 or 5110. Must be taken in sequence.

5160 Graduate Internship in Accounting (3) Full-time professional employment for one academic quarter involving qualified job experience. Enforced prerequisites to measurement of student performance. Prereq: Consent of instructor.

5210-20 Seminar in Advanced Managerial Cost Accounting (3) Critical in-depth consideration of the development and application of individual research projects. Topics include cost allocation problems, budgeting, human resource management, social responsibility, performance evaluation and responsibility accounting concepts, service industry, cost analysis and analysis of for-profit ventures and programs. Prereq: 5220 or equivalent. Must be taken in sequence.

5300 Auditing Concepts (3) Concepts and theory of auditing, environment of internal and external auditing, nature of evidence, internal control evaluation, and reporting. Not intended for persons who have credit for auditing course. Prereq: 3130. Coreq: Statistics 4415 or 5630, or equivalent. (May be taken concurrently.)

5320 Advanced Auditing (3) Case-oriented, including audit of specific asset, liability, revenue and expense accounts. Topics on reporting, data processing, statistical sampling, and internal auditing. Prereq: 4110 with C or better. (Available only to MBA students who do not have credit for 4120.)

5330 Advanced Income Tax (3) Federal income tax regulations with emphasis on tax planning and research.

¹Where prior course work and/or experience justifies, substitutions in the business core courses upon approval of the MACC program advisor.
²Students with credit for 4990 must substitute 5120 or 5140 upon approval of the MACC program advisor.
³Selected courses from other disciplines may be substituted for accounting courses upon approval of the MACC program advisor.

°5340 Consolidations and Business Combinations (3) Theoretical and practical aspects of consolidation of affiliated business entities—domestic and foreign. Not intended for persons who have credit for a course with a similar content. Prereq: 3130.

°5420 Tax Research (3) Development of expertise in tax research utilizing tax service, tax periodicals, legal cases and other available sources. Includes individual research projects. Prereq: 4430 or equivalent.

°5430 Tax Planning (Advanced study of income tax problems emphasizing alternatives available to minimize tax liability compatible with achieving taxpayer objectives. Prereq: 4420 or equivalent.

°5440 Taxation of Estates and Gifts (3) Transfers at death, inter vivos transfers, life insurance, annuities, employee death benefits, marital and other deductions and exemptions, and estate and gift tax returns. Prereq: 4430 or 5330 and 5420. (Not available to students with credit for 4440.)

°5510 Not-for-Profit Accounting (3) Theory and practice of budgeting and fund accounting, financial reporting, measures of output and accomplishment, and financial and performance auditing for non-profit entities. Prereq: 9 hrs of accounting and consent of instructor.

°5620 Accounting Information Systems (3) Literature on accounting information systems and advanced systems analysis and design concepts. Information needs of other functional areas of business and interfacing of these areas. Prereq: 4630 or equivalent.

°5810 Accounting for Control (3) User-oriented survey of computerized management cost accounting topics. Prereq: 5060 or equivalent or consent of instructor. Not available for accounting majors.

°5910-20-30 Seminar in Accounting Research (1, 1, 1) Research and discussion of contemporary issues in practice of accounting. May be repeated. Admission by consent of department head. S/N/C only.

°5950 Seminar in Accounting Research (1) Integration of areas of financial, managerial, tax, and auditing, including directed problem-oriented research in selected topics. Prereq: 5110, 5120, 5160, 5260. (Not available to MBA students.)

°5990 Individual Research in Accounting (3) Directed research in a topic of mutual interest to student and faculty member. Prereq: Consent of department head in quarter prior to anticipated enrollment. May be repeated. Maximum 6 hrs.

°6000 Doctoral Research and Dissertation (3-15) E

°6110-20-30 Doctoral Seminar in Accounting (3, 3, 3) Analysis of issues reflected in accounting literature. Prereq: 9 hrs of graduate credit in accounting and consent of instructor.

°Business Administration

MAJOR DEGREES

Business Administration MBA, DBA

5310 Business Policy (3) Case studies covering policy formulation and administration. Point of
departure—top and middle management, where company-wide objectives are set and departmental policies are coordinated; sizing up company's situation, determining objectives, developing sound policies, organizing and administering personnel to reach company objectives, continuous administrative reappraisals. Enrollment priority given MBA students in last quarter of their program. Prereq: All 3000-level courses. F, W, Su.

5410 Business and Its Societal Environment (3) Analysis of current forces and changes in society and interrelation of plans and actions in business firms with environmental factors. Prereq: Consent of instructor. F

5610 Seminar in Applied Business Analysis (3) Application of business concepts and analytical skills to problems of small businesses in the community. Students work in teams under supervision of participating professor. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

Business Education

See College of Education

Economics

MAJOR

DEGREES M.A., M.A.T., M.S., Ph.D.

Professors: P. D. Qualls (Head), Ph.D. California (Berkeley); R. L. Bowby, Ph.D. Texas; W. E. Cone, Ph.D. Texas; C. B. Garrison, Ph.D. Kentucky; J. F. Holly (Emeritus), Ph.D. Clark, H. E. Jansen, Ph.D. Texas; F. Y. Lee, Ph.D. Michigan State; J. R. Moore, Ph.D. Cornell; W. C. Neale, Ph.D. London School of Economics; G. A. Spiva, Ph.D. Texas; R. H. Wolf, Ph.D. Vanderbilt.

Associate Professors: L. Carroll, Ph.D. Harvard; H. S. Chang, Ph.D. Vanderbilt; E. Giustiff, Ph.D. Stanford; H. R. Granade, Ph.D. Florida; H. W. Herzog, Ph.D. Maryland; A. Mayhew, Ph.D. Texas; K. E. Phillips, Ph.D. Washington (Seattle); A. M. Schlottman, Ph.D. Washington (St. Louis).

Assistant Professors: D. P. Clark, Ph.D. Michigan State; S. P. Coelen, Ph.D. Syracuse; C. B. Doms, B. Cornell; D. L. Kaserman, Ph.D. Florida; N. C. Modeste, Ph.D. Florida; G. E. Schuler, Ph.D. Houston.

THE MASTER'S PROGRAM

The minimum requirements for a graduate major in Economics for the Master of Arts and the Master of Science degrees consist of the following:

(1) Economics 5111-12 and 5121-22. (2) 9 additional hours in economics at the 5000 level or above, or an additional 9 hours in economics at the 5000 level or above to be concentrated in one field. Students electing the non-thesis option will be required to pass a final written comprehensive examination.

The requirements for a graduate minor in Economics are as follows: Either (1) 5111-12 and 5121, or (2) 5111 and 5121-22, or (3) with the consent of the head of the economics department, an alternative sequence of 9 hours to meet unusual conditions.

MASTER OF ARTS IN COLLEGE TEACHING DEGREE

The requirements for the MACT degree are listed on page 20. A thesis is required.

THE DOCTORAL PROGRAM

Subject Area Requirements

1. Students will be required to demonstrate their competence in the core subject fields as indicated:

   a. Economic theory, by a preliminary examination.
   b. Economic history, by completing 6 hours in economic history at the 5000 level or above with an average grade of B or better or by satisfying an examining committee.
   c. History of economic thought, by completing Economics 5150 and 3 additional hours in the department at the 5000 level with an average grade of B or better or by satisfying an examining committee.
   d. Mathematical and quantitative methods in economics by completing Economics 5510, 5190, and 6510 with the average grade of B or better or by satisfying an examining committee.

   (Note: The Economics 5510 requirement may be waived for those students completing Economics 6170, 6180, and 6190.)

   2. Students will be required to demonstrate their competence by preliminary examination in three fields with the approval of the department, at least two of which must be selected from the following:

      a. Development; economics of centrally planned economics of labor and manpower; industrial organization; international economics. An examination by the department, combining two or three of the above.
      b. Exceptions to the foregoing are discouraged but may be petitioned by writing directly to the department and the faculty. This petition is to be submitted at least nine months before the student takes the preliminary examination.

   Course Requirements. Candidates for the Ph.D. degree in Economics will be required to complete a minimum of 72 quarter hours of coursework beyond the Bachelor's degree, plus the dissertation which carries 36 quarter hours of credit. At least 54 hours shall be in economics.

4000 Special Topics (3) Student generated course offered at convenience of department upon student initiative. Subject matter and contents determined by students and instructor with approval of the department.

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a 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.

5011-12 Problems in Lieu of Thesis (3, 3)

5910-20-30 Economics Seminar (1, 1, 1) Research in progress and discussion of selected topics. May be repeated. S/NC only.

6000 Doctoral Research and Dissertation (3-0-0) E

ECONOMIC THEORY

4110 Managerial Economics (3) Application of economic theory to business decision making; emphasis on profit objectives, measurement and forecasting, demand and costs, and capital budgeting. Prereq: 2110-20-30. (Same as Water Resources Development 4110.)

4130 Business Cycles (3) Fluctuations in income, employment, prices, and output in the economy system. Subjects covered are the historical facts concerning booms and depressions, statistical methods for analyzing business fluctuations, theoretical implications of cycles, and policies that have been proposed to combat them. Prereq: 3120 or consent of instructor. S

4150 History of Economic Thought (3) Development of economic thought, tools of analysis, and economics as a social science, together with an analysis of socioeconomic conditions which influenced this development. Prereq: Consent of instructor. F

4170-90 Introduction to Mathematical Economics (3, 3) Application of a set of mathematical methods in theoretical study of micro- and macroeconomic phenomena. Designed for beginning graduate students who have limited training in analytic geometry or the equivalent. Must be taken in sequence. Prereq: 3110 and college algebra, calculus, and analytic geometry or the equivalent. F, W

5010 Introduction to Econometric Analysis (3) Analytical tools of macro- and microeconomics for students without prior training in economics. Price determination, national income measurement and determination, and banking system. Not available to students with credit for 2110-20-30 or equivalent. S, F

5600 Managerial Economics (3) Application of economic concepts to business decision making. Analysis and forecasting of demand, cost analysis, pricing behavior, and optimizing techniques. Prereq: 5010 or equivalent. Prereq or coreq: Statistics 5010 or equivalent. F, W

5630 Economic Fluctuations, Forecasting, and Stabilization (3) Macroeconomic environments of the firm. Determination of level of output, employment and prices for economy as a whole. Implications of short and long run fluctuations for individual firm. Role of forecasting techniques and stabilization policies. Prereq: 5010 or equivalent. F, Sp, Su

5111 Microeconomics (3) Basic topics in microeconomics, verbal and geometric and algebraic techniques. Theory of consumer behavior and demand, theory of production and cost, long and short run theories of profit maximizing firm in both perfectly competitive and monopolistic environments, and theory of derived demand. Prereq: 5110. F

5112 Microeconomic Theory (3) Fundamental theory of price determination in partial and general equilibrium settings, including theories of preference and consumer behavior production, short and long run profit maximization under conditions of perfect and imperfect competition, demand for factors of production and distribution. Prereq: 4170 and 5111 or equivalent. Sp

5121-22 Macroeconomic Theory (3, 3) Determination of levels of employment and prices for economy as whole, focusing on relationships between interest rates, price expectations, productivity, and quantity of money, on one hand, and aggregate saving, investment, and money supply on the other. Prereq: Intermediate economic theory or equivalent. F, W; Sp

5150 History of Economic Thought (3) Development of economic ideas from ancient times through Adam Smith and Marshall; emphasis given to classical and neoclassical tradition.

5180-90 Mathematical Methods in Economics (3, 3) Applications of basic concepts in differential and integral calculus, difference and differential equations, linear algebra and stochastic models to topics in theory of firm, growth models, game theory, linear programming, and decision making under uncertainty. Prereq: 1 yr of calculus. Sp; F

5510 Quantitative Methods in Economic Research (3) Methods of estimation and testing of economic relationships with use of time series and cross section data, with applications to current economic problems. Prereq: Intermediate statistical or Statistics 5211 or equivalent. W

5520 Introduction to Econometrics (3) Statistical demand analysis, production and cost analysis, distribution of income and wealth, models of growth and cycles, macroeconomic applications. Should not be taken by students who contemplate taking Economics 6170-60-30. Prereq: 1 yr of principles of economics and consent of instructor. F

5710 Public Finance: Revenues (3) Same as Finance 5710. F

5720 Public Finance: Expenditures (3) Same as Finance 5720. W

5740 Seminar in Public Finance (3) Same as Finance 5740. Sp
6710-20 Seminar: Fiscal Theory and Public Finance
simultaneous equation models with application to

5810 Financial Markets and Intermediaries (3) (Same as Finance 5810) W
5820 Monetary Theory and Policy (3) (Same as Finance 5820) F
5830 Commercial Bank Management (3) (Same as Finance 5830) F, Sp
611 Seminar in Advanced Microeconomics (3) Topics in microeconomic theory. May be repeated with permission. Prereq: 5111, 5112 and consent of instructor. W
612 Seminar in Advanced Macroeconomics (3) Topics in macroeconomics. May be repeated with permission. Prereq: 5121, 5122 and consent of instructor. Sp
5150-60 History of Economic Doctrines (3, 3) Important ideas of economic thinkers from Middle Ages to present. W, Sp
5170-80-90 Econometric Methods (3, 3, 3) Theory and techniques of statistical testing of economic hypotheses and construction and estimation of econometric models. Review of classical least squares regression model, extensions of least squares regression model, and approaches to simultaneous equation models with application to current econometric research. Prereq: 5180-90 and 5510 or equivalent. F, W, Sp
6710-20 Seminar: Fiscal Theory and Public Finance (3, 3, 3) Problems or problem areas of current importance in fields both of international economics and economic development. Prereq: 5510 or 5320. W
4230 Problems in International Trade and Economic Development (3) Problems or problem areas of current importance in fields both of international economics and economic development. Prereq: 5510 or 5320. W
4231 The Political Economy of Latin America (3) Description, analysis, and comparison of major economic problems and policies of various Latin American countries. F
4222 The Political Economy of Asian Development (3) Description, analysis, and comparison of major economic problems and policies of India, China, and Southeast Asian countries. W
4260 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. Prereq: 2130. W
5210 Seminar in International Trade Theory (3) Pure theory of international trade. F
5220 Seminar in Economic Development (3) Economic problems of developing countries. F
5250 Economic History of Europe (3) Nature and functioning of economic systems and policies in history of western civilization; examination of some major issues of method and interpretation. F
5260 Economic History of the U.S. (3) Interpretation of economic history and policies; analysis of economic structure and policies from colonial times. W
5610 Location and Regional Development Theory (3) Theory of industrial, agricultural, and residential location; economic basis for land use patterns and central places; examination of regional inequalities and national assistance for regional economic development. F
5620 Methods of Regional Analysis (3) Theory of regional structure and growth. Examination of regional models for impact analysis and economic forecasting. Methods of analysis include regional descriptive statistics, gravity and potential concepts, regional income and product accounts, shift and share analysis, regional input-output, linear programming, and econometric models. W
6231-32, 6241-42 Seminar in Economic Development (3, 3, 3, 3) Development and application of analytical tools to problems of economic policy faced by developing regions and countries. W, A, Sp; F
6250 Seminar in European Economic History (3) Selected topics in European economic history. Prereq: Consent of instructor. May be repeated with consent of instructor. W
6260 Seminar in American Economic History (3) Selected topics in American economic history. Prereq: Consent of instructor. May be repeated with consent of instructor. Sp
6270 Seminar in Economic History of the Third World (3) Selected topics in economic history of societies other than those of Western Europe and English-speaking North America. Prereq: Consent of instructor. May be repeated with consent of department. F, A
6610 Seminar in Regional Analysis (3) Selected topics in regional economic theory and analysis. Maximum 6 hrs. Sp, A
6820 Regional Economics Workshop (3) Selected topics in applied regional research. Emphasis on student participation in model design and estimation, forecasting, simulation, and mathematical and computer programming. Prereq: Consent of instructor. Maximum 6 hrs. Sp, A
6650 Seminar in Environment and Resource Economics (3) Topics in environmental quality, natural resource allocation by private markets, and issues in formal and informal political mechanisms for solving environmental problems. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. Sp, A

5340 Seminar in Private Enterprise and Public Policy (3) Structure of contemporary industry, factors in investment and development, and consequences for business conduct and performance; social control of business through antitrust and other government regulation. F
6340 Seminar in Private Enterprise and Public Policy (3) Structure of contemporary industry, factors in investment and development, and consequences for business conduct and performance; social control of business through antitrust and other government regulation. F
6331 Theory and Practice of Economic Planning (3) Leading issues in imperative and indicative planning. Prereq: Consent of instructor. May be repeated with consent of department. F
5310 Economic Systems (3) Study and appraisal of underlying theories and operation of capitalism, socialism, communism, and other economic systems. W
6331 Theory and Practice of Economic Planning (3) Leading issues in imperative and indicative planning. Prereq: Consent of instructor. May be repeated with consent of department. F
5310 Economic Systems (3) Study and appraisal of underlying theories and operation of capitalism, socialism, communism, and other economic systems. W
5331 Theory and Practice of Economic Planning (3) Leading issues in imperative and indicative planning. Prereq: Consent of instructor. May be repeated with consent of department. F
5410 Seminar in Labor Manpower Economics (3) Emphasis on economic analysis of labor and manpower economics literature. Emphasis on problems, analysis, and possible solutions. Prereq: Consent of instructor.
5420 Seminar in Wage and Employment Theory (3) Current and past theories of wage and employment determination. Prereq: 5410, equivalent or consent of instructor.
6411-12, 6421-22 Seminar in Labor Economics (3, 3, 3) Selected problems chosen for their current interest of continuing significance—development and application of problems and techniques. W, A, W, Sp, A

Finance

Professors:
R. M. Duvali (Head), Ph.D. North Carolina;
L. P. Anderson, Ph.D. Wisconsin; R. A. Bohl, Ph.D. Washington; W. D. Dvorak, Ph.D. Cincinn; R. E. Shieffer, Ph.D. California (Los Angeles); D. L. Stevens, Ph.D. Michigan State.

Assistant Professors:
H. B. R. Banton, Ph.D. Georgia State; T. P. Boehm, Ph.D. Washington; L. A. Yachinovcik, Jr., Ph.D. Illinois (Champaign-Urbana); R. A. Wei; Ph.D. North Carolina.

5002 Non-Thesis Graduate Competition (3-15) Required for the non-thesis student not otherwise required during any quarter when such a 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

6000 Doctoral Research and Dissertation (3-19) E

FINANCE AND INVESTMENTS

5010 Financial Management and Asset Valuation (3) Analysis of decision making in financial management. Process by which a firm is valued; roles of investors, financial markets, instruments, risk and expected return. Capital budgeting process with respect to identifying relevant variables, understanding alternative capital budgeting tools, decision rules and decision-making criteria. Capital budgeting decision examined under conditions of uncertainty. Alternative risk methods. Prereq: Economics 5101; Statistics 5101. Prereq or coreq: Accounting 5000. W, Sp


5120 Quantitative Techniques in Financial Management (3) Applications of mathematics, probably, and statistics to model building and testing in financial management. Prereq: 5020.

5130 Financial Administration (3) Cases and readings within firm: refined techniques of analysis; optimal financing decisions; capital cost measurement; and financial planning and control. Prereq: Statistics 5101; Coreq: Corporate financial theory. Prereq: 5020.

6140 Seminar: Managerial Finance (3) Applications of theory and quantitative techniques to solution of problems in managerial finance. Prereq: 5210 or 5310.

5440 Commodity Futures and Stock Options (3) Trading in commodity futures markets and in "put and call" stock options. Factors influencing commodity and options prices; option valuation models. Prereq: Economics 5130.

5800 Executive-In-Residence Seminar for MBA (3) Practical aspects of financial management and investments. Leading industry, banking, and governmental personnel in conduct class. Prereq: Consent of department. Sp

5990 Research in Finance (3) Directed research on topic of mutual interest to the student and staff member. Prereq: 5420.

5990-20 Seminar: Financial Economics (3, 3) Investment decision making under conditions of uncertainty and risk. Application of theory of choice to the allocation of financial resources over time with reference to decision-making, investment decisions, and the determinants of the cost of capital. F

6510 Seminar in Financial Management (3) Employment analysis, quantitative techniques in formulation and solution of financial management problems. W

MONETARY POLICY AND FINANCIAL INSTITUTIONS

5810 Financial Markets and Intermediaries (3) Capital formation and allocation of capital in U.S. economy and abroad. Process of saving, partial institutionalization of these savings, investments of financial intermediaries, efficiency of allocation process and its effect on economy, and impact of financial institutions on financial markets. (Same as Economics 5810.) W

5920 Monetary Theory and Policy (3) Relationship of monetary policy to formulation of objectives and control of money supply. (Same as Economics 5920.) F

5930 Commercial Bank Management (3) Bank management decision-making analysis of changes in banking environment and structure; acquisition and management of funds; current banking problems. Prereq: Consent of instructor. (Same as Economics 5930.) W

6110 Seminar: Monetary Theory (3, 3) Study of money, credit, and liquidity as related to income, interest rates, employment and prices as well as examination of effects of monetary policy on economic activity. Prereq: Economics 5520 or equivalent. (Same as Economics 5920.) F

6110 Seminar: Fiscal Policy (3, 3) Study of money, credit, and liquidity as related to income, interest rates, employment and prices as well as examination of effects of monetary policy on economic activity. Prereq: Economics 5520 or equivalent. (Same as Economics 5920.) F

6810 Financial Institutions and Markets (3) Theory of financial markets, role of financial institutions, and management of financial institutions. (Same as Economics 6810.) W

GOVERNMENTAL FINANCIAL ADMINISTRATION

5710 Public Finance: Revenues (3) Allocative, distributive, and stabilization effects of alternative revenue systems. Prereq or coreq: Economics 5520 or equivalent. (Same as Economics 5710.) F

5720 Public Finance: Expenditures (3) Functions and growth of public sector, public goods, and benefit-cost analysis. Prereq or coreq: Economics 5520 or equivalent. (Same as Economics 5720.) W

5730 Finance Administration of Government (3) Budgeting and cash management in public sector. Prereq: Economics 5520 or consent of instructor. Sp

5740 Seminar in Public Finance (3) Selected topics: public choice, impact of future markets, fiscal policy, and fiscal dynamics. Prereq: 5710. (Same as Economics 5740.) Sp

5710-20 Seminar: Fiscal Theory and Public Finance (3, 3) Analysis of major topics in fiscal theory and policy. (Same as Economics 6710-20.) W

INSURANCE


REAL ESTATE AND URBAN DEVELOPMENT

4900 Aspects of Urban Environment (4) Interdisciplinary course in urban problems. Prereq: Consent of instructor. Readings and papers on architecture, planning, and urban problems. Prereq: Economics 4500 or equivalent. W


5120 Real Estate Analysis (3) Analysis of real estate investment, real estate finance and appraisal theory. Prereq: Economics 5520 or equivalent. W

5130 Housing and Urban Land Markets (3) Analysis of housing demand, supply and location. Segregation and housing discrimination. Impact of urban renewal and public policy on housing markets. Prereq: 5010 or consent of instructor. SP

5140 Real Estate Investment and Taxation Analysis (3) Analysis of economic factors and institutions which underlie real estate investment decision making. Case method utilized. Prereq: 5120 or consent of instructor. Sp

Management

Professors:


Associate Professors:

F. A. Chamblin, MBA; O. S. Fowler, Ph.D. Georgia; R. C. Maddox, Ph.D. Texas; C. W. Neel, Ph.D. Alabama.

Assistant Professors:

J. A. Bachman, Ph.D. Virginia Polytechnic Institute; M. C. Rush, Ph.D. Akron; J. E. Thieli, Ph.D. Indiana; C. R. Woolfam, M.A.; M. S.; S. C. Vance, Ph.D. California; M. Gordon, Ph.D. California; A. H. Keatty, Ph.D. Connecticut; C. W. Neel, Ph.D. Alabama.

Adjunct Professors:

M. A. M. A.; M. S.; M. S. M. (Student Teaching); F. C. M. M. (Teaching Assistant). (For MBA students only. Available only as stated on page 35.)

4801-02-03 Readings and Research in Personnel Management (1, 2, 3) Prereq: 4460; Statistics 4310, and consent of instructor. E

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before the degree is completed. May not be used toward degree requirements. May be repeated. NC only. E

5010 Organization Theory and Behavior (3) Application of organization theory, organizational behavior and management research and development concepts to organizational problems. F, W, Su

5020 Operations Management (3) Management processes of planning, operating and control of production systems. Management concepts and quantitative techniques with systems framework to operating problems. Prereq: 5010; Management Science 5020, F, Sp, Su

5050 Production Management (3) Analysis of production function with emphasis upon application of mathematical-statistical methods. (For MBA students only. Available only as stated on page 35.)

5110 Organization Theory I (3) Analysis and design of organization structure. F

5120 Organization Theory II (3) Dynamic of organization leadership, motivation, informal organization. Prereq: 5110

5130 Management Planning and Control (3) Processes of management planning and controlling with emphasis on long-range corporate planning. Sp

5170-80-90 Proseminar in Industrial and Organizational Psychology (3, 3, 3) Introduction to basic content and analysis of industrial and organizational psychology. Must be taken in sequence during the student's first year. (Same as Psychology 5170-80-90.) F; W; Sp

5210 Personnel Management (3) Analysis and appraisal of the personnel function. F

5220 Wage and Salary Administration (3) Analysis of programs, problems, and practices. W

5230 Human Problems in Administration (3) Review and critique of research in industrial human relations. (Same as Psychology 5450.)

5250-60-70 Industrial and Organizational Psychology (1-3, 1-3, 1-3) Reading in industrial and organizational psychology. Prereq: Consent of instructor. W

5320 Management Problems in Industrial Research (3) Basic administrative problems encountered in management of industrial technological research and engineering programs, and comparable programs in which professional personnel predominate. F, A

5410-30-50 Production Management (3, 3, 3) Quantitative approach to solution of production management problems. Prereq: 36 hrs of mathematics and statistics, including 3 hrs of computer programming, or equivalent and consent of instructor.

5610-20 Organizational Behavior (3, 3) Behavioral methodology and perspective, including review of empirical behavioral research in organizations. Must be taken in sequence. F

5710 Management of Foreign Operations (3) Analysis of operational environment of international business firms and impact of internal and external factors on managerial decisions. Readings and cases. Sp

5810 Energy Management: Theory and Practice (3) Management of energy resources in operating systems, decision criteria, trade-offs, system analysis, energy audits, technical parameters, conservation methods, worldwide energy supply and demand, new energy technologies.

6000 Doctoral Research and Dissertation (1-19) E

6110 History of Management Thought (3) Significant historical ideas leading to present state of art of management. E

6120 Advanced Organizational Theory (3) Analysis of functioning of complex organizations: structure, culture, and adaptation. E

6130 Seminar in Contemporary Management Issues (3) Contemporary management policy issues. May be repeated.

6250-60-70 Seminar in Industrial and Organizational Psychology (3, 3, 3) Advanced problems in organizational psychology. Areas include performance evaluation, executive development, group processes, and morale. (Same as Psychology 6250-60-70.)

6380 Seminar in Industrial and Organizational Psychology (3) (Same as Psychology 6380.)

6900 Field Work in Industrial and Organizational Psychology (1-18) Supervised practice. One credit hr for each 30 hrs of such practice. Maximum 15 credits. (Same as Psychology 6900.) E

Management Science

MAJOR

Management Science

Degree Requirements

Professors: C. E. Bell (Chairperson), Ph.D. Yale; R. S. Gartinkel, Ph.D. Johns Hopkins.

Associate Professor: R. E. Esselstine, Ph.D. Georgia Institute of Technology.

Management Science Committee: Members of the Management Science faculty and in addition: R. W. Boling, Management; A. H. Keally (Emeritus), MBA Pennsylvania; G. H. Whitlock, Ph.D. Tennessee.

William S. Stokely Professor of Management

Alumni Distinguished Service Professor
These requirements generally are completed by the end of the first year of the program.

Preliminary 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 preliminary 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 36 quarter hours of Management Science 6000, 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 72 quarters of course work, normally is completed in the last year of the program.

Prerequisites for Management Science Courses. The Management Science Program is interdisciplinary and students in other degree programs are encouraged to enroll in management science courses. Prerequisites are designed to indicate the level at which courses are taught. Interested students whose prior course work does not match the prerequisites are encouraged to seek the instructor's guidance and consent to enroll.

5000 Thesis (1-15) E
5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a 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
5340 Application of Management Science Methods (3) Application of methods from 5310-20-30 to large-scale management problems. 5330 may be taken concurrently. Su
5810 Special Topics in Management Science (3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.
5910 Management Science Problems (1-6) Directed study on subject of mutual interest to student and staff member. E
6000 Doctoral Research and Dissertation (3-15) E

6110-20-30 Models for Production Systems (3, 3, 3) Seminar providing research practice to enhance professional development of doctoral students. Investigation of existing mathematical models for production processes and opportunities for original research.
6210-20 Network Flows (3, 3) In-depth treatment of widely applied network optimization algorithms including transportation, transshipment, primal-dual and primal basis-tree methods; multimodality, multiperiod and dynamic flows; with game, and other advanced topics. Prereq: 5310 or equivalent. A
6310 Integer Programming (3) Theoretical and computational aspects of linear programming with integer variables, branch and bound, cutting plane, and group theoretic algorithms. Prereq: 5310 or equivalent. A
6410 Large Scale Mathematical Programming (3) Development of solution strategies for linear programming problems that have many constraints, many variables or extremely sparse constraint matrices. Prereq: 5310 or equivalent. A
6510 Nonlinear Optimization (3) Solution of constrained and unconstrained nonlinear optimization problems focusing on algorithms that have performed well in recent practice. Prereq: 5310 or equivalent. A
6550 Markovian Decision Models (3) Formulation and analysis of Markov chain models; Markov chain models which incorporate decisions—their formulation, application and solution through policy iteration. Stochastic dynamic programming models in continuous time. Prereq: 5330. F
6620 Queuing Models (3) Application and mathematical analysis of models of congestion. Basic birth-death process models, other Markovian models; non-Markovian models for systems with general service or arrival patterns, priority customers or other complicating assumptions; queues in series. Prereq: 5330 or Mathematics 4750-60. Sp.
6710 Location Models (3) Application of linear, nonlinear and network optimization techniques to problems of optimal location of new facilities. Prereq: 5310 or equivalent. A
6810 Special Topics (3) Prereq: 5310-20-30 and consent of instructor. May be repeated. Maximum 9 hrs.

Marketing and Transportation
G. N. Dicer (Head), DBA Indiana.

Marketing
Associate Professors: D. W. Cravens, DBA Indiana; J. R. McMillan, Ph.D. Indiana State; R. C. Reizenstein, Ph.D. Cornell; G. D. Seltell, DBA Indiana.
Assistant Professors: J. R. McMillan, Ph.D. Purdue; E. T. Hadley, Ph.D. Indiana State; D. W. Cravens, DBA Indiana; F. L. Barbour, Ph.D. Illinois; L. R. Dufoss, M.S. Purdue; R. L. Jenkins, Ph.D. Indiana State; L. S. Sorel, Ph.D. Purdue.

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a 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

The College of Communications offers two graduate degrees with a major in Communications, the Master of Science (M.S.) degree and the Doctor of Philosophy (Ph.D.) degree. In addition, Communications is available as a minor for students majoring in other departments. Required course work will be selected after discussion with the major advisor and an advisor from the College of Communications.

The College's news-editorial and advertising sequences are accredited by the American Council on Education for Journalism. It is a member of the American Association of Schools and Departments of Journalism and the Broadcast Education Association.

MASTERS OF SCIENCE

The Master of Science degree with a major in Communications is offered for students who primarily desire (1) advanced preparation in effective communication for mass media and other fields of applied communications, or (2) a deeper understanding of the communication process and the social role of the mass media.

The prospective student who is interested only in acquiring basic skills in journalism, advertising, or broadcasting is advised to consider a second baccalaureate rather than an advanced degree. (Note: There is no M.S. in Journalism or Advertising or Broadcasting at this institution. Students desiring a major in one of these fields must take the B.S. program.)

Applicants must meet admission requirements of the University Graduate School. In addition they must complete the Graduate Record Examination, the California Psychological Inventory, and application forms as required by the College of Communications. All application materials will be screened by an admissions committee authorized by the Graduate Studies Committee of the College of Communications.

New students may be admitted to the program at any time; however, beginning enrollment is limited to the summer and fall quarters each year. Unless necessary materials are received at least six weeks before registration, applications may not be processed in time for admission to full potential candidate status in the first quarter. In these cases, the student may still qualify for non-degree or provisional status.

The student may choose either of two tracks, both leading to the M.S. in Communications and both requiring a thesis:

The academic track is designed for the student who wishes to emphasize advanced study of the theory and effects of communications. A minimum of 45 hours of approved graduate work is required:

- 12 hours of core courses:
  - Communications 5100, 5120, 5140 and 6100, the first three of which must be taken during the first two quarters of the student’s program, except with written approval of the Assistant Dean for Graduate Studies for the College. In addition, students who earned their Bachelor’s degrees outside the field of Communications will normally be required to add Communications 5130 to their core;
  - 24 hours of selected courses within the College, including at least 9 hours at the 5000 level;
  - 9 hours of thesis work (Communications 5000).

After the formal program of courses and research in either track is completed, the student must pass an oral examination conducted by his/her graduate committee.

The professional track is designed for the student who wishes to emphasize a particular professional area, such as advertising, broadcasting, journalism, or public relations. A minimum of 45 hours of approved graduate course work is required:

- 9 hours of core courses:
  - Communications 5100, 5120 and 5140, which must be taken during the first two quarters of the student’s program, except with written approval of the Assistant Dean for Graduate Studies for the College;
  - 15 hours in a major area within the College, including at least 6 hours at the 5000 level;
  - 9 hours of thesis work (Communications 5000);
- at least 12 hours in a minor area approved by the major advisor, of which at least 6 hours must be at the 5000 level.

In addition, students with Bachelor’s degrees in other cognate areas will be required to complete prerequisites as designated by their advisors. Advising for the professional track will be supervised by the chairperson of the appropriate department of the College. Students who have had no courses in their major areas of concentration may expect to spend six or more full-time quarters in the program.

Program planning, however, will be flexible and students must consult with their advisor before registration, applications may not be processed in time for admission to full potential candidate status in the first quarter.

DOCTORS OF PHILOSOPHY

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

The program is interdisciplinary, consisting of a required core curriculum and recommended emphasis 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.

The Master’s degree is not required for entry into or completion of the doctoral program. Program planning, however, will
permit the Master's degree to be earned if desired. Students lacking academic or professional experience in communications will be required to take prerequisite courses. In general, however, the program may be completed within three academic years of full-time study beyond the Bachelor's degree.

The following are normally minimal requirements for admission to full potential candidate status: (a) a 3.0 (4.0 system) grade point average in undergraduate studies, or 3.5 for graduate work if applicant holds a Master's degree; (b) above the fiftieth percentile in verbal and quantitative aptitude on the Graduate Record Examination; (c) completion of the California Psychological Inventory; (d) endorsement by at least three former teachers or professional colleagues chosen by the Graduate Studies Committee; (e) a statement of the applicant's goals and reasons for pursuing the doctorate. Personal interviews with members of the Graduate Studies Committee may be required.

Professional experience in some field of communications is a highly desirable criterion for admission.

The following program represents work normally required for an individual with only the Bachelor's degree and no technical competence: (a) prerequisite courses offered by the College of Communications and approved by the major advisor for applicants lacking the necessary academic and/or professional background; (b) core curriculum: 33 hours of course work; (c) primary concentration in communications: 15-18 hours of course work; (d) secondary concentration in a cognate minor subject normally outside communications: 12 hours of course work; (e) technical competence area in either teaching, research, or administration: 15-18 hours of course work and, for those who lack appropriate professional experience, an internship the equivalent of 9 credit hours; (f) research tool: 12 hours of course work, e.g., statistics, foreign language, or computer science; (g) dissertation: 36 hours of Communications 6000.

The following courses represent the required core curriculum (beyond the Bachelor's degree): Communications 5100, 5120, 5140, 6100, 6200.

One of the following: Communications 6300, 6310, 6320.

For the teaching or administrative technical competence area: a one-week, non-credit seminar in communications: 15-18 hours of course work; (d) secondary concentration in a cognate minor subject normally outside communications: 12 hours of course work; (e) technical competence area in either teaching, research, or administration: 15-18 hours of course work and, for those who lack appropriate professional experience, an internship the equivalent of 9 credit hours; (f) research tool: 12 hours of course work, e.g., statistics, foreign language, or computer science; (g) dissertation: 36 hours of Communications 6000.

Communications Research Center

The Communications Research Center is a vital adjunct to the communications graduate program. Objectives of the Center are: (a) to conduct original research in mass and public communication; (b) to disseminate research-generated information; and (c) to provide research services to faculty and students, professional communicators, and others interested in improving the quality of human communications.

Departments of Instruction

Planned course offerings in the College of Communications for a full calendar year are published in the College newsletter the preceding November. This information is available from the Dean's Office, 302 Communications Building, 974-3031.

Communications

MAJOR DEGREES

Communications M.S., Ph.D.


Associate Professors: G. A. Everett, Ph.D. Iowa; H. H. Howard, Ph.D. Ohio; E. F. Shaw, Ph.D. Stanford.

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree requirements are completed. May not be used toward degree requirements. May be repeated. S/NC only. E

5100 Introduction to Graduate Studies (3) Scope and methods of advanced study in communications. Informative sources, literature review methods, scholarly style, thesis and degree requirements and procedure, overview of traditional and behavioral research methods. Su, F.

5120 Research Methods (3) Communications research, strategy and methodology. Scientific process, bases for derivation and verification of hypotheses, and basic methods of designing research in communications. Su, F.

5130 Advanced Principles of Mass Communications (3) Proseminar covering all phases of mass communications including history, development and current status of communication industry, principles of broadcasting, and principles of advertising. Su.


5150 Seminar in Communications Issues (3) Contemporary topics in communications. Prereq: 5100 and 5140, or consent of instructor. May be repeated. Maximum 6 hrs.

5970 Independent Study (3) Reading, research, or projects on special topics in communication. On individual basis, under faculty direction, with consent. May be repeated.

6000 Doctoral Research and Dissertation (3-15) E

6100 Seminar in Communication Theory (3) Intensive analysis of selected theories and supporting research data dealing with source, message, media, receiver, or situational variables in process of communication. Prereq: 5140. Recommended prereq: 5100.

6200 Seminar in Communication Topics (3) Identification, presentation, and analysis of special issues and problems in communication. Organization and strategy in writing research proposals. Prereq: 5100, 5120, 5140. Recommended prereq: 6100 or consent of instructor.

6300 Survey Research Methods in Communications (3) Survey methods applied to opinion and communications media research problems. Planning, sampling, questionnaire construction, data gathering (personal, mail, and telephone), data processing and interpretation. Attitude measurement and message pretesting applications. Prereq: 5120 or consent of instructor. Prereq or coreq: Basic statistics.

6320 Seminar in Historical Research Methods in Communications (3) Materials and methods in historical, descriptive, and legal research in communications theory and behavior. Prereq: 5100, 5120. Recommended prereq: 5140, 6100. A

Advertising

Professors: R. Joel (Head), M.A. Wisconsin; A. D. Fletcher, Ph.D. Illinois; D. G. Hileman, Ph.D. Illinois; S. K. Zeigler, Ph.D. Michigan State.

3650 Advertising Copy and Layout (4) Ideas and their translation into persuasive words and pictures. Principles and techniques of copy and layout. Course may contain laboratory and lecture parts. Prereq: 3800 with grade of "C" or better or consent of instructor. F, W, Sp

4000 Advanced Advertising Copy and Layout (4) Creative strategy and execution of advertisements for mass media. Problems in idea creation for advertisers. Lectures and labs. Prereq: 3630 with grade of "C" or better or consent of instructor. F, W, Sp

4360 Advertising Media (3) Media, markets, and audiences. Evaluation of media in relationship to communication needs of advertisers. Prereq: 3000 with grade of "C" or better or consent of instructor. W

4460 Cases and Problems (3) The case approach to the study of advertising problems. Analysis of campaigns and trends. Prereq: 3630, 3650 and 4360 or consent of instructor. F

4470 Advertising Campaigns (4) Application of theory in planning and execution of campaigns. Market and consumer research; development and allocation of budgets. Choice of appeals and approaches; media selection; preparation of advertisements. Prereq: 3650, 4000 and 4360 or consent of instructor. W

5310 Current Issues in Advertising (3) Current socioeconomic, legal, ethical, and cultural issues in advertising and communication to determine advertising's role in and responsibility toward society. Emphasis on both marketing and behavioral science aspects of advertising. Consideration of
5910 Creative Projects (3) Creative or problem solving interests related to advertising. Designed for the advanced student who wishes to apply theory and skills to specific problems. Prereq: 4000 and 4460 or consent of instructor. May be repeated.

5970 Independent Study (3) E

Broadcasting

Professors: D. W. Holt (Head), Ph.D. Northwestern.

Associate Professors: H. H. Howard, Ph.D. Ohio; I. G. Simpson, M.S. Syracuse

Assistant Professors: F. A. Lester, M. A. Tennessee; R. A. Shirley, M. A. Tennessee; M. K. Sidell, Ph.D. Northwestern.

3360 Television and Radio Advertising (3) Principles and techniques of television and radio advertising. Emphasis on media research, rate structure, program creation, creativity, television commercials. W, Sp

3560 Radio-Television Writing (3) Theory and techniques of radio-television writing. Emphasis on preparing and editing broadcast scripts except news and dramatics. Special events, interviews, musical programs, radio talks, documentaries, and promotion materials. F, W, Sp

4010 Speech for Broadcasting (3) Fundamental broadcasting conditions affecting the announcer, pronunciation and oral interpretation of general American speech. Spanish, Italian, German, and French pronunciation. Prereq: Speech 2311. F, W

4020 Radio Production (3) Study of radio productions, past and present. Familiarization with production tools and techniques. Group and individual production activities. Prereq: 2750 or consent of instructor. Cannot be taken for graduate credit by communications majors. E

4030 Television Production (3) Overview of elements of television production: camera, sound, lighting, film, videotape recording, optics, and studio control centers. Presented with the layperson and professional broadcast student in mind. Prereq: 4020 or consent of instructor. Cannot be taken for graduate credit by communications majors. E

4040 Advanced Television Production (3) A self-instructional course in program origination, production, directing and performing with orientation to the professional broadcast student. Prereq: 4030 or consent of instructor. Sp

4100 Broadcast News Operation (3) Theory and practice in covering local news and public events associated with radio and television. Gathering and production of news broadcasts, using tools of broadcast newsgathering. Prereq: 3610 and 3700 or consent of instructor. 2 hrs and 1 lab. Sp

4670 Radio-Television Management (3) Business policies and practices of networks and stations. Departmental functions, cost and income figures, sales techniques, promotion, advertising agencies, and governmental regulations. Lectures by commercial broadcasters. Prereq: 2750 or consent of instructor. F, Sp

4680 Broadcast Sales Management (3) Problems and practices of television and radio sales. Case studies in sales development pricing, promotion, and related aspects of sales management. Prereq: 2750 or consent of instructor. Sp

5410 Educational Broadcasting (3) Summary, analysis, application, and evaluation of television and radio broadcasting for educational purposes. Sp

5510 Creative Projects (3) For students having specialized broadcasting interests or those who wish extensive directed study in creative writing or production projects. May be repeated. E

5610 Public Affairs Broadcasting (3) News and public affairs function in broadcasting stations and networks, including management, economics, personnel utilization, sources of program materials, ethical and legal aspects, and development, particularly press conferences, interviews, and news specials. Prereq: 4100 or consent of instructor.

5620 Broadcast Law and Regulations (3) Sociopolitical control of broadcasting: effect of laws, regulations, and public pressures upon station policies. Prereq: 3610 or consent of instructor.

5630 Broadcast Documentary Writing (3) Role of documentary in radio and television. Research, writing, and criticism of documentary programs. Sp

5650 Radio-Television Program Development (3) Planning basic program structures for broadcasting stations. Historical trends in programming and current programming practices as related to audience requirements, governmental policy, and competitive conditions. Individual studies of program development on both local station and network levels. Prereq: 2750 or consent of instructor. Su, F

5970 Independent Study (3) E

School of Journalism

Professors: J. A. Crook (Director), Ph.D. Iowa State; J. C. Cady, Ph.D. Iowa; J. B. Haskins, Ph.D. Minnesota; J. Hoherberg, B. Litt. Columbia; B. K. Lefler, Ph.D. Southern Illinois; J. R. Lynn, Ph.D. Southern Illinois

Associate Professors: J. N. Adamson, M.S. Tennessee; P. G. Ashdown, Ph.D. Bowling Green; C. A. Everett, Ph.D., Iowa; E. F. Shaw, Ph.D. Stanford; F. B. Thompson, M. A. Florida.

Assistant Professor: J. P. McKerns, Ph.D. Minnesota

3120 Writing Feature Articles (3) Selection of topics and practice in writing feature articles for newspapers, magazines, and company publications. Prereq: 2220 or consent of instructor.

3410 Communications Law (3) Statutory law and judicial precedents affecting mass communications. Emphasis on the first amendment and invasion of privacy. Prereq: 2220 or consent of instructor.

3710 Public Relations (3) Theories and principles of public relations. Overview of PR as a management tool of business, government, institutions, and organizations. Cannot be taken for graduate credit by communications majors.

3720 Advanced Public Relations (3) Preparation of communications materials to gain support from various publics. Presentation of public relations programs. Prereq: 3710. F, Sp

3810 Specialized Publications (3) Editorial and design considerations for company publications and small magazines. Prereq: 2220 or 3310 or consent of instructor. W, Sp

3990 Journalism Research Methods (3) Use of social science research methods in journalism with emphasis on survey techniques. Interpretation and communication of research findings to public. W, Sp

4130 Editorial Writing (3) Analysis of editorial policies, practices, pages. Writing of editorials and columns, with emphasis on study and use of rhetorical devices and logic.

4150 Issues in Journalism (3) Topics vary. May be repeated. Maximum 6 hrs.

4310 Reporting Public Affairs (3) Reporting news of courts, politics, and government. State, county and local coverage. Prereq: 2220 and senior standing. F, Sp

4400 Mass Media and Society (3) Roles and responsibilities of mass media in society. Critique of mass media performance. Media codes and controls on the media.

4420 Newspaper Management (3) Daily and weekly business operations. Developments in newspaper management. Sp

4560 Investigative Reporting (3) Investigative and interpretive reporting of complex or specialized subjects to place news in perspective or to clarify situations. Emphasis on writing for publication. Prereq: 2220. W

4710 Public Relations Cases (3) Case studies and application of public relations principles to problems in business and industry, government, institutions, trades and professions; solving problems in public relations situations. Prereq: 3720. Sp

4810 Journalism in the High School (3) Functions and methods of high school publications. Staff organization, writing and editing techniques, editorial problems, and business management. Su

4910 News and Feature Photography (3) Advanced principles and methods in black-and-white photography. Emphasis on news and feature photographs, and picture stories. Prereq: 3910 or consent of instructor.

4950 International Communications (3) Communication of news and opinion among nations and under varying types of political and economic systems: world news organizations, the press as a factor in international affairs; barriers to the flow of information; comparison of world press systems. F

4970 Independent Study (3) May be repeated. Maximum 6 hrs.

5210 Government and the Press (3) Historic and current problems in the relations of executive, judicial, legislative, and regulatory segments of government and press. Prereq: 3110 or consent of instructor. W

5250 Public Opinion and Mass Media (3) Nature of public opinion with emphasis on role of press in its formation and how the press in turn is influenced by public opinion. Prereq: 4410 or consent of instructor. W, Su

5510-20-30 Writing and Editing Projects (3, 3, 3) Specialized writing or editing interests, such as agriculture, politics, labor, finance, science, for technical as well as general publications. Prereq: 2220 or 2230.

5560 Magazine Article Writing (3) Techniques of writing in-depth articles for mass circulation magazines. Organizing and presenting material. Problems in specialized areas, such as, business, science, agriculture, the humanities. Prereq: 3120 or consent of instructor. Sp

5710 Studies in Public Relations Communications (3) Problems of communication between institutions and organizations and their publics. Case histories and evaluations of programs. Prereq: 3710 or consent of instructor. Sp

5810 Magazine Editing and Production (3) Analysis of current and production problems of general, regional, and specialized publications. Reader interest evaluation, individual editorial projects. Prereq: Consent of instructor. F

5950 Communications and International Development (3) Seminar emphasizing mass media in national and international development. Communications and change in developing countries. Problems in international and cross-cultural communications. Prereq: 4950 or consent of instructor.

5970 Independent Study (3)
College of Education

William H. Coffield, Dean
E. Dale Doak, Associate Dean for Undergraduate Programs
Helen B. Watson, Associate Dean for Graduate Studies
Madge M. Phillips, Director, School of Health, Physical Education, and Recreation
Charles M. Peccolo, Director, Bureau of Educational Research and Service

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

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

The College of Education, through the Graduate School, offers programs leading to the Master of Arts in College Teaching, the Master of Science degree, the Specialist in Education degree, and the Doctor of Education and Doctor of Philosophy degrees.

M. SCIENCE

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

SPECIALIST IN EDUCATION DEGREE

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

DOCTORAL DEGREES

The College of Education offers programs of advanced study leading to the Doctor of Education degree in the major areas listed on page 8, and to the Doctor of Philosophy degree in Health Education.

Bureau of Educational Research and Service

Four major types of activities—research, development, educational services, and publications—are channeled through the Bureau of Educational Research and Service (BERS), located in Claxton Education Building. The research activities relate to the development of research proposals, conducting 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 administrative training programs. Official publications of the College of Education are developed through the Bureau. A limited number of graduate student assistantships are available.

The Educational Opportunities Planning Center and the School Planning Laboratory are integral parts of the Bureau of Educational Research and Service.

EDUCATIONAL OPPORTUNITIES PLANNING CENTER

The Educational Opportunities Planning Center (EOPC) works with school districts in the Tennessee-Kentucky area to help meet their desegregation and sex discrimination needs by assisting with needs assessment and by helping develop plans to meet the needs. Staff members provide in-service training for local district personnel. Such training is directed toward solutions of curricular, human relations, and other types of problems created or compounded by school desegregation and sex discrimination. On-site evaluation of locally installed practices and continuing cooperative evaluation of the progress of local programs are additional major efforts. This program is funded by the U.S. Office of Education.

SCHOOL PLANNING LABORATORY

The School Planning Laboratory (SPL), located in Claxton Education Building, assists schools and colleges in integrating curriculum offerings with architectural designs, organizing regional institutes to promote innovative construction concepts, encouraging full staff utilization to secure an optimal learning environment, facilitating renovative projects within existing buildings, and conducting custodial clinics on proper maintenance techniques. Course work relating specifically to school planning is offered through the Department of Education Administration and Supervision, while two-year graduate assistantships are under the administrative auspices of the Laboratory.

Departments of Instruction

Art and Music Education

C. H. Ball, Head

Art Education

MAJOR

DEGREE

M.S.

Art Education

Professor:
J. W. Robertson, Ed.D. Columbia.

Associate Professor:
H. N. Hull, Ed.S. Peabody.

Assistant Professors:
P. Johansen, Ed.D. Indiana;
J. P. Watkins, M.S. Tennessee.

The Master of Science degree in Art Education is offered for art teachers, supervisors, and art-trained persons holding
Moreover, it is possible to achieve Tennessee provides both thesis and non-thesis options. The program electives 18 hours as follows:

| Quarter hours | 1. Art Education 5310, 5320, and electives | 18 |
| 2. Education Curriculum and Instruction 5600, and electives | 9 |
| 3. Minor (selected with committee) | 9 |
| 4. Thesis (Art Education 5000) | 9 |

The non-thesis option requires 45 quarter hours as follows:

| Quarter hours | 1. Art Education 5210, 5310, 5320, and electives | 21 |
| 2. Education Curriculum and Instruction 5600, and electives | 9 |
| 3. Minor (selected with committee) | 9 |
| 4. Electives | 6 |

The thesis option requires satisfactory completion of an oral examination prior to awarding the degree, while the non-thesis option requires satisfactory completion of a final written comprehensive examination. Both the oral and written exams are conducted by the student’s Master’s degree committee.

Not all courses in art education are offered regularly each quarter, so the student should plan his or her program carefully with a faculty advisor.

3210 Art in the Secondary School Program (3) Program planning; materials and equipment; relation to other school experiences. Classroom observation. Prereq: 9 hrs art education. 1 hr and 2 labs. F, Sp

3920 Clay in School Program (3) Exploring methods of hand-built forms, glazing and firing procedures. Prereq: 2100. 1 hr and 2 labs. F, Sp

3930 Textiles in School Program (3) Exploration of processes of weaving, stitching, batik, and silk screen. Prereq: 2100. 1 hr and 2 labs. F, Sp

410 Designing of Teaching Aids for Art in School Program (3) Design and preparation of charts, exhibitions, slides, films, and other teaching aids for guidance of the student in the selection of 2100 or consent of instructor. 1 hr and 2 labs. W, Su

4130 Three-Dimensional Design in School Program (3) Exploration of wood, wire, metal, plastics, and other materials and materials. Prereq: 2100 or consent of instructor. 1 hr and 2 labs. F, Sp

4150 Lettering, Posters, and Displays in the School Program (3) Design and layout; techniques and procedures. Prereq: 2100 or consent of instructor. 1 hr and 2 labs. W, Su

4160 Appreciation of the Arts in the School Program (3) Prereq: 2100 or consent of instructor. 1 hr and 2 labs. Su

4350-60-70 Problems in Art Teaching (3, 3, 3) Prereq: Consent of instructor. E

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a 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

5210 Organization, Administration, and Supervision in Art in the School Program (3) W

5310 Art in Education (3) Historical background, current philosophy, theory, and trends; nature and function of aesthetic behavior in visual arts; relations to psychology, socioology, and anthropology. F

5320 Program Development in Art Education (3) Objectives, organization, content selection, facilities, and equipment; supervision; evaluation; professional growth; leadership and community relationships; art for special student. Sp

5850-60-70 Problems in Art Education (3, 3, 3) Prereq: Consent of instructor. E

Music Education

MAJOR

Music Education M.S.

DEGREE

Professors:

C. H. Ball (Head), Ph.D. Peabody; A. W. Humphreys, Ed.D. Illinois; W. J. Julian, Ph.D. Northwestern.

Associate Professors:


Assistant Professor:

M. C. Moore, Ph.D. Michigan.

Thesis and non-thesis programs lead to the Master of Science degree in music education. Prerequisite preparation: undergraduate degree is completed. All graduate students in music education must pass proficiency examinations in music theory and applied music.

Requirements for thesis program: 45 quarter hours as follows:

1. A major: at least 27 quarter hours in music education.

2. Evidence of ability to understand and interpret research through completion of:

a. Curriculum and Instruction 5610 or equivalent.

b. Music Education 5710.

c. Satisfactory performance of research activities in required courses in music education listed below.

3. Curriculum:

a. At least 27 quarter hours in music education.

b. A minor: at least 15 quarter hours in music education.

c. 9 quarter hours in professional education including: One seminar (3 hours), Curriculum and Instruction 5610 and Educational Psychology 4760 or equivalents and a 3-hour elective.

With the exception of the required courses listed and with approval of the student’s advisor, courses may be selected (15 quarter hours) including:

One seminar (3 hours), 5210, 5240, 5250, 5710.

b. Music: Six quarter hours in applied music (piano; voice; a band or orchestra instrument; or theory and composition).

c. Education (limited elective of 6 quarter hours): Educational Psychology 4760 or 5050, 5320, or other appropriate course in educational psychology with 3 hours credit.

d. Electives (with approval of advisor):

a. Music Education: 12 credit hours from courses numbered 5000.

b. Music: 9 credit hours from courses at the 3000, 4000, or 5000 levels. No courses required in the undergraduate curricula may be included.

c. Education: 3 credit hours, elected from other departments in Education.

Evaluation (in addition to routine examinations in courses):

a. Written comprehensive examination in major and minor fields.

b. The student shall elect one of the following programs below (with approval of advisor and committee):

(1) Oral examinations in major and minor fields.

(2) A public recital in principal instrument, piano, or voice.

(3) The presentation in public performance of an original musical composition(s) accepted by the committee as music suitable for school music performing groups.

(4) Plan, rehearse and conduct a full public performance of music by junior or senior high school music groups. This shall be worked out as a long-term project under the supervision of the student’s committee.

(5) Student’s Commitment. A minimum of three faculty members—the advisor from music education; one member from music; one member from education.

4441-42-43 Teaching Class Piano (1, 1, 1) For majors in music, music education, or instrumental music education. Prereq: Consent of instructor. F, W, Sp


4460 Marching Band Techniques (3) Functions, organization, and direction of a school marching band. Prereq: Consent of instructor. Coreq: 3511. F, Su

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a 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

5150 Studies in Secondary School Music (3) Development of understandings regarding growth patterns and processes through music experiences; cultural and community influences on secondary school music programs in administration and teaching of music in secondary school; relationship of music with humanities in curriculum. Sequel to 3150.

5210 Psychological Foundations of Music (3) Perception; function; aesthetics; talent measurement; implications for teaching theory and practice. A review of classical and current experimental studies. Prereq: Consent of instructor. Su

5220 The Administration and Supervision of School Music (3) Improvement of teacher-learning, child-learning process in music education. Problems of supervision, research, and in-service education, teacher preparation, and guidance.

5230 Comparative Teaching Procedures in Music Education (3) Modern teaching theories and their implications.

5240 Evaluation Procedures in Music Education (3) Tests, measurements, and evaluation of musical development of students at all levels. Standard educational measurements and teacher-made tests applicable to music and specialized evaluative techniques for use in classroom situations. Uses of musical aptitude and achievement tests. Statistical measures applied to learning music. Prereq: General psychology, educational psychology, and elementary statistics. Su

5250 The Role of Music in Education (3) For school personnel, other than music teachers, on the role of music in public education. No previous experience in music required. Su
5360 Music for Early Childhood (3) Prereq: 3120 or 3130 or consent of instructor.

5370 Studies of Music for Children in the Primary Grades and for Early Childhood Education (3) Prereq: 3120 and 3130 or consent of instructor.

5320 Advanced Choral Literature and Conducting (3) Reading, conducting, and interpreting vocal scores suitable for school, college, church, and community groups; emphasis on contemporary and standard major choral works. Prereq: Undergraduate degree with a major in music or music education; 4520 or equivalent.

5350-60-70 Special Problems in Music Education (3, 3, 3) Current problems in music education at all levels of instruction and in various specialized areas of music curriculum. Prereq: 5710 or equivalent and consent of instructor. E

5410 Advanced Band Literature and Conducting (3) Reading, conducting, and interpreting band scores suitable for school, college, church, and community groups; emphasis on contemporary and standard band literature. Prereq: Undergraduate degree with a major in music or music education; 4330 or equivalent.

5510-20-30 The Talent Education Program of Shinichi Suzuki (2, 2, 2) Study of the psychology, procedures and literature utilized by Shinichi Suzuki in Talent Education program in Japan. Prereq: Consent of instructor. F, W, Sp

5710 Research in Music Education (3) Prereq: Consent of instructor. Su


5820 Seminar (3) Music teaching in vocal and general music areas of junior high school curriculum. Survey of research, professional literature and development of bibliography. Laboratory activities. Projects. Prereq. Admission to M.S. program.

5830 Seminar (3) Music teaching in instrumental areas of the elementary, junior high, and senior high curricula. Survey of research, professional literature and development of bibliography. Laboratory activities. Projects. Prereq. Admission to M.S. program.

5840 Seminar (3) Music teaching in vocal, theoretical, historical, and appreciation area of the secondary school curriculum. Survey of research, professional literature and development of bibliography. Laboratory activities. Projects. Prereq. Admission to M.S. program.

Continuing and Higher Education

MAJOR

DEGREE

Adult Education

M.S.

MAJORS

Curriculum and Instruction

M.L. M. S.

DEGREES

End Ed.

Elementary Education

M.S.

English Education

M.S.

Foreign Language Education

M.S.

Instructional Materials

M.S.

Mathematics Education

M.S.

Science Education

M.S.

Social Science Education

M.S.

Professors:


Associate Professors:


Assistant Professors:


Dean:

J. L. Bell, Ed.D. California (Berkeley)

Associate Dean:

E. S. Christensen, Ed.D. Colorado

Programs:

Curriculum and Instruction

M.S.

MAJORS

Curriculum and Instruction

M.S.

END EDUCATION DEGREES

End Ed.
quarter hours of graduate study. If the student has earned the Master's degree, a maximum of 45 hours of the Master's work may be credited toward the Ed.D. degree requirement. (45 hours of 5000-level courses are required.) The program must also include the following:

1. A minimum of 12 hours taken in one of the eight areas listed below.
2. At least 12 hours taken within the College of Education in areas other than the student's major area.
3. A minimum of 12 hours taken outside the College of Education.
4. A minimum of 12 hours earned through the writing of a thesis. (Students who have written a thesis for the Master's degree may be exempted from a thesis in the Ed.D. program provided, in the judgment of the student's committee, the thesis meets the standards of research appropriate for the Ed.D. degree.)
5. A minimum of 45 elective hours taken according to a plan jointly developed by the student and the major professor in terms of the student's professional goals.

THE DOCTORAL PROGRAM

The doctoral major in Curriculum and Instruction may include emphasis upon the following fields: curriculum, social foundations, educational research, elementary education, English education, foreign language education, mathematics education, science education, social science education.

For further information, write the Department of Curriculum and Instruction.

4010 International Education: Europe and the Americas (3) Historical, philosophical, and sociological foundations; special reference to England, USSR, France and Germany.

4110 Education in Cultural Perspective (3) Contribution of anthropological concepts (primarily concepts of culture) to understanding of education processes, problems, and thought in our society and others. (Same as Anthropology 4110.)

4111 Non-Western Education: Anthropological Approaches (3) (Same as Anthropology 4111.)

4150 School Library Administration (3) (Same as Library and Information Science 4150.)

4210 Curriculum in Elementary School Social Studies (3) Survey of current curricular approaches and trends in elementary school social studies. Prereq: Teaching experience or student teaching. May be repeated. 6 hrs can be taken in the degree requirements. May be repeated. 6 hrs can be taken in the degree requirements. May be repeated.

4215 Teaching Elementary School Science (3) Methods and materials used in teaching science in elementary school. Developmental and diagnostic/corrective programs. Not open to students with recent course or background in teaching elementary science.

4216 Teaching Elementary School Mathematics (3) Methods and materials used in teaching mathematics in elementary school. Developmental and diagnostic/corrective programs. Not open to students with recent course or background in teaching elementary school mathematics.

4217 Teaching Elementary School Language Arts (3) Methods and materials used in teaching language arts in elementary school. Development and diagnostic/curriculum-referenced programs. Not open to students with recent course or background in teaching elementary language arts.

4240 Classroom Instructional Organization (3) Developing understandings and skills relating to group development, classroom organization, grading, integration, and achieving an effective social environment. For elementary classroom teachers. Prereq: Senior standing.

4250 Initiating the Activities Program (3) Prereq: Educational Psychology 2430, 6 hrs of methods of teaching in elementary school.

4260 Philosophy of Education (3) Truth, knowledge, and value in educational processes and institutions. Prereq: 3010, Educational Psychology 2430 or 3810, or equivalent. E

4261 Educational Classics (3) Discussion of selected writings on education, with emphasis on Dewey.

4262 Diagnosis and Correction of Classroom Reading Problems (3) Prereq: 3380 or equivalent. E

4300 Developmental Reading in Secondary School and Community College (3) Approaches and materials for teaching basic reading skills and organizing classrooms and/or laboratories at middle school, secondary school, and community college level. Prereq: Consent of instructor.

4301 Teaching Developmental Reading (3) Methods and materials used in teaching reading in the elementary school. Includes development of functional relationships with other curriculum areas, diagnostic procedures and remedial work. Not open to students with recent course work or background in the teaching of reading. E

4303 Language Development of Children: Birth-Preadolescence (3) In-depth view of language development from birth through preadolescence; application of process of language development to instructional programs for early and middle childhood.

4304 Developing Reading Skills in Content Fields (3) Approaches and techniques for teaching reading sharing in content areas of school program. Emphasis on middle school and secondary school programs. Prereq: Consent of instructor.

4340 The Junior High School and Middle School (3) To identify and analyze distinguishing characteristics of the Junior High and Middle School curriculums.

4350-60-70 Problems in Teaching English (3, 3, 3)

4351-61-71 Problems in Teaching Mathematics (3, 3, 3)

4352-62-72 Problems in Teaching Social Studies (3, 3, 3)

4353-63-73 Problems in Teaching Science (3, 3, 3)

4354-64-74 Problems in Teaching Language Arts (3, 3, 3)

4355-65-75 Problems in General Curriculum (3, 3, 3)

4356-66-76 Problems in Instructional Materials (3, 3, 3)

4357-67-77 Problems in Teaching Foreign Languages (3, 3, 3)

4359-69-79 Problems in Teaching Conservation (3, 3, 3)

4381 Problems in Early Childhood Education (3) May be repeated. Maximum 9 hrs. 6 hrs can be taken concurrently.

4400 Problems in Improvement of Instruction (1-3) Special conferences, workshops, or in-service programs designed for improvement of instruction. May be repeated. Maximum 9 hrs. S/NC only.

4410 Educational Sociology (3) (Same as Sociology 4410.)

4450 Teaching in Kindergarten: Overview (3) Relationship of kindergarten to total elementary program; goals; historical settings and current developments.

4451 Teaching in Kindergarten: Program Development (3) Curriculum planning and organization; classroom management. Prereq: Consent of instructor. E

4630 Current Educational Problems (3)

4654 Programs, Methods and Materials in Environmental and Science Education (3) Instructional materials, teaching methods, curricular programs and issues in environmental and science education.

4750 Utilization of Instructional Media (3) Introduces the basic communications process, need for instructional media, instructional development, selection and utilization of media, and basic software production techniques. (Same as Library and Information Science 4750 and Vocational-Technical Education 4750.) E

4840 Introduction to Data Processing in Education (3) Analysis of current activities in field of data processing. Emphasis on hardware, administrative, and research opportunities in data processing, using modern electronic data processing machines and machines within the scope of the class.

4860 Programmed Learning (3) Theories of learning as related to technology of programmed instruction; techniques and applications of programming. Prereq: Psychology 3210, Educational Psychology 3730, or consent of instructor. (Same as Psychology 4860.) 2 hrs and 1 lab.

5000 Thesis (1-15 E)

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a 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

5040 Seminar in Elementary School Language Arts (3) Analysis of current issues related to elementary school language arts education. Emphasis on individual student presentations, projects, and investigations. Prereq: At least 1 yr teaching experience (K-9) or consent of instructor.

5070 Seminar in Intercultural Education (3) Analysis of selected problems: political factors in creation of educational policy; social stratification and its effects on education in elite and mass societies; related to education to manpower planning and technological change; and others.

5100 History of European Education (3) Ancient Greece to development of national school systems.

5110 History of Education (3) Foundations for American education. E


5140 Comparative Philosophies of Education (3) Educational theory and policy proposals of the major historical and current educational schools of thought. Prereq: 4260 or equivalent.

5141 Pragmatism in Education (3) Effects of American pragmatist tradition on educational policy and practice. Prereq: At least one course in history or philosophy of education.

5142 The Existential Student (3) Literature of existentialism as source for harmonizing student's educational potential and career. E

5143 Supervised Readings in Philosophy of Education (3) Prereq: At least 9 hrs history or philosophy of education.

5150-60-70 Seminar in 1-3, 1-3, 1-3 Curriculum, elementary education, secondary education, or social foundations as they relate to goals of student's programs. Maximum 9 hrs. S/NC only.

5180-90-200 Seminar: Educational Specialist Research and Thesis (3, 3, 3)

5210 Seminar in International Education: Asia and Africa (3) Historical, philosophical, and sociological foundations; special reference to Japan, China, India, and Nigeria.

5211 Instructional Strategies in Elementary School Social Studies (3) Special topics in teaching methods and instructional procedures for organizing social studies learnings. Prereq: Undergraduate social studies course or equivalent.

5220 Supervised Readings in International Education (3) Supervised readings and research in any area of international education, with emphasis on historical, philosophical and sociological foundations. Prereq: Consent of instructor.

5230 Diagnosis and Remediation of Arithmetic Difficulties (3) Problems in learning arithmetic concepts, methods, and strategies for diagnostic teaching of arithmetic. Prereq: 5290 or 5825, or consent of instructor. F, Su

5240 Creative Thinking and Expression in the Elementary School (3) (Gives students opportunity...
5250 Secondary School Instruction (3)
5270 The Elementary School Curriculum (3)
5250 The Teaching of Language Arts in the Elementary School (3) Prerequisite: 1 yr teaching experience in content and method for the language arts program, grades 1-8. Prereq: 3260 or consent of instructor.
5281 Teaching Social Studies in the Elementary School (3) Recent trends, issues, and research findings. Credit cannot be earned for both 5281 and 5282.
5282 Teaching Science in the Elementary School (3) Trends, issues, and research in content and method for elementary program.
5283 Programs and Materials in Teaching Elementary Science (3) Analysis of new and innovative science program materials, instructional strategies inherent in teaching of these materials. Prereq: 5282 or equivalent, or consent of instructor.
5284 Seminar in Teaching Elementary Science (3) Analysis of issues and problems of elementary science education. Emphasis on individual student presentations, projects, and investigations. Prereq: 5270, 4215, or 5282 or equivalent, or consent of instructor. At least 1 yr teaching experience (K-6).
5290 The Teaching of Mathematics in the Elementary School (3) Trends, issues, and research in content and method for mathematics program, grades 1-6. Prereq: 3350 and Mathematics 2110-20-30 or consent of instructor.
5291 Programs and Materials in Elementary School Language Arts (3) Programs and special instructional aids associated with language arts. Prereq: 5282 or equivalent, or consent of instructor.
5292 Seminar in Research and Theory in Teaching Mathematics in the Elementary School (3) Systematic study of research and theory and their application to teaching of mathematics. Prereq: 3350 or equivalent, consent of instructor, and 1 yr of teaching experience.
5302 Psychology of Reading (3) The reading act, relationship between learning theory and reading, role of reading in child's intellectual development. Prereq: Undergraduate reading course or consent of instructor.
5303 Methods and Materials for Teaching Critical Reading (3) Instructional techniques, methods, and materials for development of higher level comprehension skills, concepts, and attitudes for creative (or productive) and critical (or evaluative) reading. Prereq: 3280, 4300, 4301, or at least one course in the fundamentals of teaching.
5304 Programs and Materials for Reading Instruction (3) Examination, selection, and use of materials in reading program, distinguishing between approaches and materials for teaching reading. Prereq: 3281 or 4302 or consent of instructor.
5305 Trends and Issues in Teaching Reading (3) Critical analysis of new programs, materials, innovations, and developments in reading. Prereq: An undergraduate course in reading or consent of instructor.
5306 Teaching Reading to the Linguistically Different Learner (3) Language characteristics and special reading problems pertaining to linguistically different learner. Prereq: Undergraduate reading course, 4300 or 4301 or consent of instructor.
5307 Assessment and Correction of Classroom Language Arts Difficulties (3) Classroom approaches to assessing and correcting language arts (other than reading) difficulties. Prereq: 5440 or 5260.
5350 Curriculum Development and Evaluation (3)
5360-70 Curriculum Development in the Local School (3, 3)
5365 Mathematics Laboratories in Elementary School (K-6) (3) For elementary school teachers dealing with activity-oriented mathematics laboratory materials and pedagogical strategies. Theoretical considerations and development of curriculum and materials for laboratory. Prereq: Consent of instructor. Sp, Su
5360 Diagnosis of Remedial Reading Problems (3) Prereq: 4260.
5361 Remediation of Remedial Reading Problems (3) Prereq: 5360 or consent of instructor.
5362 Development Reading Practice (3) Diagnosing and teaching children having developmental and receptive reading needs. Prereq: 4260.
5363 Remedial Reading Practice (3) Prereq: 5361.
5370 Organization and Administration of Reading Programs (3)
5410 The High School Curriculum (3) Theoretical background and experimental approaches.
5530 Curriculum Laboratory for High Schools (3) Production of syllabi, courses of study, source units, and other materials.
5540 Curriculum Planning and Development (3)
5610 Educational Statistics (3)
5620 Problems in Direction and Supervision of Student Teaching (3)
5630 Practicum in the Individualization of Instruction (3) Prereq: 4810-20.
5640 Newer Trends in Elementary Education (3) Trends in classroom procedures, equipment, and materials of instruction; problems involving improvement of instruction. W, Su
5650-60 Curriculum Laboratory for Elementary Schools (3, 3) Production of syllabi, courses of study, source units, and other materials.
5670 Curriculum Laboratory for Early Childhood (3) Sp, Su
5680 Teacher-Parent-Community Relations (3) Development of techniques for effective relations between parents and teachers. Roles and expectations of parents and teachers, parent involvement, and influence of community on educational process. W
5690 Design of Instructional Media (3) Design and application of instructional development module to arrive at solutions to instructional problems, development and design of a learning sequence or module, using appropriate media in actual learning setting. Prereq: 4750 or consent of instructor.
5691 Advanced Production of Audiovisual Software (3) Lettering, overhead projectuals, mounting, presentation, photography, non-photographic slides, and videotaping for producing classroom audiovisual software. Prereq: 5690 or consent of instructor. Library and Information Science 4750 or equivalent. (Same as Library and Information Science 5691.)
5692 Evaluation of Instructional Media (3) Evaluating and recycling media prototype to meet needs and objectives of learners. Prereq: 5691 or consent of instructor.
5693 Administering Instructional Media Programs (3) Duties, functions, and responsibilities of media professionals developing and administering media program in various organizational and learning settings. Prereq: 5691, 5692, or consent of instructor.
5694 Utilization of Educational Television and Radio (3) Uses of commercial and educational TV and radio in schools and colleges. Prereq: Consent of instructor.
5695 Research in Instructional Media (3) Media research and evaluation toward improvement of instruction and learning. Prereq: Consent of instructor.
5696 Practicum Experience in Instructional Media (3) Practicum experience in professional media role as identified by student in various organizational and learning settings. Prereq: Consent of instructor.
5710 Techniques of Research in Education (3) Study and analysis of research and research methods.
5720 Classroom Observation and Analysis (3) Classroom observation and analysis procedures, development of objective observation and analysis skills, examination of existing observation systems.
5750 Career Development: Workshop (1-6) (Same as Educational Psychology 5750).
5800 Seminar in Cooperative Curriculum Research (3) Action research procedures and their application to programs. E
5820 Seminar in the Teaching of Mathematics (3) Analysis of teaching strategies related to subject matter and learner problems. Student presentations initiate discussion sessions. Prereq: At least 1 yr teaching experience (mathematics grades 7-12) or consent of instructor. Sp
5825 Teaching Mathematics in the Middle and Junior High School (3) Problems related to teaching mathematics in middle and junior high schools. Understanding structure of mathematical concepts, strategies, methods, and materials for teaching. Materials suitable for individualized instruction, mathematical laboratories, and independent study. Opportunities for individual projects. Prereq: 3350 or 3751-52 or equivalent. W
5830 Seminar in Mathematics Education (3) Current curricular issues. Emphasis on individual student projects and investigation.
5835 Teaching Mathematics in the Senior High School and Community/Junior College (3) Curriculum, teaching methods in teaching mathematics. Planning, 'analysis' courses such as Algebra II, trigonometry, analytic geometry and calculus. Prereq: 5751-52 or equivalent. W
5841 Trends and Issues in Early Childhood (3) Historical background, trends, and issues as basis for evaluating current programs; materials and techniques of teaching.
5842 Problems in Education: Early Childhood Education (3) May be repeated. Maximum 9 hrs. Six hrs may be taken concurrently.
5843 Seminar in Early Childhood Education (3) Analysis of research in early childhood education (K-3) with emphasis on application to programs and methods of instruction. Prereq: 5710 or 5600 or equivalent.
5844 Mathematics in Early Childhood Education (3) Behavioral characteristics of children in regard to mathematics, content materials and functional instructional settings, and teaching strategies for development of mathematical ideas. Prereq: 3350 or equivalent. W
5845 Social Studies and Science in Early Childhood Education (3) Integrative approaches to and substantive classification systems of content areas of social studies and science for early childhood education. Emphasis on application of appropriate social studies and science content and approaches for the young child. Prereq: 3270 and 3720 or equivalent. F
5846 Language Arts in Early Childhood Education (3) Language development of young learner with emphasis on teaching methods, procedures, program materials, and instructional strategies. Programming. Prereq: 3260 and 3260-81 or equivalent. W
5850-60-70 Problems in Education: English (3, 3, 3)
5851-61-71 Problems in Education: Mathematics (3, 3, 3)
5852-62-72 Problems in Education: Social Studies (3, 3, 3)
5853-63-73 Problems in Education: Science (3, 3, 3)
5854-64-74 Problems in Education: Language Arts (3, 3, 3)
5855-65-75 Problems in Education: General Curriculum (3, 3, 3)
5856-66-76 Problems in Education: Instructional Materials (3, 3, 3)
5857-67-77 Problems in Education: Foreign Languages (3, 3, 3)
5859-69-79 Problems in Education: Conservation (3, 3, 3)
5899 Field Experience (1-6) Application of curricular and instructional principles, methods, and materials in schools. Program prerequisites must be met.
and consent of instructor required. May be repeated. Maximum 12 hrs. S/NC only. 
5900 Seminar in the Teaching of English in the Secondary School (3) Su
5901 Linguistics and the Teacher of English (3) Analysis and application of linguistics in the classroom. Su
5902 Teaching Composition in the High School (3) Techniques for teaching rhetoric. W
5903 Teaching Fiction in the Secondary School (2) Reading, study, and analysis of literary selections. F
5904 Teaching the Mass Media in the English Classroom (3) Nature of mass media and importance to American education and life. Sp
5905 Teaching English in the Community-Junior College (3) Emphasis on thorough understanding of communication needs of community/junior college students and objectives, strategies, and materials for meeting these needs. Su
5906 Teaching Poetry in Grades 7-12 (3) Materials and strategies for teaching poetry. F
5907 Teaching Drama in Grades 7-12 (3) Strategies and materials for teaching drama. W
5908 Developing Speaking and Listening Skills in Grades 5-7 (3) Strategies for teaching skills of speaking and listening. Sp
5909 Instructional Theory and Design (3) For those individuals at Master's and doctoral levels who have interest in intensive study of instructional process and its relationship to curriculum and learning.
5910-20-30 Problems in Lieu of Thesis (3, 3, 3)
5911 Directing the Forensic Program (4) (Same as Speech 5911)
5912 Play Production in Secondary Schools (4) (Same as Theatre 5912)
5950 The Function of the Thinking Process in Education (3) Analysis of thinking process for purposes of tracing its implications for education theory and practice.
5960 The Teaching of Natural Science (3) Teaching strategies, testing and evaluation techniques, and professional guidelines for program planning in science.
5961 Seminar in Science and Environmental Education (3) Recent developments in science education of concern to classroom instruction. Particular emphasis on interrelationships of environmental factors on science education. W
5970 The Teaching of the Social Studies (3) Su
5980 Projects, Programs, and Materials in Social Studies (3) Projects and aids associated with each social science discipline. W
6000 Doctoral Research and Dissertation (3-15) E
6010 Studies in English Education (3) Reading and study in various areas of teaching of English, composition, language, and literature. Su
6020 Seminar in Teaching the Social Studies (3) Problems associated with classroom instruction in junior and senior high schools. Su
6030 Research and Theory in Teaching Reading (3) Research and theory in application to teaching of reading; research design as it applies to reading investigations. Prereq: Two 5000-level courses in reading. W
6031 Seminar in Reading and Language Arts (3) Topics new to broad area of language arts. Two topics each term chosen by need and instructor(s). Prereq: 5000-level course in reading and language arts. Su
6040 Seminar in Curriculum and Instruction (1) Required three quarters. S/NC only. E
6060 Advanced Study of Methodology in the Elementary School (3) (Continuation of 5640) Consideration to recent and current literature in field and to sound educational practices in guiding learning of children. Prereq: 5640 or consent of instructor. W
6080 Advanced Seminar in Philosophy of Education (3) Some selected philosophical issues in education. Prereq: At least 2 courses in history or philosophy of education.
6081 Phenomenology and Education (3) Selected philosophical issues in education. Prereq: At least 2 courses in history or philosophy of education.
6082 Philosophical Analysis and Education (3) Philosophical analyses of language concepts in educational research and writing. Prereq: At least 2 courses in history or philosophy of education.
6150 Education as Social Policy (3) Education as instrument of national or cultural well-being; problems faced by society in shaping educational program; comparisons of education in this country and in other nations. W
6210 Seminar in Elementary School Social Studies Research (3) Current research in elementary social studies, studies of research in field, needed research-related research from other fields. Prereq: Undergraduate course and one graduate course in social studies, or equivalent. Su
6230 Programs for Curriculum Improvement (3) W
6250 Seminar in History of Education (3) May be repeated with consent of instructor.
6282 Advanced Studies in Elementary School Science (3) Critical analysis of current research in elementary school science. Prereq: Graduate course and one graduate course in science, or equivalent.
6350 The Professional Education of Teachers (3) Basic theories, programs, and practices.
6400 The Dynamics of Educational Change (3) Causes of lag between educational theory and practice; factors useful in reducing this lag.
6500 Advanced Studies in Early Childhood Education (3) May be repeated. Maximum 6 hrs.
6510 Advanced Studies in Elementary School Language Arts (3) Critical research analysis of selected issues in elementary school language arts. Prereq: 5280 or equivalent and consent of instructor. Sp
6710 Advanced Educational Statistics (3)
6720 Interpretation of Data (3) Types of data in published materials in education: principles of sound interpretation.
6730 Theory and Evaluation in Curriculum Planning (3) Application of principles of evaluation to curriculum programs in elementary and secondary schools. Prereq: 5270 or 5410 or equivalent.
6731 Studies in Curriculum Theory and the Structure of Knowledge (3) Study of theories, models, and designs; structures of knowledge and structures of disciplines in elementary and secondary school programs. Prereq: 5270 or 5410 or equivalent.
6740 Curriculum Workshops in Instructional Improvement (3) Observation and participation in workshops sponsored by College of Education; evaluation of workshop approaches to teacher education and instructional improvement.
6750-60-70 Problems in Curriculum and Instruction (1, 3, 3)
6830 Studies in Mathematics Education (3) Reading and study related to historical trends and issues in mathematics education in United States providing broad perspective on current curriculum problems and future trends. Prereq: 5830 or consent of instructor.
6850 Principles of Educational Leadership (3) Conflict concepts, with application to major problems in instruction, supervision, and administration.
6899 Internship (1-6) Advanced level experiences in application of principles and practices of curriculum development and instructional improvement. Program prerequisites must be met and consent of instructor required. May be repeated. Maximum 12 hrs. S/NC only.

College of Education

Educational Administration and Supervision

DEGREES
M.S., Ed.S. Ed.D.

MAJOR
Educational Administration and Supervision

Programs are planned for (1) students preparing for administrative positions normally found in the educational structure of the state; (2) students preparing for the position of supervisor of education; (3) administrators and supervisors in service who wish to improve their professional competence; (4) students and teachers preparing for teaching positions involving administrative responsibilities; and (5) students preparing for teaching educational administration or for administrative positions in higher education.

In addition to M.S. and Ed.D. degrees, a special two-year graduate program is offered which leads to the Ed.S. (Specialist in Education) degree and which provides advanced preparation for applicants judged to be potentially competent school administrators.

5000 Thesis (1-15) E
5002 Non-Thesis Graduation Completion (3-15) Requirements for the non-thesis student not otherwise registered during any quarter when such a 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
5100 Internship in Educational Administration (3) May be repeated with consent of department. Maximum 6 hrs. F, W, Su
5130 Introduction to Educational Administration (3) Tasks, functions, and processes of educational administration; organization and structure of educational programs and institutions.
5180-200 Educational Specialist Research and Thesis (3, 3) E
5220 Philosophy and Theory in Educational Administration (3) Philosophical and theoretical foundations of educational administration, programs, and institutions, within the framework of American culture. F, W, Su
5230 Seminar in the Behavioral Sciences in Educational Administration (3) Key behavioral science concepts/constructs and their application in administration such as semantics, communication, leadership, change process, organizations and organizational behavior, motivation and morale, role theory. W, Sp, Su
5290 The Politics of Education (3) Special emphasis on leadership structures, operational beliefs, and communication of ideas with regard to community decisions concerning education. E
5310 School Administration and Civil Rights Issues (3) To help school administrators meet responsibilities and resolve problems stemming from civil rights legislation pertaining to race, sex, and the handicapped.

* Distinguished Service Professor.
5420 District Level Administration (3) Role of central administrative team, and relationships, behavior of executive leaders and professional staff to develop an effective school organization. F

5430 Building Level Administration (3) For beginning school principals and administrators, and for those training in rural, suburban, or consolidated schools. W, Su

5440 Introduction to Law, Finance, and Business Management at the Building Level (3) Orientation for beginning principals for basic foundations of the American legal system; how case law affects daily building level operations; building level methods of fiscal and logistical support measures. F, W, Su

5450 Organization of the School Program (3) For principals and supervisors; conceptual and technical skills in organizing school program including curriculum, instruction, student grouping, staff, schedules, and space. F, Sp, Su

5460 Personnel Administration: Local School (3) Planning personnel needs: job analysis; recruitment; selection; placement; orientation of new staff; full employment and compliance; and contract administration for both professional and supporting staff. W, Su

5470 Introduction to School Facility Planning (3) For school administrators; facility planning; skills in building planning, use and evaluation. F, Su

5480 Instructional Supervision—Local School (3) Developing a concept of supervision; instructional help and support; leadership; supervision of curriculum; staff development; and staff evaluation. F, Sp, Su

5530 Introduction to Educational Planning (3) Processes for improving decision-making function through both quantitative and qualitative planning techniques. Relating educational policy analysis to educational planning. F


5560 Research for Educational Administrators (3) Descriptive, experimental, and quasi-experimental designs to help student without quantitative background to read and understand technical literature. Primarily for nontechnical students. Should be taken early in M.S. or Ed.D. program. W, Su

5580 Seminar in Communication Skills for Educational Administrators (3) Identification, development, and use of interpersonal and group related communication skills. F, Sp

5711 Problems in Educational Administration and Supervision: School Operation (3) May be repeated. E

5712 Problems in Educational Administration and Supervision: Higher Education (3) May be repeated. E

5713 Problems in Educational Administration and Supervision: State School Administration (3) May be repeated. E

5714 Problems in Educational Administration and Supervision: Preparation Programs (3) May be repeated. E

5715 Problems in Educational Administration and Supervision: Community Education (3) Independent study of administrative problems. May be repeated. E

5721 Problems in Educational Administration and Supervision: Theory (3) May be repeated. E

5722 Problems in Educational Administration and Supervision: Finance (3) May be repeated. E

5730 Problems in Educational Administration and Supervision: Business Management (3) May be repeated. E

5740 Problems in Educational Administration and Supervision: Transportation (3) May be repeated. E

5750 Problems in Educational Administration and Supervision: Community Education (3) May be repeated. E

5758 Problems in Educational Administration and Supervision: School Law (3) May be repeated. E

5759 Problems in Educational Administration and Supervision: Supervision (3) May be repeated. E

5770 Maintenance of School Plants (3) Skills in operating school custodial and maintenance programs. Sp, Su

5810 Survey Research Methods (3) Overview of descriptive statistics, data collection, analysis, and interpretation for survey studies and school surveys, strategies for descriptive research in education. W, Sp, Su

5850-60-70 Independent Study in Educational Administration (3, 3, 3) Prerequisite: Consent of instructor. E

5890 Decision Making and Decision Theory in Educational Administration (3) Theoretical constructs undergirding executive decision making; direct application of decision theory problem-solving activities for preservice and practicing administrator. Executive decision making at several administrative levels in complex educational organization. S/NC only. A

5900 Special Topics (3) May be repeated. E

5910-20-30 Problems in Lieu of Thesis (3, 3, 3) E

5950 Elementary Administrators Seminar (3) For in-service training of elementary school administrators. Developments, problems, programs, and trends of the elementary school; theoretical constructs for elementary school administrators. Prerequisite: Presently an elementary school administrator or consent of instructor. May be repeated. S/NC only. F

5960 Middle School Administrators Seminar (3) For in-service training of middle school administrators. Developments, problems, programs, and trends of middle schools and management skills of middle school administrators. Prerequisite: Presently a middle school administrator or consent of instructor. May be repeated. S/NC only. F

5970 Secondary Administrators Seminar (3) For in-service training of secondary school administrators. Developments, problems, programs, and trends of secondary schools and associated management skills of secondary school administrators. Prerequisites: Presently a secondary school administrator or consent of instructor. May be repeated. S/NC only. F

6000 Doctoral Research and Dissertation (18-18) E

6040 Seminar in Educational Administration and Supervision (1) Required three consecutive quarters. S/NC only. E

6100 Internship in Educational Administration (3) May be repeated at discretion of student's commitment. Opportunity for advanced graduate students to gain experience in performance of critical tasks of educational administration under supervision of practitioner and University representative. E

6110 Administrator Update (3) Current topics of concern to practicing school administrators, selected each quarter and presented by a specialist. Prerequisite: Presently a school supervisor or administrator, or consent of instructor. May be repeated. S/NC only. E

6190 Administration in Higher Education (3) Developing conceptual understanding of administrative theory and practice in higher education. F, Sp

6220 Programs for the Professional Preparation of Educational Administrators and Supervisors (3) E

6340 Current Trends in School Law (3) Logical arrangement of case and statutory material for public school administration; in-depth examination of problems concerning the law and public education. W, Su

6380 Instructional Supervision—School District (3) Definition and analysis of instructional supervision at the school district level. Supervisory operations including goal development; curriculum development; instructional support, help, and service for teachers and administrators; personnel development; program evaluation. W, Su

6420 School Board-Supervision Relationships (3) The local unit of school administration, school organizations, the local school board, board of education or school board. Sp

6440 School Business Management (3) Emphasizes superintendency team concept; planning, procurement and utilization of fiscal resources. F, Su

6450 Grant and Contract Proposal Preparation (3) Grants and contracts processes in education. Basic concepts applicable to other special agencies. Sp

6460 School Personnel Administration (3) Personnel administration functions for professional and supporting staff in educational organizations. Recruitment, selection, performance of key personnel policies, employee wage and salary administration, fringe benefits, collective negotiations, human relations, staff development, and staff evaluation. F, W, Su

6480 Special Topics in School Personnel Administration (3) Human problems in school personnel administration; staff planning, record systems, personnel policy development; collective bargaining in education; and staff evaluation. May be repeated. Maximum 12 hrs. F, W, Sp

6530 Futuristic Educational Planning Methods (3) Methods for describing alternative futures. W

6540 Contemporary Economics and Educational Finance (3) Concepts, terms, policies and their influence on educational service and program, national economy, welfare of individuals, and the welfare of the nation. F, Su

6550 State-Federal Relations in Education (3) Purposes and functions of federal/regional/state/local educational agencies, organizational control and political variables. Major education laws, rules, and regulation-making process, grants and contracts as inter-level policy instruments. F, Su

6560 Legal Foundations of Public Education (3) Legal frameworks and theoretical concepts that impinge on operation of schools within present legal structure of the United States. Sp

6580 Seminar in Managing Conflict (3) Learning about and experiencing various forms of conflict. W, Su

6750-50-70 Independent Studies in Educational Administration and Supervision (3, 3, 3) Prerequisite: Consent of instructor. May be repeated. E

6800 Administration of Complex Educational Organizations (3) Concepts and theoretical formulations to understand, analyze, evaluate, and change complex educational organizations. W, Sp

6870 Advanced Study in School Facility Planning (3) Intensive exploration of educational facility planning and its impact on educational specifications and techniques of leadership in creation of quality educational facilities. W

6900 Special Topics (3) May be repeated. E

6981 Specialized Seminar: School Operation (3) E

6982 Specialized Seminar: Higher Education (3) Current policy development, organizational relationships, and administrative issues in higher education. W, Su

6983 Specialized Seminar: State School Administration (3) E

6984 Specialized Seminar: Preparation Programs (3) E

6990 Specialized Seminar in Politics of Education (3) Political theories and practices as they affect operation of educational agencies, ethical, political, and social issues. May be repeated. W, Su

6991 Specialized Seminar: School Administration (3) E

6992 Specialized Seminar: Finance (3) E

6994 Specialized Seminar: Business Management (3) E

6995 Specialized Seminar: Personnel (3) E

6996 Specialized Seminar: School Plant (3) Theory and practice in planning and operating educational facilities; related research in education and other
Educational Psychology and Guidance

MAJORS DEGREES
Guidance M.S.
College Student Personnel M.S.
Educational Psychology M.S.
Educational Psychology and Guidance Ed.S., Ed.D.

Professors: L. M. Caroliner, (Head); Ph.D. Michigan; S. C. Dietz, Ed.D., Arizona State; S. W. Huck, Ph.D., Oregon State; B. S. Lord, Ph.D., Indiana; E. W. McClain, Ph.D., Texas; W. A. Poppen, Ph.D.; D. Ohio State; C. L. Thompson, Ph.D.; R. T. Doud; Ph.D.; R. George, Ph.D.; L. Peabody.

Associate Professors: K. L. Davis, Ed.D., Georgia; D. J. Dickinson, Ed.D., Oklahoma State; J. W. Edgerton, Ph.D., Georgia; E. D. Tennessee; W. George, Ed.D., Tennessee; M. A. Hector, Ph.D., Michigan State; N. M. Hector, Ph.D., Ohio State; K. K. Swander, Ph.D., Florida.


Graduate programs (thesis or non-thesis option) lead to the Master of Science degree with majors in College Student Personnel, Educational Psychology (also with a concentration in school psychology), or Guidance, with concentrations in elementary or secondary guidance, to the Specialist in Educational degree, both with concentrations in educational psychology, guidance, school psychology, counselor education, counseling in college and mental health centers, educational measurement and research, career development, and sex-fair counseling and teaching. Appropriate courses taken in this department and in the Department of Psychology will satisfy requirements for certification as a school psychologist. Write the department for information concerning the program requirements. Application deadlines to Ed.D. are February 1 and May 1; Ed.S. and M.S. deadlines are October 15, February 1, May 1, and July 15.

4110 Psychology of Sex Role Development
Examination, from both a theoretical and research base of factors which contribute to sex role development and definition in society and role of education in these changes. For student with minimal background in behavioral sciences. F., Sp., Su.

4130 Mental Health
Studies and exploration of positive mental health. Application of mental health criteria to a study of one's self based on a battery of personality assessment instruments.

4350-60-70 Problems in Educational Psychology and Guidance (3, 3, 3) E

4440 General Evaluation Procedures for Public Schools (3) Prereq: 2430 or equivalent. E

5455-56-56 Student Leadership Workshops (1, 1, 1) Small group and individualized experiences to develop knowledge and skills in leadership roles. Sections are designed for resident assistants, student government leaders, and other students. Prereq: Consent of instructor. S/NC only. E

5460 Standardized Testing (3) Use and interpretation of standardization in assessment of intelligence, aptitude, achievement, vocational interests, and personality adjustment. E

5465 The Construction of Classroom Tests (3) Concerned with teacher-made classroom tests: instructional objectives, principles of test construction, item analysis, evaluation of test reliability and validity, interpretation and use of test scores, relationship between testing and grading. W., Su.

4780 Advanced Child Study (3) Prereq: 2430 or 3810 or consent of instructor. W., Su.

4800 Psychology of the Disadvantaged Child (3) Significant behavioral differences and causes; appropriate intervention approaches. F

4810 Psychosocial Aspects of Appalachian Population (3) Exploration of psychosocial aspects of Appalachian population with focus on history, culture, and role of education. W.


4880 Differential Psychology (3) Nature and sources of individual differences in behavioral characteristics, and differences between racial, ethnic, socioeconomic, sex, and other groups.

4910 Diagnostic and Corrective Teaching (3) Practical procedure for improving pupil's learning. F

5000 Thesis (1-5) E

5021-02-03 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a 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

5040 Guidance and Pupil Personnel Services in Education (3) (Same as Vocational-Technical Education 5040.) F, Su.

5050 Children and Adolescents (3) Mental, social, physical, and emotional growth; development, and learning of children and adolescents; prevention, identification, and remediation of learning problems. W., Su.

5060 Group Approaches with Students (3) Knowledge and skills appropriate to functioning with groups in counseling; psychological and parent education. F., W., Su.

5070 Seminar in Elementary School Guidance (3) Trends, role, function, and administration of guidance in elementary school. Sp.

5099 Field Work (1-6) Practical experience in departmentally approved field placement. Supervision by field and University personnel. Program prerequisites for field work must be met. May be repeated. Maximum 6 hrs. S/NC only.

5100 Developmental Psychology (3) (Same as Psychology 5100.) F, W., Su.

5110 Psychology of Women (3) Past and current educational and psychological theory and practice with special attention to assumptions and practice in regard to women: social conflict in which various theories were developed and current theories and research focusing on women and/or sex differences. Prereq: 4130 or basic course in personality theory. Sp.

5111-12-13 Seminar in Current Issues in School Psychology (1, 1, 1) (Same as Psychology 5111-12-13.) S/NC only. E

5120 Seminar in Bias-Free Counseling (3) Feminist psychology, bias-free education, and counseling. Prereq: 4110 and 5110 or consent of instructor. May be repeated. Maximum 9 hrs.

5140-50-90 Psychoeducational Assessment (3, 3, 3) (Same as Psychology 5140-50-90.)

5149-59-99 Practicum in School Psychology I (2, 2, 2) (Same as Psychology 5149-59-99.) S/NC only.

5180-90-200 Educational Specialist Research and Thesis (3, 3, 3) E

5210 Interpreting Published Articles: Statistics (3) Descriptive and experimental research in educational psychology, guidance and counseling, and college student personnel. Prereq: Non-thesis option students only or consent of instructor. F., W., Su.

5220 Interpreting Published Articles: Research Design (2) For students not conducting research projects; interpret and evaluate statistical tables and statistical tests as reported in journals. Prereq: 5210 or consent of instructor. F., W., Su.

5319 Field Work in School Psychology; Level I (2)

5320 Advanced Classroom Behavior Modification (3) Current research in psychology and its application to educational problems. E

5330 Theory and Research in Human Learning (3) Contemporary theories of human learning and its influence upon school practice. F

5331 Current Developments in Human Learning (3) Sp.

5340 Group Dynamics (3) Principles of group dynamics as they apply to a variety of group settings. Group counseling, and school leadership skills. (Same as Psychology 5340.) E


5400 College and University Law—Constitutional Rights and Responsibilities of Students (3) Legal precedent affecting student personnel services in public higher education. Student discipline, housing, dress, organizations, activities, fees, tuition, and related federal legislation. Some as Continuing and Higher Education 5420.) Sp.

5500 Student Personnel in Higher Education (3) Philosophy and scope.

5560 The College Student (3) Nature, characteristics, and needs.

5570 Case Studies in College Student Personnel (3) Prereq: 5550 or consent of instructor.

5720 Evaluation in Education (3) Techniques and instruments for identifying and appraising social values, the thinking processes, social adjustment, emotional needs, personal interests, and problems.

5790 Career Development: Theory and Research (3) F., W.

5785 Career Development: Program Development, Implementation and Evaluation (3) Career development and program planning and mental health counseling, counseling and teaching. Appropriate courses taken in this department and in the Department of Psychology will satisfy requirements for certification as a school psychologist. Write the department for information concerning the program requirements. Application deadlines to Ed.D. are February 1 and May 1; Ed.S. and M.S. deadlines are October 15, February 1, May 1, and July 15.

5790 Career Development: Workshop (1-6) Described for in-service training of school personnel. Development, programs, and training related to career development. May be repeated. Maximum 8 hrs. (Same as Curriculum and instruction 5790 and Special Education 5790).

5840 Student Appraisal (3) Gathering, interpreting, and using data for development of guidance programs and individual counseling. Prereq: Educational Psychology or Psychology 4640 or equivalent in standardized testing, (Same as Psychology 5840.) W.

5850-60-70 Special Topics and Problems in Educational Psychology and Guidance (1-6, 1-6, 1-6) May be repeated. May be taken for letter grade or S/NC. E

5880 Career Development: Occupational and Educational Resources (3) Gathering, interpreting, and using educational, social, occupational, and community information in the guidance program; sources, types of materials, and occupational planning plans. For use both in group and individual guidance program. W., Su.
emphasize in one of the specialized areas. Among the areas of specialization available is disability evaluation (non-thesis only).

Under the sponsorship of Social and Rehabilitation Services, a specialized institute for the preparation of professionals to adapt their skills toward services to hearing impaired and deaf people is provided. For further information write the department head.

EDUCATION OF THE HEARING IMPAIRED

4000 Rehabilitation Practicum (3) Evaluation of client data practicing rehabilitation prognosis. Prereq: 4290. F, Su

4190 Speech Development of Hearing Impaired (3) Anatomy and physiology of speech system. Relation of hearing to speech development. Theories and techniques of speech development and improvement; for hearing impaired children. Prereq: Audiology and Speech Pathology 4210. F, Su

4210 Language Development of Hearing Impaired I (3) Systems by which formal language is presented. Prereq: 4210 or consent of instructor. (Same as Audiology and Speech Pathology 4210.) F, Su

4220 Language Development of Hearing Impaired II (3) Techniques; various systems by which formal language is presented. Prereq: 4210 or consent of instructor. (Same as Audiology and Speech Pathology 4220.) W, Su

4230 Communication Processes for the Hearing Impaired I (3) Various communicative skills required for hearing impaired person; speech and language development; auditory training, speech reading, manual language and its relation to other forms of communication. Observations and practicum. (Student must acquire a degree of proficiency in use of manual language.) Prereq: Consent of instructor. F

4231 Communication Processes for Hearing Impaired II (3) Intermediate course in manual communications skills and techniques with emphasis on vocabulary development with receptive and expressive fluency. Prereq: 4230 or consent of instructor. A

4240 Nature of Hearing Impairments (3) Basic principles of audiology and physics of hearing; nature and causes of hearing loss; methods and instrumentation for assessment of hearing level; interpretation of audiograms; selection and use of hearing aids; relation of audiology services to medical and other rehabilitation disciplines. Observations and practicum. F

4250 Introduction to the Psychology and Education of the Hearing Impaired (3) For those planning to enter field of teaching deaf and hard-of-hearing. Review of history of deafness, social studies relating to psychology, social adjustment, and learning of deaf. Survey of professional literature in area of deaf child and adult. (Same as Audiology and Speech Pathology 4250.) E

4280 Curriculum Development in Elementary and Secondary Schools for Hearing Impaired (3) Adaptation of curriculum, teaching, and learning methods of public school education to meet needs of deaf and hard-of-hearing students in residential and integrated settings. W

4290 The Teaching of Reading to Hearing Impaired Children (3) Readiness activities, developmental approaches, theories, and specialized materials for curriculum in teaching reading. W, Su

4707 Student Teaching with Hearing Impaired Children (9) Supervised practicum with preschool, day school, and residential pupils. S/NC only. F, W, Sp
580 Seminar on Educational Implications of Language Deficiency (3) Readings, discussion, and projects on impact of language deficiency on educational programming for children with language deficiency. Sp, Su

5310-20-30 Manual Communication (2, 2, 2) Basic and advanced skills in fingerspelled and signed forms of communication. Emphasis on ability to express and receive the manual forms. Prereq: Consent of instructor. Must be taken in sequence. F, Su; F, Su; F

5490 Educational and Vocational Guidance of the Deaf (3) Philosophical and theoretical and educational models, methodologies, and techniques for orientation and evaluating students with hearing impairment. Research and materials current in use of various sign language systems and adaptations. Emphasis on approaches which accommodate and assist integration of hearing impaired children in regular classrooms. W, Su

5280 Seminar on Educational Implications of Language Deficiency (3) Readings, discussion, and projects on impact of language deficiency on educational programming for children with language deficiency. Sp, Su

5113 Advanced Curriculum for the Mentally Retarded (3) Program and curriculum development for training/education of severely retarded in public school institutions and privately operated schools and workshops. Su

5112 Psychology of the Severely Mentally Retarded (3) Program and curriculum development for training/education of severely retarded in public school institutions and privately operated schools and workshops. Su

5111 Psychology of Mental Retardation (3) Intellectual functioning, psychological theories and learning interrelations and theoretical and educational implications emphasized. Prereq: 4110. F, Su

5110 Psychology of Mental Retardation (3) Intellectual functioning, psychological theories and learning interrelations and theoretical and educational implications emphasized. Prereq: 4110. F, Su

4130 Education of the Brain-Injured Child (3) Nature of brain injury; recent research for and development educational, physical, and emotional characteristics; special educational techniques. E

4150 Education Problems of Hospitalized and Homebound Children (3) School and home responsibility for physical care and social relationships, educational adjustment, vocational needs, and cooperation with related service resources. E

4840 Educational Problems of the Cerebral Palsied Child at Home and School (3) Physical, social, and educational needs of the cerebral palsied; evaluation techniques; related services. A

4921 Student Teaching in Crisis and Special Health Conditions (3-15) Observation and supervised practicum in home, hospital, and classroom. S/N.C only. E

EDUCATION OF THE EMOTIONALLY DISTURBED

4610 Nature and Characteristics of Learning and Behavior Disorders (3) Forms of academic and social problems in individuals; orientation of severity, possible causes, and relationships to each other. Relationships with respect to personality characteristics and development factors interpreted through behavioral and psychodynamic theory as well as practical situations in which learning and behavior disorders may occur. E

4620 Education of the Emotionally Disturbed Child (3) Managing behaviors, models for instruction, teaching techniques and materials, and teacher-pupil family interpersonal relationships as basic to academic achievement for the pupil. Prereq: 4610. W, Su

4630 Practicum in Residential Settings Serving Children with Disturbing Behavior (3) Practice in scientifically identifying, observing, and recording disturbing behaviors. Initiating behavior changes regarding disturbed behaviors. To perform in a supportive environment within a residential setting; and to take part in discussion and evaluation of social and educational implications of such behavior. Prereq: 4610 and 4620 or consent of instructor. A

4640 Practicum in Public School Systems Serving Children with Disturbing Behavior (3) Problems in planning and organizing the educability of mentally handicapped in a team approach. Lab experience in a regular public school program involving the handicapped. Prereq or coreq: Curriculum and Instruction 4720 or 4820. S/N.C only. A

4924 Student Teaching of the Emotionally Disturbed (3) Individual tutoring and classroom observation and teaching. Prereq or coreq: Curriculum and Instruction 4720 or 4820. S/N.C only. A

REHABILITATION COUNSELOR EDUCATION

5100 Orientation to Rehabilitation (3) History, philosophy, basic principles of rehabilitation service; evaluation movement, case finding, intake, diagnosis, physical restoration, counseling, training, placement, follow-up, and rehabilitation teams; facilities and programs in hospitals, institutions, community agencies, and vocational rehabilitation teams; facilities and programs in hospitals, institutions, community agencies, and vocational rehabilitation teams. Prereq: Consent of instructor. W; Sp; Su

5141 Diagnostic Vocational Evaluation in Rehabilitation (3) Process, principles, and techniques used to diagnose vocational abilities of handicapped individual including functional analysis of biographical data and use of evaluation interview. W

5142 Vocational Clinical Evaluation in Rehabilitation (3) Process, principles, and techniques used to determine and predict work behavior and vocational potential, includes rationale underlying selection of outcome measure, development and interpretation of evaluation programs, work samples, situational tasks, simulated work experiences, and job tryouts in vocational evaluation. Prereq: 5141 Sp

5143 Interpretation of Vocational Evaluation Data in Rehabilitation (3) Procedures, principles, and techniques used in interpretation of vocational evaluation data to handicap adults, to referral agency, and to facility staff. Interpretation of data through the formal staff conference, vocational counseling report writing, and follow-up. Prereq: 5141 and 5142. Su

5144 Development and Supervision of Client Evaluation Programs (3) Procedures involved in establishment and maintenance of effective vocational evaluation programs. Determining and planning amount of floor space, type of equipment, type and number of staff, and method of coordination essential to maintenance of vocational evaluation programs. Effective supervisory, referral, recording, budgeting, and staff development techniques. Prereq: 5141, 5142 and 5143, or consent of instructor. Su

5145-46-47 Practicum in Rehabilitation (3, 3, 3) Supervised experience in area of rehabilitation with emphasis on application of assessment techniques and skills acquired in previous or concurrent course work. Prereq: Consent of instructor. W, Sp; Su

5150-60 Internship in Rehabilitation (9, 9) Supervised experience in a rehabilitation setting with emphasis on application of assessment techniques and skills acquired in previous or concurrent course work. Prereq: Consent of instructor. W, Sp; Su

DISABILITY EVALUATION EDUCATION

5700 Evaluation and Mobilization of Community Resources (3) Issues, processes, and programmes related to community rehabilitation. Emphasis on integration with emphasis on social and rehabilitation facilities and agencies. Assessment utilizations in planning mobilization of community resources to facilitate development of innovative service programs for handicapped. W

5710 Medical Aspects of Disability I (3) Biology, clinical signs, symptoms and diagnostic procedures related to musculoskeletal, neurological, circulatory, and respiratory diseases/disorders. Effect on structure and function of human body. Restorative measures to eliminate or minimize resulting handicaps; skills necessary to communicate effectively with lay persons and medical community on evaluation of impairments and administration of appropriated treatments. W

5720 Medical Aspects of Disability II (3) Biology, clinical signs, symptoms and diagnostic procedures related to neoplastic, skin, digestive, genito-urinary, endocrine, and nutritional disabilities. Effect on structure and function of the human body. Restorative measures to eliminate or minimize resulting handicaps; skills necessary to communicate effectively with lay persons and medical community on evaluation of impairments and administration of appropriate rehabilitative measures. W

5730 Vocational Assessment in Disability Evaluation (3) Vocational assessment: resource materials; criteria for vocational assessment of disability in performance; procedures for conducting job analysis and case file vocational assessment experiences. Prereq: Admission to program in disability evaluation or consent of instructor. Sp

5130-40 Seminar in Rehabilitation (3, 3)
THE SPECIALIST PROGRAM

The Ed.S. degree program, which is a thesis or non-thesis program, is a cooperative undertaking involving all vocational service areas. Options are available in agricultural, business, distributive, and industrial education and in general vocational-technical education.

THE DOCTORAL PROGRAM

The comprehensive Ed.D. program in Vocational-Technical Education is designed to provide for achieving professional objectives, developing needed competencies, and gaining desirable experiences and understanding of vocational-technical areas.

Required for the non-thesis student not otherwise registered during any quarter when such a 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

5400 Supervised Occupational Experience in Agriculture (3) Prereq: 4350.

5620 Teaching Agricultural Mechanization in Vocational Agriculture (3) Prereq: 4350.

5750-60-70 Special Problems in Agricultural Education (3, 3, 3) May be repeated. Maximum 18 hrs.

Business Education

4230 Curriculum Construction in Business Education (3) Aims, principles, practices and problems in construction of business curricula for various types of educational institutions in which business subjects are taught.

4610-20-30 Problems in Business Education (3, 3, 3)

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a 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

5011 Problems in Lieu of Thesis (3)

5110 Graduate Seminar in Current Problems (3)

5111-12-13 Graduate Seminar: Current Problems in Business Education (1, 1, 1)

5120 Graduate Seminar in Tests and Measurement (3)

5130 Graduate Seminar in Guidance (3)

5140 Organization and Operation of Area Vocational-Technical Schools (3) (Same as Industrial Education 5140)

5410-20-30 Practicum in Business Education (2, 2, 2)

5510 Evaluation of Research in Business Education (3) Prereq: Curriculum and Instruction 5610 or equivalent.

5611-21 Problems in Business Education: Typing (3, 3)

5612-22-32 Problems in Business Education: Shorthand (3, 3, 3)

5623-33 Problems in Business Education: Bookkeeping and Accounting (3, 3, 3)

5614 Methods and Materials for Vocational Office Education (3) Methods and materials for vocational office education programs. Development of instructional aids, recent developments and research, individualized instruction, and occupational clusters for VOE.

5624 Problems in Business Education: Clerical Practice (3)

5615-25-35 Problems in Business Education: General Business (3, 3, 3)

5618 Organization and Management of Vocational Office Education Program (3) Developing office occupation guidelines to cooperatives, laboratory, and model office programs. Physical facilities, instructional aids, related instructional activities (clubs), enrollment, instructor and advisory committee tests.

5628 Problems in Business Education: Administration (3)

6110-20-30 Current Issues in Business Education (3, 3, 3)

6210-20-30 Advanced Studies in Business Education (3, 3, 3)

6410 Higher Education for Business (3)

Distributive Education

4130 Areas of Distribution (3) Marketing, product or service technology, social skills, basic skills, and distribution as these areas affect the distributive education curriculum in secondary and postsecondary programs.

4140 Supervised Distributive Experience (3) Minimum 200 hours experience in approved distributive business; concurrent analytic project.
School of Health, Physical Education, and Recreation

Madge M. Phillips, Director

Graduate programs are available to students preparing for (1) teaching and research positions in colleges, high schools, and vocational schools; (2) administrative and supervisory work in athletics, health education, physical education, and recreation; (3) recreation specialist positions in various public, voluntary, private, and commercial agencies and institutions; and (4) public health positions in community health education, health planning and administration, and environmental health.

THE MASTER'S PROGRAM

Four programs leading to the Master of Science degree are available: Physical Education, Recreation, Safety Education and Social Science, and School Health Education. Forty-five quarter hours are required for the M.S. Approximately 22 quarter hours of work selected from courses numbered 5000 and above are included in the M.S. requirement. Course selection shall be made according to each student's professional interests in health, physical education, safety, or recreation with the approval of the major professor. Non-thesis options are available in all M.S. degree programs. A 3 quarter-hour course in research techniques and/or statistics and/or a seminar in research will be required. Each non-thesis degree candidate will take a final comprehensive examination.

Programs leading to the Master of Public Health are available in community health education, health planning/administration, and occupational/environmental health and
safety. Fifty-four quarter hours are required for the M.P.H. degree. One full quarter of field practice is required. During field practice, no student shall hold a full-time job except by special permission of the division chairman. Students may be placed in all parts of this country.

DOCTORAL PROGRAM

The Doctor of Education and the Doctor of Philosophy degrees are offered in Health Education. See further description under Health Education.

The Doctor of Education degree is offered with a major in Physical Education and two collateral areas of study. The curriculum to be pursued will be determined by the student and a doctoral committee. Selection of this curriculum will be based on the past training, experience, and interest of the student.

The basic requirements for admission are:

a. A minimum of 40 (physical education) or 50 (health education) quarter hours.

b. Submission of satisfactory scores on the aptitude section of the Graduate Record Examination is required for all doctoral and specialist programs.

c. A superior grade point average.

d. Submission of satisfactory references relating to training, employment, and character.

e. Evidence of successful teaching or potential for success in the major area of study.

Graduate Assistantships. A variety of graduate assistantships are offered in health education, physical education, safety education, and recreation to 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.

Assistantships are made available by local schools, agencies, and the School of Health, Physical Education, and Recreation in return for part-time services rendered. The services may consist of teaching physical education classes, teaching safety classes, teaching field work students, and/or directing or helping to manage extracurricular programs. Students interested in these opportunities should file their applications before February 1. Letters should be addressed to: The School of Health, Physical Education, and Recreation, The University of Tennessee, Knoxville, Tennessee 37916.

Public Health Traineeships. A few Public Health Traineeships are offered for Master of Public Health candidates concentrating in community health education. These are provided by the United Public Health Service. Letters should be addressed to: Health and Safety Division, The University of Tennessee, 1914 Andy Holt Avenue, Knoxville, Tennessee 37916.

Departments of Instruction

Division of Health and Safety

MAJORS

Health Education

DEGREES

Health Education Ed.D., Ph.D.
Public Health M.P.H.
Safety Education and Service M.S., Ed.S.
School Health Education M.S.

Professors:

R. H. Klink (Chairperson), H.S.D. Indiana;
W. J. Huffman, Ed.D. Illinois; B. C. Wallace,
Ed.D. California State.

Associate Professors:

A. J. Brown, Ed.D. Tennessee; C. B. Hamilton,
Dr. P. H. Oklahoma; J. Gorski, Dr. P.H.
California (Los Angeles); M. A. Miliken
(Emuritis); M. A. Yale; A. F. Thompson, Ph.D.
Michigan State.

Assistant Professors:

J. Ellison, Ed.D. Tennessee; V. Pressly, Ed.D.
Tennessee.

Lecturers:

M. Duffy, M.D. Pennsylvania; H. P. Hopkins, Ph.D.
North Carolina.

The Health and Safety Division offers the following degree programs:

Master of Public Health degree with a major in Public Health. Option in community health education is accredited by the American Public Health Association. Options with specialization in health planning/administration or occupational/environmental health and safety are also available.

Master of Science degree with a major in School Health Education or Safety Education and Service (thesis and non-thesis options). Non-thesis option requires 45 quarter hours of coursework.

Educational Specialist degree in Safety Education and Service.

Doctor of Education degree in Health Education.

Doctor of Philosophy degree in Health Education.

Public Health

3000 Foundations of Health Science (3) In-depth study of content areas relating to personal health for the major in contemporary health problems, i.e., mood modifying products, consumer health, international health, personal health practices, reciprocal relationships involving humans, disease and environment.

3210 First Aid and Emergency Care (4) Theory and practice of first aid and emergency care. Instruction in medical self-help. Course leads to Red Cross Certification in Advanced First Aid and Emergency Care. (Applicant must be at least 18 years of age for certification.) (Same as School Health 3240.) E

3310 Communicable and Noncommunicable Diseases (3) Modern concepts of diseases, etiology of common communicable and chronic disease problems including prevention and control. Prereq: 1 yr of biological science and 1 course in bacteriology. F, W, Sp

3320 Sanitation (3) History of sanitary awakening; disease-producing relationships and controls of water, sewage, refuse, milk, meat and other foods, air, insects, and soil; sanitation of homes, swimming pools, industrial plants, markets, restaurants, camps, and public bathing places. Healthful school living as affected by buildings and grounds, lighting, acoustics, thermal control, and safety practices. Prereq: 1 yr biological science, 1 course in microbiology. 2 hrs and 1 lab. E

4120 Community Health Problems—Alcoholism (3) Explores problems of alcoholism regarding overall health of community. Emphasis placed on factors making alcoholism a serious public health problem. Various types of educational programs to control the disease covered. F

4130 Community Health Problems—Suicide (3) Explores problems of suicide regarding overall health of community. W

4140 Community Health Problems—Drug Education (3) Exploration of ramifications of death and dying as related to personal and community health. E

4210 Urban and Industrial Health (3) Health problems created by a burgeoning population and the megalopolis; industrial health problems of concern to management, supervisor, and industrial worker, control of occupational diseases, poisons, accidents, and other conditions incidental to industry. Sp

4220 Communications for Better Health (3) Selective study of communications in health enterprise. Consideration in logical progression of the problems of transmitting current and new information to practitioners; communications among members of the modern health teams, among health agencies, and use of mass media for transmitting health information. W, Sp

4410 Consumer Health and Safety Education (3) Survey of major consumer health and safety problems: selecting, purchasing, and financing of safety and medical services.

4411 Instructors Advanced First Aid and Emergency Care (3) Designed to teach first aid. Satisfactory completion qualifies one for American National Red Cross Certification as an Advanced First Aid and Emergency Care Instructor. (Applicant must be at least 21 years of age.) Prereq: 3210 or valid Advanced First Aid and Emergency Care Certificate. F, W, Sp

4420 Drug Abuse Education (3) Drug abuse and suspected causes; pharmacology of drugs and their effect on society and methods of drug abuse education. F, Sp

4700-10-20 Field Practice in Public Health (3, 3, 3) Field practice in public health under supervision of public health profession. S/N only. E

4730 Workshop in Public Health Education (3-6) For teachers, nurses, case workers, sanitarians, and other voluntary and public health agency personnel, emphasizes the problem-solving approach through small group interaction, case method, and critical incident technique. May be repeated. Su

4830-50-60 Problems in Public Health Education (1, 1, 1) Individual identity of student; study of current problems in public health education. Extensive reading of literature required. E

5092 Non-Thesis Graduate Completion (3-15) Requires study of the non-thesis option. Must be registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirement. May be repeated. S/N only. E

5010-30-30 Workshop in Public Health (3, 3, 3, 3) Designed to deal with specific public health problems in short or extended period of time. Su

5070-80-90 Field Practice and Seminar in Public Health (3, 3, 3, 3, 3) Internship or field experience under professional supervision in public health. S/N only. E

5110 Environmental Health (3-5) Varied environmental factors within general framework of air, food, water, shelter, transportation as they affect human health. Emphasis on factors and their role in health. Lecture, demonstrations, laboratory, and field practice. Prereq: Consent of instructor. Su

Division of Physical Education

MAJOR

DEGREES

M.S., Ed.D.

Professors:


Associate Professors:


Assistant Professors:


The Physical Education Division offers the following degree programs:

Master of Science degree in Physical Education (thesis and non-thesis programs).

Doctor of Education degree in Physical Education with concentrations in exercise physiology, motor behavior, adapted physical education, and philosophical and sociological foundations.

3050 Rhythmic Analysis (2) Emphasis on analysis of rhythmic movement. Prereq: Consent of instructor. A

3080 History of Dance and the Related Arts I (2) Dance history and the arts related to it from beginnings in primitive societies through the nineteenth century. F

3151 History of Dance and the Related Arts II (2) Survey of dance and the arts related to it, tracing their development in the twentieth century. W

3430 Adaptive Physical Education Laboratory (1) Practical work, including student teaching, supplementing 4110. F, W, Sp

4010 Advanced Modern Technique (2) Development, integration, and synthesis of previous dance vocabulary, emphasis on advanced practice and principles. Prereq: 3080. May be repeated. Maximum 6 hours. Available to dance majors and minors or with consent of instructor. F, W, Sp

4020 Practicum in Dance Production (2) Prereq: Consent of instructor. W

4060 Advanced Composition (4) Application of compositional, production, and administrative skills culminating in presentation of two complete choreographic works. Prereq: 3080, 4520. A

4070 Stagecraft for Dance Production (2) Equipment, light design, properties, sets, and stage management.

4110 Adaptive Physical Education (3) Classification of atypical students who require modified programs in physical education, activities and class organization suitable for required or special physical education classes. E

4140 Measurement and Evaluation in Physical Education (3) Relationship of measurement and evaluation in physical education. Administration and development of tests to measure physical fitness, sports skills and knowledge. W, Sp, Su

4150 Creative Rhythms for Children (3) Methods and materials for grades 1-6. 3 hrs a lab. F

4800 Motor Behavior: A Theoretical Perspective (4) Examination of motor behavior from information processing perspective and applies current research to support theoretical base. Prereq: Senior or graduate standing. Recommended: 1 yr chemistry, physics, and mathematics. 3 hrs and 1 lab. W

5520 Experimental Techniques in Applied Physiology (3) Laboratory course in experimental methodology and instrumentation. Respiratory and blood gas analysis, human calorimetry, blood chemistry, and pulmonary function tests. May be repeated with consent of instructor. S/N only.

5650 Social-Psychological Dimensions of Physical Activity (3) Examination of social-psychological factors which influence performance in physical activity with emphasis on research. Prereq: Psychology 3120 or equivalent. Sp

5910-20 Seminar in Physical Education (1, 1, 1) Current issues and problems in physical education with emphasis on outstanding studies and research in field. E

5910-20 Problems and Projects in Physical Education I (1, 1, 1) Problems of professional interest and value to the individual student, selected by the student and approved by the major professor. S/N only. E

6000 Doctoral Research and Dissertation (3-15) E

6100 Seminar in Physical Education (1) Research topics in literature related to physical education. May be repeated with consent of instructor. S/N only. E

6220 Independent Research (3) Selection of topic, development of procedure, and conduct of study including final writing of research paper. S/N only. E

6330 Advanced Motor Behavior (3) Theoretical issues of contemporary significance in human motor behavior. Prereq: Psych 5450 or consent of instructor. F

6410 Practicum in Kinesiology (3) Electromyography laboratory and film analysis of sports skills. Prereq: Psych 3110, 5500 and Physics 2210 or equivalent. May be repeated with consent of instructor. S/N only.


6610 Seminar in Applied Physiology (2) Prereq: 5510. May be repeated with consent of instructor. S/N only. F, Sp

6640 Research Participation in Applied Physiology (1-6) Advanced research techniques under supervision of faculty member whose research area coincides with interests of student. Prereq: Consent of instructor. May be repeated with consent of instructor. S/N only. F

6810-20 Practicum (2, 2) Intern experience in areas of major interest. S/N only. E

Division of Recreation

MAJOR

DEGREE

M.S.

Professor:

M. L. Peters (Chairperson), Ph.D. Illinois.

Assistant Professors:

M. J. Carter, Re.D. Indiana; K. L. Krick, Re.D. Indiana.

The Recreation Division offers the following degree program:

Master of Science degree in Recreation (thesis and non-thesis programs) with concentrations in recreation administration, and therapeutic recreation.

4130 Recreation Administration (3) Introduction to recreation administration, including planning, personnel, program services, finances, and public relations. Prereq: 3140, 3200, 3880, or consent of instructor. F, W

4200 Survey of Recreation for Special Populations (3) Responsibility of recreation profession to minority groups whose leisure opportunities and needs may require special servicing. Prereq: 3140, 3200, 3880, or consent of instructor. Sp

4500 Specialized Study in a Selected Area of Recreation (1-6) Comprehensive study in a selected specialized area within the broad field of recreation, for recreation students only. Prereq: Consent of
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College of Education

instructor. May be repeated with consent of division. Maximum 9 hrs. E

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a 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

5130 Interpretations of Leisure (3) Concepts of leisure including social, psychological, cultural, and philosophical; recreational uses of leisure. Prereq: 3140 or consent of instructor. E

5140 Leisure Service Delivery Systems (3) Various systems—public, private, and commercial—involved in provision of leisure services for community at large. Prereq: Consent of instructor. F

5150 Current Issues in Recreation (3) Identification and consideration of broad issues—social, environmental, ethical—which currently have greatest impact on use of leisure, and implications for recreation administration. Prereq: Consent of instructor. Sp

5420 Therapeutic Recreation (3) Role of recreation in lives and treatment of persons with disabilities—mental, physical and medical. Possibilities for helping ill and disabled realize their fullest potential. Prereq: Consent of instructor. W

5250 Implementations of Recreation Services for the Ill or Disabled (3) Policies and guidelines for organizing and implementing programs of recreation for the ill or disabled in treatment centers and other community agencies. Prereq: 4200 or consent of instructor. Sp

5260 Leisure and Mental Health (3) Relationship between leisure activity and mental health, with emphasis on its use in therapeutic recreation. Prereq: Psychology 3650 or equivalent, and consent of instructor. W

5300 Seminar in Recreation (1) Presentation and general discussion of students' research studies, projects, and thesis in recreation. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. S/NC only. F, W

5340 Administration of Recreation Funds (3) Development and management of budgets for recreation agencies with special emphasis on obtaining federal funds appropriated specifically for recreation, management of revenue received, and exploration of funding alternatives. Prereq: 4130. Sp

5350 Organizational Policies for Recreation (3) Advanced study in the analysis of organizational policies and functions of management in recreation. Prereq: 4130. W

5360 Management and Operation of Recreation Facilities (3) Management process as it pertains to operation of recreation facilities. F

5440 Problems and Projects in Recreation (1-9) Individual research on problem of special significance to student. Research projects of limited nature undertaken in lieu of thesis. May be repeated. Maximum 9 hrs. New project must be undertaken for each repetition. E

5450 Specialized Study in Recreation (1-9) Advanced comprehensive study in selected specialized area within leisure and recreation field. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E
The remotely-taught courses offered by UTK carry full graduate credit toward the Master's degree under authorization of the regional accrediting agency, the Southern Association of Colleges and Schools. 

YEAR-IN-JAPAN M.S. PROGRAM

This is a unique program allowing American engineering students to develop some understanding, both scientific and cultural, of Japan. It allows an M.S. candidate to obtain a degree from UTK while carrying out research work at a Japanese university. The program requires approximately two years, one year being spent in Japan and the remaining period being spent at UTK to fulfill the course requirements and to write the thesis or project report, as appropriate to the particular department. The program is administered in the framework of each department's regular graduate program except that the research is done in Japan. Although the language of communication in Japan would be English, cultural understanding is one of the important objectives of the program and as such a participant would be asked to begin Japanese language study. At the option of the department, up to 6 hours of graduate credit may be allowed for language study, either at UTK or in Japan. Financial support for living expenses in Japan and for the roundtrip transportation can usually be arranged through fellowships from the Japanese Ministry of Education.

Engineering Experiment Station

F. N. Peebles, Director
W. K. Stair, Associate Director

The Station is organized to conduct investigations in fundamental engineering science and to aid in the development of the state's resources and industries as far as funds available will permit. The Station may also make special arrangements with any person or company to study any technical question within the capacity of its resources, and to report the results exclusively to the company requesting the study. In such case, the whole expense will be carried by the parties requesting the investigation.

Engineering Administration

MAJOR: Engineering Administration
DEGREE: M.S.


A program of study leading to the degree of Master of Science with a major in Engineering Administration is offered. This program is aimed at preparing engineers in the organization and direction of work in engineering functions, at a level which requires understanding of such areas as marketing, finance, and industrial relations. It should be emphasized that this is an engineering program, aimed at preparing individuals for line management positions in construction, design, development, and manufacturing where both technical and nontechnical factors exert significant influence on the success of a given activity. The program does not provide the opportunity for in-depth study of any of the traditional areas of business administration. Students with such interests are advised to consider graduate programs available in the College of Business Administration.

To be admitted to the Graduate School as a potential candidate for a Master's degree with a major in Engineering Administration, the applicant must submit reasonable evidence of ability to pursue graduate studies at an acceptable level of performance. In general, the applicant should have graduated from a recognized undergraduate institution in engineering with a satisfactory grade point average. In addition, applicants must satisfy one of the following experience requirements: (1) at least two years of engineering experience after graduation if a full-time student or (2) current employment in engineering work if a part-time student.
THE MASTER'S PROGRAM

Minimum requirements for the Master's degree are the satisfactory completion of the following core courses:

1. An Engineering Core, 27 hours of graduate credit consisting of Engineering Administration 5900, at least three courses chosen from Industrial Engineering 4150, 5110, 5210, and 5710, and a complement of engineering courses normally selected from the student's undergraduate major department or from courses of other departments pertinent to the program.

2. A Business Administration Core, 15 hours of graduate credit consisting of Accounting 5810, Finance 5650, Marketing 5050, Management 5130, and Transportation 5210.

3. General Electives, 9 hours of graduate credit chosen from computer science, economics, engineering, management science, mathematics, psychology, statistics, and other program-related disciplines.

The program requirement totals 51 hours of graduate course credit. No thesis is required. A final oral and written examination must be passed on the work offered for the degree. Course prerequisites for the program are Accounting 2110, Computer Science 3150, Industrial Engineering 4520, and Statistics 3450 or their equivalents. None of these prerequisites may be counted as part of the 51 hours of credit offered for the degree. These course prerequisites will be waived upon presentation of evidence of competency in the course subjects. Other prerequisite courses may be required, depending upon the student's background and the electives chosen.

5022 Non-Thesis Graduation Completion (3-15)
Required for the non-thesis student not otherwise registered during any quarter when such a 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.

5900 Project in Engineering Administration (3)
Study and formal report of engineering administration topic, normally performed during last quarter of study and formal report of engineering administration, chemical, chemical engineering, chemical bioengineering, advanced control systems, and polymer science and engineering, in Metallurgical Engineering, and in Polymer Engineering.

THE MASTER'S PROGRAM

Minimum departmental requirements include the following:

1. A major consisting of 18 to 27 quarter hours of graduate courses in chemical engineering, metallurgical engineering, or polymer engineering. The polymer engineering major must include Polymer Engineering 5110, 5230, 5310, 5410, and 5510.
2. One or two minors or collateral work, 9 to 18 hours total in engineering, chemistry, mathematics, physics, or other related fields.
4. Active participation in graduate seminars in the department. Resident students must register for the appropriate 5010 every quarter offered.
5. Final examination covering thesis, related fields, and graduate course work.

THE DOCTORAL PROGRAM

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

Department requirements consist essentially of the satisfactory completion of:

1. Graduate courses in chemical engineering, metallurgical engineering, or polymer engineering amounting to approximately 36 quarter hours, at least 12 of which must be in 6000 series courses. The polymer engineering major must include Polymer Engineering 5110, 5210, 5230, 5310, 5410, 5510, and Chemistry 5140.
2. Supporting courses in related scientific and engineering fields amounting to approximately 36 quarter hours, subject to approval by the student's faculty committee. These related fields will normally include chemistry, mathematics, physics, and engineering.

3. The preliminary examination, usually given in two parts, and covering such materials as chemical, metallurgical, and polymer engineering courses containing processes, thermodynamics, technology, mathematics, physics, chemistry, and other related fields.

Active participation in graduate seminars conducted by the department. Resident students must register for the appropriate 5010 every quarter offered.

5. Reading knowledge of a foreign language relevant to the field of the Ph.D. candidate's research program; selection of language to be made in consultation with the faculty committee. Appropriate languages are French, German, Italian, Japanese, Russian.

PROGRAM OPTIONS IN POLYMER SCIENCE AND ENGINEERING

M.S. and Ph.D. degrees with specialization in polymer science and engineering are possible through two routes—one in the department (chemical or metallurgical engineering) with an engineering emphasis, and a second in a joint program with the Chemistry Department having a chemical emphasis.

The specialization program in the department requires, for the M.S. degree, a thesis in the field, completion of Polymer Engineering 4910 and 4920, Chemical Engineering 5531 and 55140, plus active participation in the Polymer Seminar. The Ph.D. candidate must meet the above requirements, pass a special written examination in polymer science and engineering, complete an additional academic program to be specified by the student's committee.

M.S. and Ph.D. degrees in the joint specialization program with the chemistry department require a thesis or dissertation in the field. Chemical and metallurgical engineering departmental requirements include completion of Polymer Engineering 4910 and 4920, Chemical Engineering 5531, and 55140, plus active participation in the Polymer Seminar. Ph.D. students must also pass a special written examination as well as complete the above requirements.

Chemical Engineering

3410 Flow of Fluids (4) Differential and overall momentum balances, mechanical energy balances; flow in tubes, piping systems, and packed beds; metering devices, pumps. Prereq: Chemical and Metallurgical Engineering 2020, Mathematics 2850. 3 hrs and 1 lab.

3420 Heat Transfer (4) Differential and overall energy balances; steady and unsteady state, heat conduction in simple geometries; heat transfer in tubes and heat exchangers; condensation and boiling; radiation. Prereq: 3410, 3 hrs and 1 lab.

3440 Stagewise Operations (3) Analytical and graphical methods applied to stagewise separatory operations.

3450 Diffusional Operations (3) Diffusion, simultaneous heat and mass transfer, applications including humidification, gas absorption, extraction. Prereq: 3420. Chemical Engineering 3040.


3620 Chemical Process Control (3) Basic control

Departments of Instruction

Chemical, Metallurgical and Polymer Engineering

MAJORS

DEGREES

Chemical Engineering

M.S., Ph.D.

Metallurgical Engineering

M.S., Ph.D.

Polymer Engineering

M.S., Ph.D.

Professors:

H. F. Johnson (Head), D. Eng., Yale
D. C. Bogus, Ph.D., Delaware
B. S. Bower, Ph.D.
Ph. D. Massachusetts Institute of Technology
C. R. Brooks, Ph.D., Tennessee
E. S. Clark, Ph.D., California
H. D. Bower, Ph.D., Michigan
C. R. Scott, Ph.D.
C. J. McHargue, Ph.D., Yale
A. T. O. Culberson, Ph.D., Tennessee
J. F. Fellers, Ph.D., Akron
G. C. Frazier, Ph.D.
J. P. Hopkins, Ph.D., Tennessee
H. W. Hsu, Ph.D., Wisconsin
S. H. Juri (Emeritus), Ph.D., Tennessee
E. Spruiell, Ph.D., Tennessee
W. T. Becker, Ph.D., Illinois
P. J. Meschter, Ph.D.
F. D. Burns, Ph.D., Houston
M. A. Wright, Ph.D.
B. F. Oliver, Ph.D., Pennsylvania State

*Alumni Distinguished Service Professor.

†Space Institute, Tuscaloosa.

May be substituted for by students with significant experience in polymer research.
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theory applied to chemical processes: feed-back control systems, cascade control, critic, advanced control, and response. Survey of modern control of typical industrial unit operations. Prereq: 3610.

4110 Chemical Engineering Data Analysis (3) Analytical techniques for the identification of system exter-

4120 Probabilistic Chemical Engineering Systems (3) Experiment designs, simulation of stochastic systems, prediction feedback control, and analysis of net-


4200 Process Design and Economic Analysis (3) Development of basic information on a process into an integrated plant design considering mass and energy balances, product specifications, equipment characteristics, capital investment, operating costs and economic merit. Prereq: 4410, 4530.

4300 Special Problems in Design and Economics (3) Extension of 4420 for student participation in the American Institute of Chemical Engineering annual contest problem; other advanced design projects. Prereq: 4420.


4700 Sulfur Removal from Coal and Associated Problems (3) Chemical and physical properties of coke and associated minerals; beneficiation by both physical and chemical methods; fluidized bed combustion with both natural and synthetic Sox systems; sulfur; gas, SOx scrubbing. Prereq: Consent of instructor.

4800 Coal Processing to Liquid Fuels (3) Characterization of various methods; modeling of conversion processes and estimation of maximum yields; water and oxygen requirements; pyrolysis; catalytic hydrogenation; reactor design considerations; re-

4900 Chemical Reaction Kinetics (3) Chemical reaction rates in closed and flow systems; interpretation of laboratory and pilot plant data; reactor design. Prereq: 3420, Chemistry 3430.


5620 Process Modeling, Simulation, and Control of Chemical Processes (3) Development of process models, experimental process identification, process computer simulation, conventional and non-

5730 Mass and Energy Flow in Biological Systems (3) Basic physiochemical and organizational principles applicable to biological systems. Derivations of general equations of biomass and energy transfer. Thermodynamics of transport and equilibrium in biological systems. Discussion of Volterra's equation and biological clocks. Prereq: Consent of instructor.

5740 Introduction to Transport Phenomena in Biological Systems (3) Application of principles of transport phenomena to biological systems. Trans-

5750 Microbiological Process Engineering (3) Application of chemical engineering principles and design concepts to microbiological processes; con-

5760 Principles of Biocatalysis (3) Fundamental aspects and similarities of modern biocatalysis, including biomembrane systems, design of production and analytical sys-

5810-83 Topics in Chemical Engineering (3, 3) Problems of interest in chemical bioengineering. Prereq: Consent of instructor.


5130 Methods of Optimization (3) Principles and applications of various mathematical programming techniques to chemical process design and control; variational method, maximum principle, dynamic programming, and geometric programming. Prereq: 4130.

5210 Process Dynamics (3) Analysis of recycle oper-

5250 Chemical Process Industry Economics (3) Analysis of economic components of chemical processes. Internal economics of chemical enter-

5310 Thermodynamics of Heterogeneous Equilib-

5320 Statistical Thermodynamics (3) Basic concept of statistical mechanics and application to evaluation of thermostatic properties. Prereq: 5310.

5510 Chemical Reactor Design (3) Nonideal flow patterns in chemical reactors; diffusion and reaction in two phase systems; introduction to heterogeneous catalysis and reactor stability. Prereq: 4130.

5610 Stagewise Mass Transfer Operations (3) Equi-

5620 Differential Mass Transfer Operations (3) Differential mass transfer operations; falling film, packed tower and bubble contacting devices; nonisothermal and multicomponent systems; cur-

5810 Mechanical Properties of Solids (3) Same as Engineering Science and Mechanics 5220.

5900 Special Topics in Chemical Engineering (3) Special topics of current interest to chemical engi-

6000 Doctoral Research and Dissertation (3-15) E 3, 3) Problems of interest in chemical bioengineering. Discussion of Volterra's equation and biological clocks. Prereq: Consent of instructor.

6100 Advanced Diffusional Operations (3) Fixed bed operations; stagewise and differ-

6250 Venture Analysis in the Process Industries (3) Interactions among management, market analysis, and technological aspects of chemical and biochemical separations. Design of production and analytical sys-

6310 Thermodynamics of Irreversible Processes (3) Thermodynamic treatment of irreversible chemi-

6320 Statistical Thermodynamics of Nonequilib-

6410 Stability Phenomena in Chemical Engineering: Discrete Systems (3) Instabilities in chemical process systems, including reactors and separation equipment. Emphasis on formation of models, asso-

6420 Stability Phenomena in Chemical Engineering: Continuous Systems (3) Hydrodynamic instabilities and instabilities in fluids based upon in-

6510 Applied Chemical Reaction Kinetics (3) Chem-

6610 Process Dynamics (3) Development of chemical processes. Reaction order and rate laws; testing of models by fre-

6710 Process Dynamics (3) Development of models of process equipment from conv-

6900 Advanced Topics of Chemical Engineering (3) Advanced topics of current interest to chemical en-

7050 Production Metallurgy (3) Thermodynamic and kinetic principles of smelting, refining, smelting, and purification. Prereq: Chemical and Metallurgical Engineering 3340.

7060 Metallurgical Kinetics (3) Application of prin-

3110 Engineering Materials I (4) Introductory course correlating the atomic, crystal, and micros-

3120 Engineering Materials II (3) Extension of 3110 with emphasis on control of electrical and magnetic properties of materials by specification of composi-

3130 Engineering Materials II (3) Extension of 3110 with emphasis on control of electrical and magnetic properties of materials by specification of composi-

3140 Advanced Topics of Chemical Engineering (3) Advanced topics of current interest to chemical engi-

3210 Thermodynamics of Irreversible Processes (3) Thermodynamic treatment of irreversible chemi-

3310 Metallurgical Engineering (3) Principles of catalysis, catalyst effectiveness and role of trans-

3320 Stagewise Mass Transfer Operations (3) Equi-

3410 Chemical Engineering Data Analysis (3) Analy-

3420 Process Design and Economic Analysis (3) Development of basic information on a process into an integrated plant design considering mass and energy balances, product specifications, equipment characteristics, capital investment, operating costs and economic merit. Prereq: 4410, 4530.

3430 Special Problems in Design and Economics (3) Extension of 4420 for student participation in the American Institute of Chemical Engineering annual contest problem; other advanced design projects. Prereq: 4420.


3470 Sulfur Removal from Coal and Associated Problems (3) Chemical and physical properties of coke and associated minerals; beneficiation by both physical and chemical methods; fluidized bed combustion with both natural and synthetic Sox systems; sulfur; gas, SOx scrubbing. Prereq: Consent of instructor.

3480 Coal Processing to Liquid Fuels (3) Character-

3490 Chemical Reaction Kinetics (3) Chemical reaction rates in closed and flow systems; interpre-

3500 Chemical Reactor Design (3) Nonideal flow patterns in chemical reactors; diffusion and reaction in two phase systems; introduction to heterogeneous catalysis and reactor stability. Prereq: 4130.

3510 Chemical Reactor Design (3) Nonideal flow patterns in chemical reactors; diffusion and reaction in two phase systems; introduction to heterogeneous catalysis and reactor stability. Prereq: 4130.

3520 Statistical Thermodynamics (3) Basic concept of statistical mechanics and application to evaluation of thermostatic properties. Prereq: 5310.

3550 Chemical Process Industry Economics (3) Analysis of economic components of chemical processes. Internal economics of chemical enter-

3610 Advanced Topics of Chemical Engineering (3) Advanced topics of current interest to chemical engi-

3630 Metallurgical Kinetics (3) Application of prin-

3650 Production Metallurgy (3) Thermodynamic and kinetic principles of smelting, refining, smelting, and purification. Prereq: Chemical and Metallurgical Engineering 3340.

3660 Metallurgical Kinetics (3) Application of prin-

3710 Process Dynamics (3) Development of chemical processes. Reaction order and rate laws; testing of models by fre-

3750 Microbiological Process Engineering (3) Application of chemical engineering principles and design concepts to microbiological processes; con-

3760 Principles of Biocatalysis (3) Fundamental aspects and similarities of modern biocatalysis, including biomembrane systems, design of production and analytical sys-

3781-83 Topics in Chemical Engineering (3, 3) Problems of interest in chemical bioengineering. Prereq: Consent of instructor.

3900 Special Topics in Chemical Engineering (3) Special topics of current interest to chemical en-

3950 Advanced Topics of Chemical Engineering (3) Advanced topics of current interest to chemical en-

4000 Doctoral Research and Dissertation (3-15) E 3, 3) Problems of interest in chemical bioengineering. Discussion of Volterra's equation and biological clocks. Prereq: Consent of instructor.

4110 Chemical Engineering Data Analysis (3) Analy-

4120 Probabilistic Chemical Engineering Systems (3) Experiment designs, simulation of stochastic systems, prediction feedback control, and analysis of net-

magnetic properties of materials by specification of microstructure and solid solutions, and to alloy systems. Prereq: 6910.

5910-20 Metallurgical Thermodynamics (3, 3) Application of thermodynamic and physicochemical methods to metals and metallurgical reactions. Relating the theory and experiment to structure of liquid and solid solutions, and to alloy systems. Suggested for mechanical engineering, engineering mechanics, and engineering students.

6000 Doctoral Research and Dissertation (3-15) E


6410-20 Thermodynamics of Solids (3, 3) Classical and statistical thermodynamic analysis of stability of solutions, compositions and ordered phases. Prereq: 5810-20-30 or consent of instructor.

6810 with emphasis on transport phenomena and solid solutions. Prereq: 5810-20-30 or consent of instructor.

6860 Mechanical and Physical Properties of Crystals (3) Anisotropic behavior of crystalline materials. Prereq: Core curriculum in Metallurgical and Materials Engineering 5050 or 4710 or consent of instructor.

6920 Mechanical and Physical Properties of Crystals (3) (Continuation of Metallurgical Engineering 5050 or 4710) Application of thermodynamic and irreversible thermodynamics. Prereq: 6860 or consent of instructor.

7000 Seminar in Anisotropic Properties of Crystals (3) Selected topics of current research interest in the area of anisotropic behavior of crystalline materials. Prereq: 6860 or 6820, or consent of instructor. May be repeated.

Polymer Engineering

4910 Applied Polymer Science (3) First course in the physical properties of polymers. Polymer structure and crystalline ordering, phase transitions, physical properties of amorphous and crystalline polymers, corrosion, and degradation are covered. The physical properties of polysulfide polymers are discussed. Not for credit for Polymer Engineering majors.

4920 Processing (3) Rheological and mechanical behavior of polymers in relation to the processing operations of fiber, plastics and rubber industries: dimensional analysis and scale-up, flow through
dies and pipelines, screw extrusion, spinning of fibers, injection molding. Not for credit for Polymer Engineering majors.

4930 Principles of Fiber and Textile Engineering (3) Chemical and crystalline structure of important fibers; melt, wet and dry spinning of manmade fibers; dyeing and finishing; preparation of yarns, weaving, and knitting. Emphasis on qualitative aspects.

4940 Plastics Fabrication Operations (3) Lecture and laboratory courses on the production operations of the plastics industry, including costs and mechanisms of operation of machinery used and the structure and properties of fabricated articles. Operations to include extrusion, coextrusion, injection molding including structural foam, thermoforming, blow molding, rotational molding.

5000 Thesis (1-19) E

5010 Graduate Seminar (1) Prereq: Admission to graduate program. May be repeated. E

5050 Engineering Analysis (3) (Same as Chemical Engineering 5050)

5110 Structural Characterization of Polymers (3) Experimental methods of determining nature of functional groups and structural characteristics of polymers most pertinent to plastics, fibers, and rubber. Emphasis on developing constitutive equations for yielding behavior of solid polymers, failure analysis and general deformation mechanisms of linear viscoelastic and elastoplastic macromolecules.

5120 Nonlinear Viscoelasticity (3) Tensor formulation and methods of stress analysis. Prereq: Consent of instructor.

5130 Polymer Solution Properties and Characterization (3) Molecular weight determination, chromatography, solution thermodynamics, phase separation; application to synthetic and naturally occurring macromolecules. Prereq: Undergraduate physical chemistry.

5410 Rheology and Polymer Processing (3) Methods of determining the rheological properties of polymer melts, solutions and suspensions, including all types of viscometric measurements, viscoelasticity, simple nonlinear constitutive relationships, viscous heat generation; application to processing operations such as extrusion, injection molding, film production.

5510 Modern Research Tools and Instruments for Polymer Science (3) Laboratory course in methods of characterization of polymers; gel permeation chromatography, intrinsic viscosity, spectral analysis, measurement of melt flow properties, calorimetric, and dielectric mechanical measurements. Prereq: Consent of instructor.

5710 Phase Transformations in Polymer Systems (3) Analysis of nucleation and growth of phases in polymer systems, spinodal decomposition, application to crystallization from the melt, precipitation from solution.

5810 Physical Properties of Polymer Structures (3) Molecular weight and composition distributions in copolymers, structure of phase boundaries in polymer systems, spinodal decomposition, application to crystallization from the melt, precipitation from solution.

5910-20-30 Selected Topics in Polymer Science (3, 3, 3) Advanced problems in modern polymer research selected by the major graduate student. Prereq: 4910, 4920 or equivalent.

6000 Doctoral Research and Dissertation (3-15) E

6110 Optical Properties of Polymers (3) Maxwell's equations and electrodynamic theory of light, optical properties of isotropic and anisotropic dielectrics. Emphasis on the theory of interference, total internal reflection and applications to spherical structures and fibers studies of Stein, light scattering from polymer films.

6150 Advanced X-Ray Diffraction Methods for Characterization of Macromolecules (3) Classical methods of crystal structure determination; Patterson and Fourier functions; helical nets and Bessel function techniques; use of x-ray diffraction to determine on-line motions, defects, order-disorder transitions and para-crystallinity. Precision and Weissenberg photography, single crystal and powder diffractionmetry with applications to synthetic and biological macromolecules.


6230 Advanced Mechanical Behavior of Polymers (3) Stress analysis with emphasis on developing constitutive equations for yielding behavior of solid polymers, failure analysis and general deformation mechanisms of linear viscoelastic and elastoplastic macromolecules.

6310 Advanced Industrial Polymer Chemistry (3) Chemical and properties of new polymeric engineering materials; highly integrated engineering and chemical approach. Prereq: Consent of instructor.

6910-20-30 Recent Advances in Polymer Science and Engineering (3, 3, 3) Treatment of latest developments in science and technology of polymers. May include topics of morphology, structure, characterization. Prereq: Consent of instructor.

Civil Engineering

MAJORS

Civil Engineering

DEGREES

Civil Engineering

M.E., M.S., Ph.D.

Environmental Engineering

M.E., M.S.

Emeritus Professors:

F. C. Larson, M.S. Virginia Polytechnic Institute, P.E.; G. E. Shelton, MCE Brooklyn Polytechnic, P.E.

Professors:


The Department of Civil Engineering offers degrees leading to the Master of Science, Master of Engineering, and Doctor of Philosophy with a minor in civil engineering, concentrating in environmental engineering, structural engineering, soils engineering, and transportation engineering; and to the Master of Science and Master of Engineering in Environmental Engineering with concentrations in water quality, water resources, and air quality.

M.A.S.T.E.R. PROGRAM

The Master of Science programs in Civil Engineering and in Environmental Engineering are offered to graduates of recognized undergraduate curricula.

Departmental requirements provide that for a major in Civil Engineering, the Bachelor's degree must be in civil engineering, or certain undergraduate prerequisite courses must be taken before admission to candidacy for the Master of Science in Civil Engineering.

CIVIL ENGINEERING

The Department of Civil Engineering offers two options for the Master of Science degree in Civil Engineering.

Option I: A minimum of 45 quarter hours, including at least 9 hours of thesis, is required.

Option II: A minimum of 48 quarter hours, including a 3-quarter-hour special problems course, is required. The special problem will culminate in a written report which must be approved by the student's major professor.

ENVIRONMENTAL ENGINEERING

For a major in Environmental Engineering the Bachelor's degree may be in fields other than civil engineering. In some cases prerequisite undergraduate courses may be indicated, and in general these must be completed before courses for graduate credit can be taken.

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

Option I: The student must present at least 45 quarter hours of approved graduate courses. The major shall include a minimum of 8 quarter hours of thesis and 18 quarter hours credit of approved environmental engineering course work. A minor may be selected but is not necessarily required.

Option II: The student must present a minimum of 48 quarter hours of approved graduate courses. The major shall include a minimum of 27 quarter hours of approved environmental engineering course work. A minor may be selected but is not necessarily required.

Option I or II must be approved by the department.

Normally, the graduate program of study will be adjusted by the head of the department and the student's committee to suit the individual academic requirements.

M.A.S.T.E.R. PROGRAM

Graduate programs in Civil Engineering and in Environmental Engineering leading to the degree of Master of Engineering are qualified to recognize undergraduate curricula in
civil engineering or environmental engineering. At least one-third of the program of study must be classified as engineering design. The student's advisor will assist in planning the program of study to ensure that it includes the necessary design content. The thesis and non-thesis options noted under the Master of Science programs are available under these programs.

THE DOCTORAL PROGRAM

A graduate program leading to the degree of Doctor of Philosophy is offered in Civil Engineering.

Specific departmental requirements for the Ph.D. degree include the following:

1. A minimum of 108 quarter hours credit beyond the Bachelor's degree, exclusive of credit for the M.S. thesis. Of this number, a minimum of 36 quarter hours credit in Doctoral Research and Dissertation will be required.

2. A minimum of 36 quarter hours of graduate courses in the Civil Engineering Department, exclusive of thesis or dissertation credit, at least 9 hours of which must be 6000-level courses.

3. Supporting courses in related scientific and engineering fields, amounting to approximately 36 quarter hours, subject to approval by the student's faculty committee.

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

5. Upon completion of at least one-half of all course work, each student must pass a preliminary examination.

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

Civil Engineering

4120 Concrete Design (3) Reinforced concrete continuous beams and floor slabs; footings, and retaining walls. Prereq: 4110 and 4410. Sp

4220 Foundations and Substructures (3) Selection and application of foundations; principles of theory of elasticity; stability and bearing capacity of foundations. Prereq: 3310. Su, Sp

4230 Legal and Ethical Aspects of Engineering (3) Legal principles underlying engineering work; laws of contracts, torts, agency, real property; problems of professional registration and ethics. F

4240 Structural Design (3) Plastic theory, eccentric connections, industrial building design, timber design. Prereq: 3230 and 4410. 2-3 hr periods. F, Sp

4260 Photogrammetry (3) Methods of plotting maps from aerial photographs; stereoscopic plotting in one, two, and three dimensions; use of computer based systems; approximate design methods developed. Prereq: 5120, 5150. Sp

5180 Finite Element Structural Analysis (3) Application of finite element method to structural analysis; plasticity, plate strain, axisymmetric, and three-dimensional elements; use of typical computer programs; Prereq: 5150, and Engineering Science and Mechanics 5860 (Same as Engineering Science and Mechanics 5180). Sp, A

5220 Pavement Design (3) Pavement loads; pavement design; design practices; construction and maintenance. Prereq: 3310. Sp

5240 Advanced Properties of Materials: Cement and Concrete (3) Permeability and durability; volume changes and creep; elastic and thermal properties of concrete; special types of concrete; causes of failure. Prereq: 4710. W

5250 Advanced Properties of Materials: Bituminous Substances and Mixes (3) Serviceability concepts; pavement failures and remedies; bituminous pavement maintenance; other uses of asphalt products. Prereq: 4720. Sp

5270 Planning and Transportation (3) Preparation of transportation plans, design of transportation systems; transportation and road design. Prereq: 3230. F

5310 Engineering Practice (3) Valuation and feasibility studies; depreciation and useful life; engineering economics. F

5320-30 Engineering Practice Applied to Administration of Engineering Projects (3) Engineering administration; planning of governmental and industrial projects; cost estimates and methods of financing. W; Sp

5420 Structural Model Analysis (3) Experimental methods of shear, moment, and stress analysis. 3-5 hr periods. F; Sp


5550 Soil Mechanics—Plastic Equilibrium (3) Failure theories; earth pressure analysis, bearing capacity analysis, and slope stability analysis. Prereq: 3310 or consent of instructor. F

5560 Soil Mechanics— Elastic Behavior (3) Stress deformation characteristics, consolidation, settlement analysis. Prereq: 3310 or consent of instructor. W

5570 Soil Mechanics—Seepage (3) Saturated flow through embankments, filter design criteria, seepage forces and velocities, subdrains, and embankment failures. Prereq: 3310 or consent of instructor. Sp

5610 Behavior of Steel Structures (3) Behavior of structural steel members due to static and fatigue loading; relation between research results and current specialization for design. Prereq: 3320. W

5730 Prestressed Concrete (3) Properties of prestressing materials and anchorage systems; methods of prestressing and posttensioning; analysis and design of members and continuous structures. F

5740 Behavior of Reinforced Concrete Members (3) Ultimate strength and behavior of reinforced concrete members; relation between research results and current specifications for design. Prereq: 4410. W

5800 Urban Systems: Engineering and Management I (3) Management of various urban systems usually under city manager and/or city engineer. Organization, finance, personnel administration,
purchasing and equipment management and dealing with engineering consultants as each deals with municipal public works. Prereq: Graduate standing in Civil or Environmental Engineering or consent of instructor. W, A

5805 Urban Systems: Engineering and Management (3) Continuation of 5800. Management and engineering of urban systems, including lighting and cleaning and snow removal, water supply and wastewater drainage, solid waste, air pollution and the atmosphere, and the stormwater drainage system. Prereq: 5800. Sp, A

5810 Traffic Engineering—Characteristics (3) Driver-vehicle-roadway system; level-of-service concept of capacity. Coreq: Statistics 3450. 2 hrs and 1 2-hr lab. W

5820 Traffic Engineering—Operations (3) Fixed-time and volume-density controllers; progressive systems; one-way operations; reversible flows; system operation, including computerized networks; legal aspects of operational controls. Prereq: 5810. 2 hrs and 1 2-hr lab. W

5840 Geometric Design (3) Advanced theory and practice of geometric design of highways. Prereq: 4600. Sp

5850 Functional Design of City Streets and Urban Freeways (3) Effect of street systems upon urban growth. Analysis of the interaction of the design and function of streets; design features, including cross section, intersections, utility considerations, parking, effect of street design on regional and local planning; setting; lighting; freeway, frontage road, surface street system. Prereq: Consent of instructor. Su

5890 Urban Transportation Planning (3) Prediction of traffic demands and vehicular flows; land use planning; parking needs. Prereq: 5810. F

5870 Public Transit Planning (3) Person movement by bus, rapid rail and taxicab transit. Nature of public transit: its various roles and how it fit community's need; urban-rural preferences; modal split models; total social, political, economic and technical impacts of public transit. Prereq: 4600 or graduate standing. W, F

5890 Traffic Accident Reconstruction (3) Proper traffic accident data collection and analysis as basis of designing accident prevention or control programs. Many contributing factors to an accident; approximate and secondary accident causes as they relate to roadway improvements. Prereq: 4640 or 5810 or consent of instructor. Sp, A

5900 Special Problems in Civil Engineering (1-9) To fulfill the special problem requirement in the non-thesis program. Enrollment limited to civil engineering graduate students. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/NC only. E

5910-20-30 Special Topics (3, 3, 3) Analysis and data collection and analysis as basis of traffic accident data collection and analysis. Prereq: 5670. Sp, A

6880 Planning Models for Transportation System I (3) Analysis of traffic and transportation systems using mathematical, statistical, and computer science techniques. Modal split, trip distribution, and trip assignment. Mathematical, statistical, and computer science techniques in modeling process. Models integrated for urban transportation planning process. Prereq: 6880. Sp, A

6910-20-30 Special Topics in Civil Engineering (3, 3, 3) Selected advanced problems of current interest in civil engineering. Prereq: Consent of instructor. E

Environmental Engineering

3000 Introduction to Environmental Engineering (3) Introduction to human interaction with the air, water, and land environment in which one lives; role of engineering in environmental control. F, W

4030 Environmental Engineering Chemistry (3) Fundamentals of chemistry related to generation, formation, and removal of environmental contaminants. Analytical techniques for evaluation of specific air, water, and soil pollutants. Prereq: 3000 and Chemistry 1130. F

4150 Urban Water Management (3) Introduction to urban water modeling; evaluation of optimum urban water policies; formulation of system control and analysis of decision-making process; management of storm water for beneficial use. Prereq: 3000 and 3330. Sp

4210 Water Resources Engineering Design (3) Elements of water resources systems and structures, including reservoirs, dams, control works, and open channel design. Dam safety control, environmental impact of reservoir projects. Prereq: 3330 or consent of instructor. F

4220 Water Resources Engineering Development (3) Multibjective evaluation procedures for comparing and selecting among water resources development alternatives; achieving project optimality, single- and multiple-project purposes, special topics in water resources engineering. Prereq: 3330 or consent of instructor. W

4330 Hydrologic Design (3) Application of frequency and regression analysis to hydrologic design of water resources systems; formulation of surface runoff and streamflow modeling; urban peak runoff design using kinematic wave theory; evaluation of effects of flashy time on streamflow, quality and quantity. Prereq: 3330. W

4510 Elements of Water and Wastewater Transportation Systems (3) Introduction to theory and design of water transportation and distribution systems and wastewater collection systems. Prereq: 3120 and 3330. F, W

4520 Elements of Water and Wastewater Treatment Systems Designs (3) Introduction to unit operations and processes employed in physical, chemical, and biological treatment of water and wastewater: Application of unit operations and processes in design of water and wastewater treatment plants. Prereq: 3000 and 3120. Sp, Su

4530 Sanitary Engineering Laboratory (3) Physical, chemical, and bacteriological analysis of water and wastewater. Prereq: 4030. 3 labs. W

4600 Solid Waste Management (3) Quantities and characteristics of solid wastes; collection methods and equipment; land disposal and incineration techniques; economics; planning; and management. Prereq: 3000. Sp

4700 Air Pollution-Air Resources Management (3) Introductory course on concepts of air pollution, analysis of relationship among emission sources, meteorology and topographic factors, and adverse effects on receptors; engineering approaches for air pollution control. Sp

4810 Water Law (3) Survey study in water law, including cases and water law doctrines. (Same as Water Resources Development 4810.)

4820 Environmental Engineering Law (3) Legal aspects of water and air pollution, drainage, land use controls and environmental impact statements with emphasis upon federal-state relations, recent legislation and court decisions, and enforcement. Prereq: Senior standing. F

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a 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

5150 Water and Urban Welfare (3) Social, environmental, and economic impact on planning and management of urban water systems. Emphasis upon regional and local flood problems; hydrologic and hydraulic developments; interdependence between environmental and development values, measurement of social well-being and quality of life parameters. Analyzing, modeling, and interpreting those relationships with selected case studies. Prereq: Consent of instructor.

5160 Planning and Utilities (3) Planning for adequate facilities for urban water systems, with emphasis upon federal-state relations, recent legislation and court decisions, and enforcement. Prereq: 5150. F

5170 Water and Urban Welfare (3) Social, environmental, and economic impact on planning and management of urban water systems. Emphasis upon regional and local flood problems; hydrologic and hydraulic developments; interdependence between environmental and development values, measurement of social well-being and quality of life parameters. Analyzing, modeling, and interpreting those relationships with selected case studies. Prereq: Consent of instructor.

5180 Water Law and Policy (3) Survey study in water law, including cases and water law doctrines. (Same as Water Resources Development 5180.)


5250 Environmental Science and Mechanics 6310. Sp, A

5263 Remote Sensing Data Analysis and Interpretation (3) Multiobjective evaluation procedures for comparing and selecting among water resources development alternatives; achieving project optimality, single- and multiple-project purposes, special topics in water resources engineering. Prereq: 3330 or consent of instructor. W

5264 Remote Sensing Data Analysis and Interpretation (3) Multiobjective evaluation procedures for comparing and selecting among water resources development alternatives; achieving project optimality, single- and multiple-project purposes, special topics in water resources engineering. Prereq: 3330 or consent of instructor. W

5301 Stormwater Modeling I (3) Interpretation of hydrologic data using methods of systems analysis. Hydrologic components are analyzed as linear or non linear systems and the elements are modeled. Prereq: Consent of instructor.

5302 Stormwater Modeling II (3) Continuous...
streamflow records interpreted using methods of stochastic and deterministic time series analysis. Hydrologic design of water resources systems using streamflow simulation techniques including autoregressive and fractional gaussian noise models. Prereq: Consent of Instructor. Sp.


5330 Descriptive Hydrology (3) Occurrence and description of elements of hydrologic cycle, effects on earth and resources, contaminant transport. Not for civil engineering majors. (Same as Water Resources Development 5330.)

5400 Introduction to Environmental Systems (3) Models of air and water quality, water resources, solid waste disposal, and location of central facilities; exposure to current literature on environmental management problems; optimization of these systems. Prereq: Engineering 4800 or consent of instructor. Sp.

5501 Water and Wastewater Treatment Theory I (3) Theory and unit processes employed in sanitary engineering. Prereq: 4520. F.

5502 Water and Wastewater Treatment Theory II (3) Theory of physical, chemical, and biological processes employed in sanitary engineering. Prereq: 5501. W.


5530 Environmental Engineering and Natural Systems Behavior (3) Relationship between environmental engineering and natural processes, focusing on eutrophication and limiting nutrient concentrations, and research and translation into law and wastewater engineering practice. Seminar-open discussion format. Prereq: Graduate standing or consent of instructor. Sp.

5550 Water Quality Management (3) Water quality control objectives, methods, and philosophies; water quality criteria; effect of various uses on water quality; receiving water characteristics and waste assimilation capacity, regulatory standards, economic considerations. Prereq: 3000 or consent of instructor. W.

5561 Environmental Management of Water Quality (3) Groundwater quality control; processes and constituents of water quality as a dimension of water; effects of agriculture, domestic, and industrial use upon water quality; legal and administrative natural system behavior; focusing on eutrophication and limiting nutrient concentrations and research and translation into law and wastewater engineering practice. Prereq: 3000 or equivalent. Sp.

5562 Microbiology for Sanitary Engineers (3) Microorganisms and microbiological processes significant in sanitary engineering, including basic microbiology, detection and identification, enzymes, metabolic reactions, energy transfer, synthesis and breakdown. Prereq: Consent of instructor. F.


5600 Solid Wastes (3) Magnitude and characteristics of the solid waste problem, methods for collection and disposal of solid wastes, including sanitary landfills, composting, recycling, and management of solid waste. Prereq: Graduate engineering major or consent of instructor. F.

5610 Solid Waste Disposal (3) Problems in the areas of landfill design and costing, incineration design and costing, and special topical areas. Prereq: 5600. W.


5700 Planning and Air Pollution Control (3) Relations between air pollution, area development, and urban growth; problems of air pollution. Social, economic, and political processes involved in air pollution control. Prereq: 5710. F.

5710 Air Pollution Control Engineering (3) Emission control systems for industrial and power generating processes, stack sampling methods, air monitoring, dispersion of pollutants, Prereg: 4700 and Engineering Science and Mechanics 3110. F.

5720 Air Pollution Particle Collection Theory (3) Mechanics of particles suspended in gaseous medium including particle motion, coagulation, and aerodynamic capture of particles. Prereq: 4700 and Engineering Science and Mechanics 3110. W.

5725 Air Quality Modeling and Impact Assessment (3) Techniques to assess the air quality impact of major transportation projects and industrial air pollution sources. Application of atmospheric dispersion models and evaluation of meteorological and air quality data. Prereq: Graduate standing; Computer Science 3150. Sp.

5730 Air Pollution Control Device Design (3) Design and evaluation of systems used to control emission of gases and particulate pollutants. Computation of effective design of specific devices and systems. Prereq: 5720. Sp.

5735 Industrial Source Sampling (3) Sampling methodology for air pollution emissions from industrial processes. Prereq: Graduate standing, 2 hrs and 1 lab. Su.


5750 Turbulence in the Atmosphere (3) Theoretical boundary layer mean wind and temperature profiles derived and related to observations. Estimating surface fluxes, energy spectra, and cospedra. How theories can be applied to describe changes in turbulence in air flow over urban areas. Mechanisms of formation of clear air turbulence in shear zones in free atmosphere. Prereq: 5740.

5760 Diffusion in the Atmosphere (3) Movement and dilution of natural or man-made material released into the atmosphere. Rise of buoyant plumes, relation between Eulerian and Lagrangian spectra, differences between instantaneous and conditional time series, diffusion in a zone of wind shear and diffusion from urban area sources. Prereq: 5740.

5900 Special Problems in Environmental Engineering (1-9) To fulfill the special problem requirement in the non-thesis program. Enrollment limited to environmental engineering students in the non-thesis program. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/N only. E.

5910-20-30 Special Topics (3, 3, 3) Problems and topics related to current developments in field of environmental engineering not included in other courses. E.

5990 Environmental Engineering Seminar (1) All students. Prereq: Consent of instructor.

6000 Industrial Waste Treatability and Process Controls (3) Characteristics of industrial wastes; treatment alternatives related to ultimate disposal, treatability and process control studies of processes, chemical and biological processes using laboratory bench-scale treatment units. Prereq: 5513 and 5593. Field trips, 2 hrs and 4 labs. Su.

6220 Advanced Theory and Applications in Water Resources Engineering Systems (3) Advanced theory on convective and conductive heat transfer, turbulent heat diffusion and mass transport mechanisms in open channels, applications in evaporation, thermal plant discharge heat dispersion, and stratified flow phenomena. Prereq: 6110 or equivalent. F.

6910-20-30 Special Topics in Environmental Engineering (3, 3, 3) Selected advanced problems of current interest in environmental engineering. Prereq: Consent of instructor. E.

NOTE: Prerequisite to all graduate courses: Consent of instructor.

Electrical Engineering

MAJOR DEGREES
Electrical Engineering M.S., M.E., Ph.D.

Professors: J. M. Goohe, Head; Ph.D. Georgia Institute of Technology; D. W. Hendrickson, Ph.D. Wisconsin, P.E.; J. M. Bailey, Ph.D. Georgia Institute of Technology; A. O. Bishop, Ph.D. Clemson, T. V. Blalock, Ph.D. Tennessee; R. E. Bodenheimer, Ph.D. Northwestern; R. C. Gonzalez, Ph.D. Florida; W. L. Green, Ph.D. Texas A&M; G. W. Hoffman, Ph.D. Harvard; E. C. Huebschman, Ph.D. Texas; J. C. Hung, Ph.D. Pennsylvania State; E. J. Kennedy, Ph.D. Pennsylvania State; W. O. Leftell (Emeritus), M.S. Tennessee; M. O. Pace, Ph.D. Georgia Institute of Technology; P. Z. Pesables, Ph.D. Pennsylvania; J. F. Pierce, Ph.D. Pennsylvania State; R. W. Rochele, Ph.D. Maryland; J. R. Roth, Ph.D. Cornell; B. Smith, M.S. Illinois; P. E. C. Symes, Ph.D. Oregon; J. D. Tillman, Ph.D. Auburn; C. H. Weaver, Ph.D. Wisconsin, P.E.


Assistant Professors: R. J. Birdwell, Ph.D. Massachusetts Institute of Technology; J. S. Lawler, Ph.D. Michigan State.

MASTER OF SCIENCE PROGRAM
Graduate work leading to the Master of Science degree in Electrical Engineering may be elected as a full-time study, as a two-year accelerated program of full-time study, or the degree may be obtained in two or three years of study in the evening. Graduate assistantships are available for outstanding students, who may obtain the Master's degree in one calendar year.

Specific departmental requirements include:
1. Electrical Engineering 5070-80 and 5710. Electrical Engineering 5710 is normally available in both fall and spring quarters. Students electing courses such as 5560-50, 5720-30, or 5760-50 which require 5710 as a prerequisite should register for 5710 in the fall quarter.
2. Nine quarter hours of graduate credit in
mathematics consisting of Mathematics 4710, 4550, and 4250, or 4510-20-30. Other 4000-5000 level mathematics courses approved by the student’s Master’s committee must be substituted for any of the above course material covered in undergraduate curricula.

3. An additional 18 quarter hours of 5000-level work in electrical engineering or 9 quarter hours of 5000-level work in one area of electrical engineering and 9 quarter hours of 5000-level work in another area approved by the student’s Master’s committee. The 18 quarter hours of 5000-level work in Electrical Engineering must be divided equally between two different electrical engineering areas.

4. Master’s thesis, totaling 9 quarter hours or more.

5. A final oral examination covering the thesis and related course work.

MASTERS OF ENGINEERING PROGRAM

A graduate program leading to the Master of Engineering degree is available to qualified graduates of ECPD-accredited undergraduate curricula in electrical engineering or its equivalent.

Specific degree requirements which must be fulfilled include:

1. Electrical Engineering 5070-80 and 5710.

2. Nine quarter hours of graduate credit in mathematics consisting of Mathematics 4710, 4550, and 4250, or 4510-20-30. Other approved 4000-5000 level mathematics courses must be submitted for any of the above course material covered in undergraduate work.

3. An additional 18 quarter hours of 5000-level work in electrical engineering or 9 quarter hours of 5000-level work in one area of electrical engineering and 9 quarter hours of 5000-level work in another area approved by the student’s Master’s committee. The 18 quarter hours of 5000-level work in electrical engineering must be divided equally between two different electrical engineering areas.

4. Master’s thesis, totaling 9 quarter hours or more.

5. A final oral examination covering the thesis and related course work.

A minimum of one-third of the program must be in electrical engineering, and one-third or more.

The 18 quarter hours of 5000-level work in electrical engineering must be divided equally between two different electrical engineering areas.

6. Participation in departmental seminars.

The 72 quarter hours of course work must satisfy the following requirements:

a. A minimum of 36 quarter hours of work in electrical engineering at the 5000 and 6000 level.

b. A minimum of 12 quarter hours of 6000-level course work. At least 3 quarter hours of this must be in an area other than the student’s major area.

c. A minimum of 9 quarter hours of mathematics, including Mathematics (or Physics) 5610-20-30 and 9 hours of mathematics at the 4000 level or above.

Courses required in electrical engineering undergraduate curriculum cannot be used in either the M.S. or Ph.D. programs. In addition, 4000-level courses in electrical engineering may not be used if 5000-level courses are available in the same area.

Many of the numerical engineering courses are offered in the evening. Engineers working in industry are encouraged to participate in the department’s graduate program.

Departmental graduate programs providing special opportunities for academic and research work in areas pertinent to atmospheric and space flight are also available at the Space Institute, Tullahoma.

3010 Transient Analysis (3) Analysis of transient response of electrical systems using transform methods and classical differential equation methods for system analysis; complex frequency concepts for pole-zero zero concepts; applications to engineering problems. Prereq: 2303.

3040 Basic Communication Systems (3) Fourier series and transforms; network response to signals and noise; Elements of amplitude, frequency and phase modulation systems for analog messages. Prereq: 2030.

3110 Basic Electrical Engineering—Circuits and Devices (3) For non-electrical engineering majors. Prereq: 2301. 3 hrs including occasional labs.

3150 Basic Electrical Engineering—Circuits and Devices (3) For non-electrical engineering majors. Prereq: 2301. 3 hrs including occasional labs.

3180 Basic Electrical Engineering—Devices (3) Physics and properties of semiconductor devices. Prereq: 2301. 3 hrs including occasional labs.

3350 Energy System Operation (3) Synchronous machines, transmission-lines, and transformers as power system elements; power system operating conditions; steady-state stability, per unit calculation, symmetrical components, and fault studies. Prereq: 3060 includes biweekly lab.

3810 Linear Systems Analysis (3) Steady-state and transient response; frequency-modulation, time-modulation, and other techniques of advanced power production. Prereq: Physics 2310-20-30. 3 hrs including biweekly lab.


Introduction to Feedback System Design (3) Mathematical formulation of control systems; steady state error and error constants; root-locus methods; optimum gain adjustments; compensation networks; introduction to compensation. Prereq: 3720. Lab optional.

Power System Components and Control (3) Analysis of power system components and their interconnection. Studies in control of power and frequency as well as voltage and reactive power. Prereq: 3090.

Power Systems Analysis (3) System studies including load flow, faults, and stability. Prereq: 3090.

Transmission, Distribution, and Protection (3) Studies in underground and d.c. transmission; consideration of over-voltages and insulation requirements; system protection against faults. Prereq: 3090.

Lasers and Masers (3) Introduction of principles of laser and maser action based on classical concepts and electrical engineering analogies. Consideration of practical devices and applications.

Plasma II (3) Magnetohydrodynamics. Prereq: 3192.

Plasma III (3) Macroscopic plasma equations, particle orbits, interactions, oscillations and waves. Prereq: 3190.


Electro-optics Detection and Instrumentation (3) Sensitivity, resolution (frequency response) and noise concepts of and practical engineering data for both spatial recording media (e.g. photographic emulsions) and temporal detectors (e.g. photo-diodes) will be given. The last third of the course will be devoted to selected electro-optic instrumentation systems (e.g. laser light scattering, optical data processing, holographic interferometry).


Electro-Acoustics (3) Reproduction of monochromatic and stereophonic sound, microphones, loud speakers, disc recording, magnetic recording, film recording; acoustics of studios, auditoriums.

Analog Signal Processing Circuits for Electronic Instrumentation (3) Operational amplifiers, instrumentation amplifiers and other integrated circuits in signal processing. Active filters, amplifiers, attenuators, function generators, active rectifiers, and synchronous demodulators. Analysis of inter- and intramodule transfer and intermodulation characteristic of Argus and microprocessors. Prereq: 3630. 3 hrs including project laboratory.


Sequential Machine and Digital System Theory (3) Considers design aspects of pulse-mode, clock-mode, and level-mode sequential circuits. Theory and characteristics of one- and two-dimensional iterative networks. Design of large scale space- and time-serial scale integration and digital systems. Introduces principles of reliability and error detection in digital systems. Prereq: 3180. 3 hrs including project lab.

Digital System Organization and Design (3) Considers system organization of digital signals including microcomputer and microprocessor architecture and instruction set. Characteristics of ALU and CPU structures, storage systems (RAM, ROM, and PROM building blocks), and input-output systems. Concepts developed: control unit organization including serial-parallel modes of operation, asynchronous modes of operation and microprogramming. Prereq: 3180. 3 hrs including biweekly lab.

Bioelectric Instrumentation (3) Nature and origin of bioelectric potentials, transducers, amplifier design, recording systems and noise problems.

Electronic Amplifiers (3) Feedback amplifier principles. Wideband linear amplifiers. Audio and radio-frequency power amplifiers. Prereq: 3830, 3720. 3 hrs including project laboratory.

Communications Electronics (3) Receiver and transmitter circuits for communications. Prereq: 3040, 3830. 3 hrs including project laboratory.

Digital Integrated Electronics (3) Comparison of gates, flip-flops, registers, counters, memories, analog switches, A/D and D/A conversion, clipping, clamping and sweep circuits. Prereq: 3830, 3720. 3 hrs including project laboratory.

Integrated Circuits (3) Processing and fabrication of active and passive components for monolithic and hybrid circuits. Design techniques for linear and digital circuits. Prereq: 3830. 3 hrs including project laboratory.


Hardware-Software Interface in Microcomputer and Microprocessor System Design (3) Presents microcomputer and microprocessor interface design. Hardware-software interaction and trade-offs. Priority interrupt structures are discussed and utilized. Telecommunications are developed. Project oriented, contract course. Completion of two projects, one utilizing a minicomputer and the other a microcomputer is required. Prereq: 3180.

Discrete-Data Systems (3) Introduction to pattern recognition within framework of artificial intelligence. Topics dealing with the design of learning and adaptive machines. Typical applications of pattern recognition to problems of practical significance. Computer simulation of elementary pattern recognition problems. Prereq: Either 3160 and Computer Science 4540 or Computer Science 1510. (Same as Computer Science 4820.)

Image Processing (3) Principal methods for coding, storing, and processing images by means of digital computers. Computational algorithms for image operations. Prereq: 3100 and Computer Science 1510. Prereq: Either 3160 or Computer Science 1510. (Same as Computer Science 4830.)

Small Computer Systems (3) Basic structure of small computer systems and output techniques, interrupt structures, peripheral devices, system software and assembly language programming. Course is project oriented. Prereq: Basic Engineering 1410, Computer Science 1510 or 3150 or consent of instructor. (Same as Computer Science 4850.)

Electrical Engineering Problems (3, 3) Problems in electrical engineering involving library research and experimental research.

Thesis (1-15) E

Electrical Engineering Research (3, 3, 3)

Modern Transform Methods (3) Laplace transform and complex variable theory. Z-transforms, difference equations and distributed parameter systems.


Network Synthesis and Design (3) Frequency domain and time domain synthesis of network functions; realization of one-port two-port networks by R, L, and C elements; approximation problem and filter design; computer aided techniques. Prereq: 5070 or equivalent.


Bioengineering Systems I Models, Systems Analysis and Simulation (3) Modeling techniques applied to physiological systems. Systems properties; resistance, impedance, and storage are investigated. Analog and digital simulation of biological systems. Prereq: 4570 or consent of instructor.

Bioengineering Systems II Bioelectric Phenomena (3) Phenomena associated with biological systems as stimuli and responses. Quantitative theories in neurophysiology and electrophysiology and electrocardiography. Prereq: 4660 or consent of instructor.

Bioengineering Systems III Instrumentation and Analysis (3) Process by which information is gathered and transmitted from biological system under test and process by which this information is treated, to signal analysis and modeling, to maximization of meaningful information about original biological system. Prereq: 4660 or consent of instructor.


Advanced Electrical Machinery Applications (3) Motors, generator and control, energy behavior; analog and digital control, and other speed control techniques; variable frequency operation. Prereq: 5210.


Advanced Electrical Machinery Applications (3) Motors, generators and control, energy behavior; analog and digital control, and other speed control techniques; variable frequency operation. Prereq: 5210.

Modern Systems Theory I (3) Introduction to linear systems theory. State-space model, linear dynamical system, state transition map, matrix exponential, controllability, observability, and control theory, pole placement, observers, stability theory for linear systems. Prereq: Consent of instructor.

Modern Systems Theory II (3) Optimal estimation theory. Probability theorem and stochastic processes, uncertain dynamical systems, estimation and filtering theory, Wiener filtering, the Kalman filter and recursive estimation. Prereq: 5271 or consent of instructor.

Modern Systems Theory III (3) Optimal control theory. Deterministic optimal control theory, minimum principle, optimal control of distributed parameter systems, dynamic programming, stochastic control theory,
5440 Distribution System (3) Electric power distribution with particular reference to utility systems. System organization, planning, design, and regulation. Prereq: 4410, 4420, 4430 or equivalent.

5460 Selected Topics in Power Systems (3) To meet special needs of students. Possible topics: power system planning, reliability, and economic aspects of system design; theory of power plant operation, electrical transients in power systems, and system power relay. Prereq: Consent of instructor. May be repeated with consent of department.

5510-20-30 Advanced Analog Electronics (3,3,3) Physical operation of modern electronic devices with emphasis on microelectronic devices. Topics include diodes, bipolar transistors, J-FETs, and MOSFETs. Small-signal equivalent circuits and noise models of active devices. Linear and non-linear high-frequency amplifiers and feedback circuits, including switching regulators. Use of specialized electronic systems in analog signal processors. Advanced topics in analog electronics from current literature. Prereq: 4370, 4600, 4680, 4740 or consent of instructor. Coreq: Math 4510 or 4710. Project laboratory included.

5540-Thick-Film Hybrid Microcircuits (3) Processing and basic design techniques for prototype production of hybrid-thick-film integrated circuits; from circuit design to fabrication and testing of microcircuit or thick-film pastes; cost-effective design techniques. Project oriented, includes biweekly laboratory.

5570-80-90 Advanced Electronic Switching Circuits (3,3,3) Linear and non-linear active circuits used in analog and digital systems; discrete, monolithic, and hybrid configurations; clipping and clamping circuits, negative resistance circuits, amplifiers, oscillators, filters, mixers, analog multiplexers, switched-capacitor circuits, and analog-to-digital and digital-to-analog converters, and digital memories. Prereq: 4700 or consent of instructor. Project laboratory included.


5615-25 Introduction to Switching Theory and Logic Design (3,3) Boolean algebra and applications. Combinational switching circuits. Sequential machines. Information structures and sub-systems. For computer science majors and those without prior experience in hardware and logic design. Prereq: Elementary linear algebra and calculus of several variables. 4 labs per quarter.

5630 Digital System Architecture (3) Organization of system of system level characteristics such as memory hierarchy, input-output considerations, Microprogram control, Pipeline processing, Interface standards. Prereq: 4610-25-30.


5650-60 Electronic Communication Systems (3,3) Information transmission in communications systems; mathematical treatment of modulation and demodulation in analog and pulse-type systems. Bandwidth requirements, noise, system performance in noise. All modern systems; emphasis on digital data systems. Prereq: 5710.

5707-80 Pattern Recognition (3,3) (Same as Computer Science 5640-50.)

5690 Artificial Intelligence (3) (Same as Computer Science 5210.)

5710 Random Process Theory for Engineers (3) Probability and random variables as approaches by set theory. Stochastic process and transformations of random variables. Random processes, stationarity, correlation functions and temporal analysis, power spectra and applications to the response of systems to random signals.


5740 Digital Processing of Signals (3) Analysis of discrete signals; sampling theorem and its implication; frequency domain design of digital filters; time domain design of digital filters; processing of digital signals; discrete Fourier transform. Prereq: 4100 or equivalent.


5770 System Identification (3) Various identification schemes; deterministic, stochastic, and hierarchical methods. Applications in all areas of engineering and science. Prereq: Consent of instructor.

5800 Power Transmission Lines (3) New and unconventional power transmission systems. Transmission line parameters for overhead and underground lines. Corona and radio interference of high voltage transmission. Insulation coordination and protection. Design procedures for high voltage transmission. Prereq: 4120-20-30 or equivalent.

5810-20 Electromagnetic Fields (3,3) Vector analysis. Maxwell’s equations, special relativity, plane waves, reflections, waves in anisotropic media, guided wave lines, rectangular and cylindrical wave guides, radiation from current elements. Coreq: Mathematics 4510 or 4710.

5830 Linear Antennas and Antenna Arrays (3) Polarization, dipole, line, monopole, impedance loop antennas, receiving antennas, linear arrays. Prereq: 5820.


5850 Microwave Electronics (3) Space charge waves on electron beams, coupling between beams and guided waves, Klystrons, magnetrons, traveling wave amplifiers and backward wave oscillators. Prereq: 4710.

5860 Electromagnetic Wave Propagation (3) Wave propagation in isotropic and anisotropic media, transmitted power, stored energies, propagating and nonpropagating modes, orthogonality properties, boundary and radiation conditions, sources. Prereq: 5820.


5940-50 Advanced Small Computer Systems (3) Real-time applications, memory and CPU organization, interface software, and peripheral devices of microcomputer and microprocessor systems are studied. Project-oriented supported by hardware and software interface design. Prereq: 4850 or equivalent or consent of instructor. (Same as Computer Science 5940-50.)

6000 Doctoral Research and Dissertation (3-15) E

6240-50-60 Special Topics in Quantum Electronics (3,3,3) Advanced topics in quantum electronics and quantum information theory. Prereq: consent of instructor.

6250-65-70 Special Topics in Quantum Electronics (3,3,3) Advanced topics in quantum devices and quantum information theory. Prereq: consent of instructor.
Engineering Science and Mechanics

**MAJOR DEGREES**


Ph.D. Tennessee; L. R. Schobe, M.S., Kansas State (Emeritus); P.E., D. G. Thomas, Ph.D., Ohio State, P.E.

**Associate Professors:** L. Adler, Ph.D., Tennessee; A. J. Baker, Ph.D., New York; D. A. Homan, B.S., Manitoba; P.E.; R. J. Jandrudco, Ph.D., Virginia, P.E.; K. H. Kim, Ph.D., North Carolina State, A. Mathews, Ph.D., Illinois, P.E.; W. E. Scott, Ph.D., Johns Hopkins, J. E. Stoneking, Ph.D., Illinois, P.E., R. S. Tomars, M. D. Tennessee; J. Wassermann, Ph.D., University of Cincinnati, P.E.

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 options include solid mechanics, fluid mechanics and biomedical engineering. In the biomedical and engineering science options, interdisciplinary programs are arranged to meet individual needs or interests. Each advisor will be assigned 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. 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 program options are intended to be of particular interest to prospective students currently employed in research, development, or design activities and whose interests in continuing education (either full-time or part-time) lie at one of the interfaces between science and engineering, or can best be served by interdisciplinary study in engineering. The department's course offerings and research activities are also intended to meet the needs of students who seek employment in engineering areas requiring specialization in mechanics, or in related interdisciplinary studies such as biomechanics.

**THE MASTER'S PROGRAM**

**Two M.S. plans are offered:** Plan I requires a thesis, while Plan II does not. The second plan is offered to meet the needs of engineers employed in industry, or those who plan to teach in community colleges and technical institutes. It will be available, however, to any student who, in the opinion of his/her advisory committee, can benefit from additional course work more than from work on a thesis.

In Plan I a minimum of 45 quarter hours, including the thesis, is required. In Plan II a minimum of 48 hours is required. The requirements include the following:

<table>
<thead>
<tr>
<th>Hours Credit</th>
<th>Plan I</th>
<th>Plan II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics</td>
<td>18</td>
<td>27*</td>
</tr>
<tr>
<td>Engineering courses</td>
<td>9</td>
<td>9</td>
</tr>
</tbody>
</table>

*Engineering courses under Plan II may include advanced laboratory work or special project work, for example Engineering Science and Mechanics 5910 or analogous courses under other departments.

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 appropriate for engineering courses.)

**Thesis**

A final examination is required under both plans, covering graduate course work and the thesis (if any).

**THE DOCTORAL PROGRAM**

General policies and requirements of the Graduate School relating to admission, residence, languages, research, examinations, faculty advisory committee, and admission to candidacy apply to this program.

Specific departmental requirements for the Ph.D. degree include:

1. A minimum of 108 quarter hours credit beyond the Bachelor's degree, exclusive of credit for the Master's thesis. These shall include a minimum of 36 quarter hours credit in Doctoral Research and Dissertation and a minimum of 72 quarter hours credit in other courses.

2. A minimum of 36 quarter hours in engineering graduate courses, exclusive of thesis and dissertation credit. These courses will normally be numbered 5000 and above, with at least 12 quarter hours of 6000-level courses, which constitute one or two areas of concentration selected by the student. The number of courses in this group to be taken will depend on the program selected by the student and the approval of his/her advisory committee.

3. A minimum of 18 quarter hours in mathematics or computer science in courses numbered 4000 and above, exclusive of a first course in ordinary differential equations.

4. A minimum of 9 quarter hours of courses numbered 5000 and above, offered in departments other than mathematics, computer science, and the student's major department and which are not included in the areas of concentration under item 2.

5. Active participation in graduate seminars and colloquia.

6. Preliminary examination consisting of a written qualifying examination and an advanced examination. The qualifying examination covers areas of engineering science and mathematics, for the most part at a level and scope expected of well-qualified recipients of a Bachelor's degree in engineering. The advanced examination requires demonstration of special competence in the areas of concentration selected by each student. The examination is also of the same level and scope as the preliminary examination.

7. Submission of a written proposal for dissertation research to the student's advisory committee. Oral defense of the proposal is normally required when the student takes the advanced portion of the preliminary examination.

8. Submission of a dissertation which meets the requirements of the Graduate School, the department, and the student's advisory committee.

**3311 Mechanics of Materials (4) Concepts of stress and strain; stress-strain relations and Mohr's circle; static analysis of members; area moment of inertia; stress and displacement analysis of axially-loaded
4510 Biomechanical Engineering (4) Designed to introduce the facets and opportunities of biomedical engineering with an emphasis on terminology and background knowledge for further courses in the field. Subjects include anatomy, physiology, and instrumentation of human systems. Coreq: Mathematics 2840 or consent of instructor.

4390 Medical Ceramics Laboratory (3) Surgical observations and laboratory experiments to illustrate design and application parameters. Design project or paper required. Coreq: 3430.

4520 Biomedical Fluid Mechanics (3) Discuss objectives, review in biological systems, project and/or term paper, re-evaluate the principles of mechanics and the properties of fluids as they apply to the human body. Prereq: Consent of instructor.

4590 Principles of Nondestructive Testing (3) As Same as Physics 4580.

4610 Experimental Stress Analysis (3) Basic concepts; theory, techniques, and instrumentation of stress analysis; theory and techniques of brittle coating method; introduction to other stress analysis methods. Prereq: 3310, Electrical Engineering 2020 or 3130. 2 hrs and a 3-hr lab.

4620 Dynamic Data Acquisition (4) Instrumentation of measuring systems for dynamic events and responses; signal conditioning; oscillographs, oscillographs, and magnetic tape recording; telemetry and data transmission; data processing. Prereq: 3311, 3700, Electrical Engineering 3120. 3 hrs and a 4-hr lab.


4810-20 Theory of Elasticity (3, 3) Advanced topics in mechanics of materials; foundations of three-dimensional linear elasticity. Prereq: 3410-20-30, and Mechanical Engineering 5540. 2 hrs and a 3-hr lab.

5050 Theory of Linear Viscoelasticity (3) Linear viscoelasticity of solids; quasistatic problems; vibrations problems; dynamic problems; stability problems; foundations of three-dimensional linear viscoelasticity. Prereq: 5800.


5790 Vibrations of Continuous Media (3) Equations of motion for strings, rods, beams, membranes, plates, and shells; natural modes and frequencies; response of damped and undamped components to applied dynamic loads; approximate methods of solution. Prereq: 5410 and Mathematics 4550.


5860 Advanced Fluid Mechanics (3) 3) Advanced topics in fluid mechanics with emphasis on the elementary theory of elasticity. Prereq: 3311 and Mathematics 4610.

5410-20 Theory of Elasticity (3, 3) Stress, strain in two dimensions; stresses and strains in tension, compression, shear, and bending; Mohr's circle; axiometric stress distribution; stress concentration; plate stress, plane strain. Prereq: 5800.

5430 Thermomechanics (3) Heat conduction, thermomechanical analysis; thermal stresses in beams, plates, and shells; thermal buckling problems. Prereq: 5410 or 5310-20-30, and Mechanical Engineering 5540.

5180 Finite Element Structural Analysis (3) (Same as Civil Engineering 5180.)


5130 Introduction to Turbulence (3) Macroscopic effects, analogies, statistical treatment, correlation functions, energy spectra, diffusion; application of turbulent jets and pipe flow. Prereq: 5800.

5110 Fluid Dynamics (3, 3) Kinetics of fluids, vorticity, conservation of mass, momentum, and energy; dimensionally symmetric stream functions; Navier-Stokes equation, exact solutions, creeping flow and boundary-layer approximations; nonviscous flow, potential theory, complex potentials, conformal mapping. Prereq: 5800.

5100 Stress Analysis (3) Stress, strain in two dimensions; stresses and strains in tension, compression, shear, and bending; Mohr's circle; axiometric stress distribution; stress concentration; plate stress, plane strain. Prereq: 5800.

5120-30 Advanced Mechanics of Materials (3, 3) Stress, strain in two dimensions; stresses and strains in tension, compression, shear, and bending; Mohr's circle; axiometric stress distribution; stress concentration; plate stress, plane strain. Prereq: 3311 and Mathematics 4610.

5210-20 Advanced Mechanics of Materials (3, 3) Stress, strain in two dimensions; stresses and strains in tension, compression, shear, and bending; Mohr's circle; axiometric stress distribution; stress concentration; plate stress, plane strain. Prereq: 5800.

5320 Advanced Mechanics of Materials (3, 3) Stress, strain in two dimensions; stresses and strains in tension, compression, shear, and bending; Mohr's circle; axiometric stress distribution; stress concentration; plate stress, plane strain. Prereq: 5800.


5310 Theory of Plates (3) Classical theory of bending of plates of various shapes; thick plates; plates of variable thickness; buckling and large deflection problems. Prereq: 5310-30-40.

5320 Analysis and Design of Thin Shell Structures (3) Geometry of surfaces, derivation of thin shell theory, and applications of theory for structural engineer. Prereq: 6310 or Civil Engineering 5160.


5340 Theory of Plasticity (3) Yield conditions; strain hardening and strain softening; flow equations; plastic potential; uniqueness theorems; extremum and variational principles; problems in perfectly plastic solids. Prereq: Linear plasticity. Prereq: 5410 and Mathematics 4550.

6100 Photoelasticity (3) Stress-optic law in three dimensions and index ellipsoid, rotational effects in thin plates, displacement and photoelasticity, techniques and applications of three-dimensional photoelasticity, scattered light method, dynamic photoelasticity, photothermal plasticity, and photoviscoseelasticity, recent developments in photoelasticity. Prereq: 5640, 5420 and consent of instructor. 2 hrs and 3 labs.

6710 Impact and Stress Waves in Solids (3) Mechanical impact; wave propagation in elastic solids; impact and waves in elastic rods, beams, and plates; contact problems in impact of elastic bodies; dynamic loading in viscoelastic and plastic materials; dynamic properties and materials. Prereq: 5410. Coreq: Mathematics 5630.

6800 Nonlinear Viscoelasticity (3) (Same as Polymer Engineering 6210)

6810 Energy Methods (3) Virtual work, minimum potential energy, and complementary energy; Castiglano’s theorem, Hamilton’s principle, and Laplace’s equations of motion; variational methods; examples from theory of structures, plates and stress analysis, and other selected topics. Prereq: 5710-20 and Mathematics 5610-20-30.

9190 Special Topics in Engineering Mechanics (3) Application of the special problems of interest in mechanics, worked either as group or individually. Prereq: Consent of instructor. May be repeated with consent of department.

Industrial Engineering

MAJOR DEGREES

Industrial Engineering

Assistant Professors:

E. L. Deporter, Ph.D., Virginia Polytechnic Institute; M. Eaton, M.S. Clarkson, P.E.; M. D. Fontan, M.S. Tennessee, P.E.

THE MASTER’S PROGRAM

A graduate program leading to the degree of Master of Engineering. Usually involves graduates of recognized undergraduate curricula in industrial engineering or to graduates of other engineering curricula who take up to 15 quarter hours of prerequisite course work. A non-thesis option with 45 hours of course work plus a 3-hour design project is available.

Graduate work in Industrial Engineering provides for concentrations in operations research, industrial administration, manufacturing and production systems, human factors engineering, and systems engineering. Either one or two minors may be elected in Engineering, Mathematics, Psychology, Business, Computer Science, Statistics, or Economics.

MASTER OF ENGINEERING PROGRAM

This professional degree program is intended as a culmination year in a five-year baccalaureate-master program which emphasizes engineering design and professional practice. Admission requiring a 3.0 average is recommended above plus the requirement of a Bachelor’s degree from an ECPD-accredited engineering program. This 45-quarter hour program requires 16 hours of course work in an industrial engineering elective, 12 hours of technical methods electives, 9 hours of industrial engineering design electives and 9-hour thesis or design project.

4060 Material Requirements System Design (3) Theory and applications of forecasting, production planning, inventory analysis, planning and control, and systems design and implementation. Design of the material requirements process as an integrated system. Prereq: 3510-20. Not available for graduate credit for industrial engineering students.


4100 Project Control with CPM and PERT (3) Study of project planning and control based primarily on “critical path” techniques, including resource allocation, network planning, and program evaluation. Prereq: 3510-20. Coreq: 4100.


4230 Scheduling Systems (3) Performance measures for job shop and flow shop scheduling, including both static and dynamic conditions, as well as techniques for development of scheduling plans. Deterministic and probabilistic dispatching conditions. Prereq: 3520.

4250 Work Measurement Applications (3) Application of truth and measuring techniques and incentive systems to the design of industrial work situations.

4290 Engineering Economy (3) Principles 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. Credit toward graduate credit for industrial engineering students.

4530 Case Studies in Engineering Economy (3) Extensive of basic engineering economy principles to actual problems faced by companies and regu- lated industries. Case studies taken from literature form basis of classroom discussion. Out-of-class assignment is made which involves working with local companies to evaluate make or buy options, leasing versus cash purchases, equipment re- placement studies, energy source economies. Prereq: 4520.

4540 Industrial Development (3) Application of mathematical or chemical which enter into successful establishment of engineering enterprise. Cost and location studies and market analysis to determine the commercial feasibility of new plants or projects.

4590 Simulation (3) Generation of outcome of complex random process by computer. Models of complex systems using available simulation languages. Simulations used to test design of systems. Prereq: 3430 and Computer Science 3150.

4830 Health Systems Engineering (3) Hospital management systems and means by which they may be improved. Emphasis on importance of systems engineering principles and techniques.

4850 Industrial Systems Analysis (3) Matrices and linear vector spaces for industrial systems models. Laplace and Z-transform techniques and applications to industrial systems. Prereq: 3510, 3520 and Mathematics 2860. Not available for graduate credit for industrial engineering students.

4910-30 Special Industrial Engineering Topics (3, 3, 3) Prereq: Consent of instructor. May be repeated with consent of instructor.

4950 Industrial Safety (3) Development of organization and programs for prevention and control of accidents with emphasis on OSHA Rules and Regulations.

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a 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

5110 Work Design (3) Advanced methods analysis of design and improvement of work systems, human factors, workers’ response and management participation. Prereq: Motion and time study or work measurement.

5210 Advanced Work Measurement (3) Characteristics of predetermined time systems, application to formula construction, and practice in application. Prereq: 3600 or 3620.

5240 Facilities Planning and Design (3) Modern materials handling techniques, computer-aided layout techniques, applications of operations research models and use of these to design manufacturing facility. Prereq: Production facilities planning or consent of instructor.

5250 Advanced Scheduling (3) Scheduling problems with mathematical closed form solutions. Application, analysis, and development of heuristic procedures for scheduling, Emphasis on objectives and constraints. Prereq: 4230.

5260 Information Systems Design (3) Systems engineering approach to information systems design. System model, analysis, and evaluation of information systems. Information objectives and design criteria. Optimization and simulation in system design.

5280 Production and Inventory Systems (3) Application of OR techniques to production and inventory systems. Closed form solutions, search techniques, and use of available computer codes. Prereq: 4250.

5340 Applied Decision Theory (3) Application of theory of decision making to problems in industrial engineering. Decision making under conditions of

College of Engineering 79


5600 Human Factors Engineering (3) Human characteristics which influence the design of tools, equipment, environments, and products. Modeling of human process as system controller. Prereq: Consent of instructor.

5610 Human Factors Engineering (3) Human characteristics which influence the design of tools, equipment, environments, and products. Modeling of human process as system controller. Prereq: Consent of instructor.


5701 Operations Research Applications (3) Survey of operations research techniques with emphasis on application to industrial engineering problems. Prereq: or coreq. Mathematics 2880 (or equivalent), Statistics 3450, computer programming. Available for credit only to students without a B.S. degree in industrial engineering.

5710 Linear, Quadratic and Dynamic Programming (3) Mathematical programming, linear programming, quadratic programming, and dynamic programming problems. Prereq: Computer Science 3150 and matrix algebra.

5720 Queuing Models, Inventory, and Simulation (3) Analysis of line models and inventory systems. System methods and computer simulations applied to inventory and waiting line problems. Network flow and minimal flow with applications to transportation and traffic control problems. Prereq: 5700 and 5930.

5730 Game Theory and Random Processes (3) Operations research including game theory with applications to decision making in competitive environment, and random processes with applications to queuing, inventory models and decision making. Prereq: 5360.


5830 Health Systems Engineering II (3) Health systems for analysis, control, and improvement of function and total health system. Prereq: 4830.


5900 Design Project (1-6) Industrial engineering projects, problem, and design project. Prereq. Enrollment limited to industrial engineering students in non-thesis program. May be repeated. Maximum 9 hrs.

5910-20 Special Topics in Industrial Engineering (3, 3, 3) Special problems for students qualified to do individual or group research projects. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.


6520 Operations Research Models in Engineering Economy Decision Making (3) Traditional capital planning and budgeting techniques; operations research approaches to capital budgeting problems. Mathematical programming and computer simulation. Interrelated problems, uncertain cash flows, and choice of appropriate evaluation criteria. Prereq. 5520, 5710.

6700 Nonlinear Programming (3) Optimization techniques for static and dynamic nonlinear systems subject to various constraints. Applying optimization theory to solve nonlinear optimization problems. Variable metric methods, search methods, constrained nonlinear programming, and penalty function methods. Prereq: 5700.


6910 Advanced Topics in Industrial Engineering (3) Will cover topics not covered in other graduate courses. A course for intermediate graduate students. Prereq. Consent of instructor. May be repeated with consent of department.

Mechanical and Aerospace Engineering

MAJORS

Mechanical Engineering

Mechanical Engineering

M.E., M.S., Ph.D.

Professors:


Associate Professors:


Assistant Professors:


GRADUATE STUDY PROGRAMS

Graduate programs in Mechanical Engineering or Aerospace Engineering are available which lead to the degrees of Master of Engineering, Master of Science, and Doctor of Philosophy with concentrations in fluid dynamics, aeroacoustics, aerodynamics, aeroelasticity, thermodynamics, propulsion, heat transfer, fluid mechanics, and gasdynamics. In addition to the general policies and requirements of the Graduate School, each student must satisfactorily complete a program of study which has been approved by the student's committee. Specific program requirements are given below.

MASTER OF ENGINEERING PROGRAMS

Entrance into the Master of Engineering program is restricted to qualified graduates of ECPD-accredited undergraduate curricula in mechanical or aerospace engineering. At least one-third of the program of study must be classified as engineering design. The student's advisor will assist in planning the program of study to ensure that it includes the necessary design content. Three program options (thesis, course, and problems) are described below. Note that some students may not be eligible for the course option.

MASTER OF SCIENCE PROGRAMS

Entrance into the Master of Science programs 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 (thesis, course, and problems) are described below. Note that some students may not be eligible for the course option.

MASTER'S PROGRAM OPTIONS

Three program options are available:

A. The Thesis Option. The requirements of this option are that the student must satisfactorily complete a program of study that includes:

1. A minimum of 36 quarter hours of course work which includes at least 18 quarter hours of graduate (5000-level or above) courses in graduate mechanical or aerospace engineering and normally 9 quarter hours of course work (4000-level or above) in mathematics.

2. A minimum of 9 quarter hours of credit in thesis.

3. Participation in the departmental seminar programs.

4. Submission and defense of a written thesis which demonstrates the ability to conduct and report on an independent investigation.

5. Passing a final examination on all work submitted for the degree.

B. The Course Option. Normally, this program is restricted to those students who have had significant engineering work 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 which includes:

1. An average of 3.0 or better in the course option.

2. A minimum of 36 quarter hours of course work which includes at least 18 quarter hours of graduate (5000-level or above) courses in graduate mechanical or aerospace engineering and normally 9 quarter hours of course work (4000-level or above) in mathematics.
satisfactorily complete a program of study that includes:
1. A minimum of 45 quarter hours of course work which includes at least 27 quarter hours of graduate (5000-level or above) courses in mechanical and/or aerospace engineering and normally 9 quarter hours of course work (4000-level or above) in mathematics. No minimum of hours of engineering coursework may be below the 5000 level.
2. Participation in the departmental seminar program.
3. Passing a comprehensive written final examination of course work submitted for the degree. The student's committee will be of sufficient size to include all the study areas reflected in the course program.
4. The Problems Option. The requirements of this option are that the student must satisfactorily complete a program of study that includes:
   1. A minimum of 36 quarter hours of course work which includes at least 18 quarter hours of graduate (5000-level or above) courses in mechanical and/or aerospace engineering and normally 9 quarter hours of course work (4000-level or above) in mathematics. Additional work may be credited in Selected Engineering Problems (5900).
   2. A written report must be presented for each problem investigated.
5. Participation in the departmental seminar program.
6. Passing a comprehensive written final examination of all course work submitted for the degree and an oral examination of all work (including problems) submitted for the degree. The student's committee will be of sufficient size to include all the study areas reflected in the course program.

THE DOCTORAL PROGRAM
Admission into the doctoral program will be granted to those applicants who have demonstrated superior achievement in their engineering backgrounds.

The student must satisfactorily complete an approved program of study which normally includes:
1. A minimum of 72 quarter hours credit beyond the Bachelor's degree, exclusive of credit for the M.S. thesis or problems.
2. A minimum of 36 quarter hours credit in doctoral dissertation.
3. A minimum of 18 quarter hours in mathematics in courses numbered 4000 or above.
4. A minimum of 36 quarter hours in mechanical and/or aerospace engineering courses numbered 5000 and above, with at least 12 quarter hours of 6000-level courses. These are exclusive of thesis, problems or dissertation credit.
5. Participation in the departmental seminar program.

GRADUATE CREDIT FOR UNDERGRADUATE COURSES

Junior (3000-level) and senior (4000-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 4000-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

3000 Energy—An Overview (4) Introduction to energy analysis—infrastructure, recovery and utilization; power generation techniques including conservation schemes; emphasis on the resource-energy-environment-human interaction associated with energy; primarily for non-engineering students.

3110 Applied Engineering Thermodynamics (3) Energy and laws governing energy transformations; thermodynamic properties; applications to engineering problems.

3111 Engineering Thermodynamics (3) Energy and laws governing energy transformations; thermodynamic properties.

3330 Engineering Thermodynamics (3) Properties of gases and mixtures; chemical reactions; equilibrium; applications to mechanical engineering problems.

3410 Fluid Flow (3) Development of continuity, momentum and energy principles for fluid systems; applications of mechanical and aerospace engineering problems.

3440 Heat Transfer (3) Heat transfer processes, heat conduction, thermal radiation.

3520-30-40 Thermal Sciences (3, 3, 3) Fundamental principles of thermodynamics and transport phenomena as applied to engineering design. To be taken in sequence.

3610 Mechanics of Machinery—Kinematics (3) Machine motions, graphical and analytical methods; instantaneous centers; velocities; accelerations.

3620 Mechanics of Machinery—Dynamics (3) Applications of Newton's laws, work, energy, and impact to machinery. Force analysis of mechanisms, balancing, gyroscopic effects, flywheels. Prereq: 3610.


3650 Introduction to Machine Design (3) Ductile-brittle behavior of materials under static and cyclic loading. Stress concentration, design factors and theories of failure. Changes in material behavior in processing and fabrication. 2 hrs and 1 1/2-hr lab.

3910 Engineering Analysis (3) Advanced analysis techniques for problems of aerospace and mechanical engineering. Emphasis on approximate methods.

4140 Energy Conversion Systems (3) Laws governing energy transformations and their application to power plants.

4150 Energy Conversion Systems (3) Operating and design characteristics of new technology energy conversion systems, selected direct conversion techniques.

4160 Energy Conversion Systems (3) Economic and technical design parameters as applied to power plants for public utilities or industrial applications; selected design and layout problems.

4170 Turbo-Machinery (3) Basic principles of turbo-machinery; systematic methods or analysis, design, performance evaluation.

4180 Energy Production and Utilization (3) Thermodynamic constraints on energy production; comparison of power generation methods; evaluation of new energy sources and concepts; energy conservation schemes.

4220 Environmental Noise (3) Basic principles of acoustics—measurement and control of noise in industrial and community environments.

4220 Heat Transfer (3) Heat transfer by free and forced convection, heat transfer in phase change, heat transfer in high speed flow, heat exchanger application.

4450 Lubrication (3) Hydrodynamic theory of lubrication of sliding bearings; application of Navier-Stokes equations to infinite and finite bearings; analytical and numerical solutions; applications to design.

4471-91 Experimental Mechanical Engineering (3, 3) Experimental methods and measurements of force, length, time, temperature, pressure, transport rates, and physical properties. Planning, conducting, analyzing, and applying experiments and test runs according to test standards and other specifications.

4510 System Dynamics (4) Analytical models of physical systems, linearization, Laplace transforms, dynamic characteristics and stability of systems, numerical simulations, and analog computer solutions. Not for non-graduate credit.

4520-30 Creative Design (3, 3) Application of engineering principles to the solution of current problems with emphasis on design innovation.

4621 Manufacturing Processes (3) Comparison of machining methods; plastic production; metrology.

4622 Tool Design (3) Principles underlying tool and die design, design of high-volume production tools and molds, work holding fixtures.


4624 Manufacturing Engineering Systems Design (3) Selection of manufacturing methods for a particular product, production planning, tool and fixture design, selection of manufacturing operations, redesign of product to reduce cost.

4625 Manufacturing Process Engineering I (3) Production specification: dimensional analysis of size and form; true position tolerance theory; tolerance analysis; and workpiece control for production to tolerances.

4631 Energy Methods in Mechanical Design (3) Application of strain energy principles in complex beams and structures.

4632 Application of Lagrangian Mechanics in Vibrations (3) Generalized coordinates and multiple degree of freedom vibrating systems.

4633 Matrix Analysis (3) Application of matrices to solution of complex structures and lumped parameter vibrating systems.

4660 Materials and Manufacturing Process (3) Selection of materials in design process, emphasizing relationship between stress and strain analysis, material properties, environment, temperature, manufacturing technology, and cost.

4670 Machine Elements (3) Application of strength and properties of materials, design factors, theories of failure to design machine elements, springs and shafting, selection of sleeve and rolling element bearings.

4680 Machine Elements (3) Application of strength and properties of materials, design factors, theories of failure to design machine elements, springs and shafting, selection of sleeve and rolling element bearings.

4690 Machine Design (3) Innovative design of complete machine; documentation including specifications, design calculations, working drawings and cost analysis. Written and oral report.

4710 Thermal Environmental Systems (3) Vapor compression and absorption cycles; heat pump systems; moist air properties; psychrometric processes.

4720 Thermal Environmental Systems (3) Design of air washers, cooling towers and extended surface coils; solar radiation, building heat transmission; physiological effects.

4730 Thermal Environmental Systems (3) Design of heating ventilation and air conditioning systems.

4740 Solar Energy Utilization (3) Nature and availability of solar radiation; review of selected heat transfer topics pertinent to solar energy collection and use; design and analysis of solar energy collectors and method of storage; selected applications.

4810 Internal Combustion Engines (3) Thermodynamic characteristics, internal combustion and propulsion engines. Combustion, detonation,
equilibrium, dissociation. Analysis of internal combustion engine using ideal and real fluids.


4910-20-30 Selected Topics in Mechanical Engineering (3, 3, 3) Problems related to developments and practice in mechanical engineering.

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a 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

5110 Conduction Heat Transfer (3) Analysis of steady state and transient heat conduction by analytical and numerical techniques. Prereq: 3910, 4420 and Mathematics 3150.

5120 Convection Heat Transfer (3) Equations of viscous fluid flow, energy equation, convection analysis of internal and external flows including effects of variable heat flux, surface temperature, and fluid properties. Prereq: 5310 or equivalent.


5140 Phase Change Heat Transfer (3) Prereq: 5120.

5210 Classical Thermodynamics (3) Macroscopic thermodynamics with emphasis on First and Second Laws, energy balance and thermal and mechanical engineering problems. Prereq: 5330.

5220 Microscopic Thermodynamics (3) Thermodynamic properties, kinetic theory and statistical mechanics. Prereq: 5210.

5230 Special Topics in Thermodynamics (3) Prereq: Consent of instructor.

5310 Intermediate Fluid Mechanics (3) Vector descriptions in fluid mechanics; derivation of basic equations; two-dimensional potential flows; viscous flows with emphasis on boundary-layer theory. Prereq: 3410.

5410-20 Research in Mechanical Engineering (3, 3, 3) Design of experiments, data analysis, experimental investigation.

5510-20-30 Mechanical Engineering Design (3, 3, 3) Design of mechanical engineering units and systems.


5610-20-30 Experimental Stress Analysis (3, 3, 3) Theory of elasticity; experimental methods; photoelasticity; experimental stress analysis; calibration of experimental devices; experimental techniques with laboratory experiments. Prereq.: 5640.

5630-50-60 Advanced Machine Design (3, 3, 3) Design of bearings, gears, shafting; lubrication.

5670-60-90 Dynamics of Machinery (3, 3, 3) Dynamics of machinery; vibrations; balancing flywheels and governors.

5710 Metal Machining (3) Analytical approach to mechanics of machining. Basic phenomena-plastic flow, fractures, friction and wear. Prereq: 3650, 3440, and Metallurgical Engineering 2110.

5800 Transfer Matrix Methods in Elastomechanics (3) Application of transfer matrix methods to static and dynamic lumped parameter elastic systems in mechanical engineering. Calculation of forced response, mode shapes, and natural frequencies of beams and rotating shafts having complex and conditionally symmetric lumped rotating shafts. Accuracy and numerical considerations. Prereq: Graduate standing in engineering and consent of instructor.

5810-20-30 Rocket Propulsion System (3, 3, 3) Rocket propulsion systems. Chemical, electrical and nuclear propulsion systems.

5840-50-60 Turbomachinery Systems (3, 3, 3) Design, development, and systems integration of turbomachinery systems. Prereq: First year graduate standing and consent of instructor.

5870 Dynamic Modeling and Simulation (3) Modeling physical systems including mechanical, thermal, hydraulic, chemical and electromechanical systems. Techniques for experimentally determining system parameters. Analog and digital computer simulation techniques. Prereq: 5630, 4420, and Aerospace Engineering 3511.

5900 Selected Engineering Problems (3-9) Selected problems in mechanical engineering to fulfill requirements of Program. Prereq: Consent of advisor. May be repeated. S/NC only.

5905 Seminars (1) All phases of mechanical engineering, including reports on current research at The University of Tennessee, Knoxville. May be repeated. S/NC only.

5950 Special Topics in Mechanical Engineering (1-3) May be repeated.

6000 Doctoral Research and Dissertation (3-15) E

6110-20 Advanced Topics in Fluid Mechanics and Heat Transfer (3-3) Advanced theory and applications of fluid mechanics and heat transfer; natural convection, two-phase flows, high speed reacting and non-reacting flows, advanced boundary layer techniques. Prereq: Consent of instructor.

6130-40 Advanced Radiation Heat Transfer (3, 3) Radiation heat transfer in absorbing, emitting and scattering media; interaction of thermal radiation with conduction and convection heat transfer; radiation heat transfer in hypersonic flow; radiative characteristics of gases; radiative transfer in gray gases; scattering by planetary atmosphere. Prereq: 5100-20-30; Mathematics 4550.

6420 Selected Topics in Thermodynamics (3) Comparative methods in the macroscopic approach: equilibrium of pure substance; macro-stable states. Prereq: Consent of instructor.

6430 Selected Topics in Thermodynamics (3) 6610 Engineering Vibrations (3) Mechanical transients. Linear and nonlinear single degree of freedom systems. Prereq: Consent of instructor.

Aerospace Engineering

3610 Dynamics (3) Newton's Law: work-energy impulse-momentum, Lagrange equations, central force, gynastic effects Applications to aerospace systems.

3620 Mechanical Vibrations (3) Free and forced vibrations of single and multiple degree vibratory systems, balancing of rotating machinery.

3630-40 Structural Analysis of Aerospace Vehicles (3, 3) Fundamentals of structural analysis as applied to configurations of aeroelastic interest. Introduction to aeroelasticity phenomenon. Must be taken in sequence.

4110 Aerodynamic Fundamentals (3) Atmosphere, dynamics and thermodynamics of perfect gases, fluid flow through inviscid theory, wing theory, drag. For non-aerospace engineering majors only.

4120 Aircraft Propulsion and Performance (3) Propellers, propulsion systems for aircraft, static performance and special performance problems, maneuvers, control surfaces, stability and control. For non-aerospace engineering majors only.

4210 Compressible Flow (3) One-dimensional internal flow; shock and expansion waves; friction and nonadiabatic flow.

4220 Low Speed Aerodynamics (3) Potential flow theory; kinematics and dynamics of perfect fluids; analysis and design of aerodynamic bodies.

4320 Viscous Flow (3) Boundary layer theory; laminar and turbulent flow; compressibility effects; numerical solution methods.

4420 Astronautics (3) Propulsion, trajectories, guidance, control, and atmospheric reentry of space vehicle systems.

4520 Propulsion (3) Principles of propulsion devices: turbojet, ram-jet, and rocket engines.

4620 System Design (3) Synthesis of aerospace system. Design report on the system.

4711-91 Experimental Aerospace Engineering (3, 3) Experimental methods and measurements of force, length, time, temperature, pressure, transport rates and physical properties, calorimetric and gaseous analysis, analyzing, and reporting experimental tests run according to test standards and other specifications.

4610 Airplane Performance (3) Introduction to airfoil and wing characteristics, drag; propellers; static performance and maneuvers; theory and design of control surfaces, stability.

4910 Selected Topics in Aerospace Science (3) Current problems in aerospace science and engineering required for an understanding of the several areas of aerospace science.

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a 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.

5110 Fundamentals of Aerodynamics (3) Kinematics and dynamics of perfect fluids; potential flow about a body; genetic method. Prereq: 4420 or Mechanical Engineering 5310, Mathematics 4250.

5120 Experimental Methods in Fluid Mechanics (3) Experimental techniques with laboratory experiments; hot wire anemometry and turbulence measurements, flow visualization, wind tunnel tests (supersonic and subsonic), combustor experiments, supersonic flow measurements, boundary-layer measurements. Prereq: 4210-20-30 or Mechanical Engineering 5310.

5150-60-70 Air Vehicle Aerodynamics and Performance (3, 3, 3) Application of aerodynamics to air vehicles to provide estimates of performance, stability, and control characteristics for subsonic to hypersonic speeds. Relations among thrust, drag, lift and altitude. Propulsion systems, vehicle performance characteristics, and trajectory optimization. Prereq: 4420.

5210-20 Aerodynamics of Compressible Flows (3, 3) One-dimensional flow; waves; small-perturbation theory, shock tube flow; viscous interactions; free molecule and rarefied gas flow. Prereq: 5240.

5250 Selected Topics in Aerodynamics (3) Transonic, supersonic, and hypersonic flow theories. May be repeated. Maximum 9 hrs.

5270-80-90 Aerospace Ground Test Facilities (3, 3, 3) Atmospheric models and similarity considerations. Aerodynamic similarity, wind tunnels, shock tubes, hotshots and ballistic ranges; propulsion test facilities for air breathing and rocket engines. Space environment, theoretical and practical considerations of space environment test facilities. Prereq.: 5240, Mechanical Engineering 5130 and 5250.

5310 Magnetohydrodynamics (3) Electromagnetic field theory; chemical kinetics, thermodynamic and thermophysical properties of gas plasmas; governing equations and applications. Prereq: 5220 and 4710.

5430-50 Atmospheric Entry (3, 3) Motion and heating along ballistic and lifting trajectories; dynamic stability; heat protection systems. Prereq.: 5250. Recommended: 5240.

5440-50 Transonic Flow (3, 3) Theoretical and experimental aspects. 5440—Nature of flow at transonic speeds and delimitation of non-linear nature of flow; strong viscous interaction, development of small disturbance equations and similarity parameters. Shock-wave in transonic flow and assumption of irrotational motion, solution techniques. Prereq. 5450—Shock-wave boundary layer interaction of conical or oblique shock waves and their effect on the flow field. Prereq.: 5440.
5210 System Dynamics (3) Transient analysis, La-place transforms, frequency response, stability (linear and non-linear), and sensitivity analysis by state variable methods. Dynamic analysis of distributed systems. Prereq: Consent of instructor. F

5220 Reactor System Dynamics (3) Application of methods of general system dynamics to reactor systems. Modeling of neutronic and non-neutronic processes. Dynamics, stability, and control of zero power reactors and power reactor systems. Prereq: 5210, 4130 or equivalent. W


5240 Reactor Instrumentation (3) Instrument components and systems for operation, control, and safety of nuclear reactors; role of instrumentation in public health and safety; engineered safeguards for nuclear power plants. Prereq: 4820, or consent of instructor. A

5310-20-30 Nuclear Systems Reliability (3, 3, 3) Systems reliability analysis as applied to nuclear systems. Qualitative and quantitative methods. Coreq: Statistics 3450. F; W; Sp

5310-20-30 Nuclear Systems (3, 3, 3) Various reactor types; flow diagrams, thermodynamic analysis, control methods, component descriptions of power systems using various reactor types and nuclear power economics. Prereq: 4610-20-30 or equivalent or consent of instructor.

5710-20-30 Nuclear Design (3, 3, 3) Analytical techniques for neutronic aspect of nuclear reactor core design. Multigroup discrete ordinate theory, multigroup PN theory, integral transport theory, perturbation theory, and others. Generation of required multigroup constants formulated with available point data and Nordheim treatment in slowing down region and gas kernel in thermal region. Prereq: 4130 or equivalent. F; W; Sp

5740 Reactor Shielding (3) Application of analytic solutions of Boltzman transport equation to shield design problems. Spherical harmonics, moments methods, numerical solutions, adjoint calculations, and invariant imbedding cases studied. Prereq: 4610. F


5840-50 Fast Breeder Reactors (3, 3) Special characteristics of fast breeder reactors; emphasis on LMFBR. Need for breeders; neutron physics and thermal characteristics of reactor core; development status of engineering components; fuel cycle cost analysis; safety; coolants other than sodium; world status of development.

5970 Special Topics in Nuclear Engineering (3) Lectures and recitation on recent advances in nuclear engineering. Prereq: Consent of instructor. May be repeated with consent of department.

5980 Nuclear Engineering Practice (3-13) Experiences in solving and reporting on engineering problems. Prereq: Approval of Nuclear Engineering Department. May be repeated. Only Alternate Plan students may take this course. S/NC only. E

6000 Doctoral Research and Dissertation (3-15) E

6110-20-30 Selected Topics in Reactor Theory (3, 3, 3) Transport theory, control rod theory, and perturbation theory. Selected topics from literature. Prereq: Consent of instructor. F, W, Sp

6140 Radiation Shielding (3) Advanced topics in radiation shielding. Monte Carlo techniques and space radiation problems. Natural space radiators, energy source radiators, dose conversion, probability. Selected neutron, gamma, and space-radiation shielding problems. Prereq: Consent of instructor. Sp

6150 Reactor Dynamics (3) Special topics in reactor dynamics and control. Prereq: Mathematics 5630. Su

6410 Selected Topics in Nuclear Systems Reliability Engineering (3) Advanced state-of-the-art topics in nuclear systems reliability engineering and risk assessment. Prereq: 5330 or consent of instructor.

6710 Two-Phase Flow and Heat Transfer (3) Pool boiling and flow boiling; hydrodynamics of two-phase flow, boiling crises, two-phase instabilities. Prereq: 5150 or equivalent. Su
College of Home Economics

Nancy H. Belck, Dean
Lura M. Olson, Emerita
Grayce E. Goertz, Associate Dean
Virginia S. Anagnost, Assistant Dean

Graduate study programs lead to the degree of Master of Science in Child and Family Studies; Consumer Studies and Housing; Public Policy; Interior Design and Housing; Food Science; Food Systems Administration; Vocational-Technical Education (concentration in home economics education); Nutrition; and Textiles and Clothing. Graduate study programs lead to the degree of Doctor of Philosophy in Home Economics with three options: interdisciplinary, food science, and nutrition. Graduate programs provide advanced specialized training needed for college and university teaching, for leadership positions in governmental and professional agencies, in the various professions in business, for secondary school and adult teaching, for research, and for extended services.

GENERAL REQUIREMENTS FOR GRADUATE STUDENTS

Requirements for graduate study are prescribed by the Graduate School and by the student's major department. Students lacking adequate preparation may be required to take additional courses at the undergraduate level as prerequisites to graduate study. A student deficient in English may be required to take courses as necessary to remove the deficiency.

APPLICATIONS FOR ADMISSION

Two copies of the student's transcript and an application for admission are submitted directly to the Graduate School. In addition, a College of Home Economics application and three letters of reference are sent to the Associate Dean of the College of Home Economics. (Forms may be obtained from the college.)

The Graduate Record Examination scores for the aptitude test including the quantitative, verbal, and analytical sections are required for the application for admission in the interdisciplinary doctoral program, the Master's program in Child and Family Studies, and the Master's program in Consumer Studies and Housing; Public Policy.

In submitting applications for admission to graduate study in home economics, students are requested to indicate choice of major area of study.

GRADUATE ASSISTANTSHIPS AND FELLOWSHIPS

Information and application forms regarding graduate assistantships, fellowships and general requirements for admission to graduate study may be obtained from the department head in the area of the student's major interest or from the Associate Dean of the College of Home Economics for the interdisciplinary doctoral program.

PROGRAMS LEADING TO THE DEGREE OF MASTER OF SCIENCE

Thesis Option

 Majors and minors are offered in the following areas:

- Child and Family Studies
- Consumer Studies and Housing: Public Policy
- Interior Design and Housing

< Requirements include Interior Design and Housing 5615 or Child and Family Studies 5110; Child and Family Studies 5700 or Planning 5100 or Economics 5340 or Agricultural Economics 4330, and Home Economics 5600. Three-hour course in research methods or statistics. Twenty-four hours in consumer studies or housing to include 9 hours of Child and Family Studies 5000 or Interior Design and Housing 5000.
- Consumer studies courses to be selected from Child and Family Studies 5140, 5170, 5180, 5700, 5800, 5900, Interior Design and Housing 5120; Food Science 4040; Textiles and Clothing 5180; Agricultural Economics 4710; Economics 5050-60; Political Science 5641, 5670-80, 5710; Library and Information Science 5290.
- Housing courses to be selected from Agricultural Mechanization 5110, 5610; Interior Design and Housing 4330, 5115, 5510-22, 30, Planning 5390-95; Geography 5520.
- Twelve hours in an area of home economics other than the area (consumer studies or housing) chosen above. Minimum 24 hours in the major field and 18 hours at the 5000 and 6000 level. A minimum of 27 hours of 5000 and 6000 level courses is required in the program. Some majors may require 9 hours in one collateral area.

Non-Thesis Option

The non-thesis option is available for all majors listed under the thesis option and is the only option available for public health nutrition.

In addition to the regulations of the Graduate School, the non-thesis program of study for all majors except Consumer Studies and Housing: Public Policy will consist of 45 credit hours with a minimum of 24 hours in the major field and 18 hours at the 5000 and 6000 level. A minimum of 27 hours of 5000 and 6000 level courses is required in the program. Some majors may require 9 hours in one collateral area.

Request for the non-thesis option must be made in writing by the student to the department head not later than the end of the first term in residence.

Food Science
Food Systems Administration
Nutrition
Textiles and Clothing

Major (includes minimum of 9 hours of 5000 courses) 18 hrs
Thesis 9 hrs
Collateral area(s) of study (includes minimum of 6 hours of 5000 courses) 18 hrs
(Minimum of 18 hours of 5000-level exclusive of thesis.)

Total 45 hrs

In some instances two related collateral areas may be selected with 9 hours in each area and a minimum of 3 hours of a 5000 course in each.

Collateral area(s) of study may be chosen in an area other than in home economics with the approval of the appropriate professors.

An oral examination is required.

Note: Nine hours is the maximum credit allowed for special problems work and seminar work in any one area of home economics.

Graduate study in home economics, students

Graduate School, the non-thesis program of study for all majors except Consumer Studies and Housing: Public Policy will consist of 45 credit hours with a minimum of 24 hours in the major field and 18 hours at the 5000 and 6000 level. A minimum of 27 hours of 5000 and 6000 level courses is required in the program. Some majors may require 9 hours in one collateral area.

Request for the non-thesis option must be made in writing by the student to the department head not later than the end of the first term in residence.

Requirements include those listed under the thesis option and is the only option available for public health nutrition.

In addition to the regulations of the Graduate School, the non-thesis program of study for all majors except Consumer Studies and Housing: Public Policy will consist of 45 credit hours with a minimum of 24 hours in the major field and 18 hours at the 5000 and 6000 level. A minimum of 27 hours of 5000 and 6000 level courses is required in the program. Some majors may require 9 hours in one collateral area.

Request for the non-thesis option must be made in writing by the student to the department head not later than the end of the first term in residence.

*Requirements include Interior Design and Housing 5615 or Child and Family Studies 5110; Child and Family Studies 5700 or Planning 5100 or Economics 5340 or Agricultural Economics 4330, and Home Economics 5600. Three-hour course in research methods or statistics. Twenty-four hours in consumer studies or housing to include 9 hours of Child and Family Studies 5000 or Interior Design and Housing 5000.
- Consumer studies courses to be selected from Child and Family Studies 5140, 5170, 5180, 5700, 5800, 5900, Interior Design and Housing 5120; Food Science 4040; Textiles and Clothing 5180; Agricultural Economics 4710; Economics 5050-60; Political Science 5641, 5670-80, 5710; Library and Information Science 5290.
- Housing courses to be selected from Agricultural Mechanization 5110, 5610; Interior Design and Housing 4330, 5115, 5510-22, 30, Planning 5390-95; Geography 5520.
- Twelve hours in an area of home economics other than the area (consumer studies or housing) chosen above. Minimum 27 hours in 9 hours outside College of Home Economics. Minimum of 27 hours 5000-6000 level courses and total minimum of 45 hours. Courses may be used to meet more than one requirement but all minimum requirements will need to be met.

**Requirements include those listed under the thesis option for the major in Consumer Studies and Housing. Public Policy except that 21 hours are needed in consumer studies or housing to include Home Economics 5000 (6 hours), Child and Family Studies 5060 or Interior Design and Housing 5060.
DOCTORAL PROGRAMS

The doctoral program in Home Economics provides three options for study: interdisciplinary, food science, and nutrition. The interdisciplinary option is available in all departments in the College of Home Economics. The doctoral program with a major in Home Economics requires:

1. A minimum of 96 quarter hours in courses beyond the bachelor's degree or 60 hours of credit for the Master's thesis to include a minimum of 12 quarter hours of 6000-level courses. Select a thesis area and fulfill the requirements as supervised by the faculty committee.
2. Select an option and fulfill the requirements as supervised by the faculty committee.
3. The faculty committee for each doctoral student shall determine whether a reading knowledge of a foreign language is required.
4. Doctoral research and dissertation (minimum 36 hours; maximum 48 hours) may be included in the 96 hours presented for the degree.
5. A final examination.

**Option Requirements: Interdisciplinary option:**

1. Home Economics 6110-20, 6210.
2. Twenty-four to 36 hours from at least two departments in the College of Home Economics representing one of the following concentrations:
   - Individual and Family Behavior: as related to development and change throughout the human life cycle. Emphasis may be on: normal developmental processes, in individuals and families; socialization through childhood, adolescence, and adulthood; role-taking in race and ethnic environmental and cultural settings; interaction processes within families; community services and planning to meet development needs of individuals and families.
   - Physiological Development and Well-being: in humans throughout the life cycle. Emphasis for particular age groups may be on: physiological response to nutrient intake, improvement of nutritional status through informed consumer action; cultural, economic and technological influences on food selection.
   - Environmental Factors in design, space planning, housing, food service systems, clothing, and textiles as they relate to human needs. Emphasis may be on: the impact of: cultural, sociological, psychological, and economic change; technological developments; aesthetics in improving the quality of the environment.
   - Consumers' Economic and Social Well-being: throughout the entire life cycle. Emphasis may be on: the relationship between family structure and decision-making processes in the use of human resources; the effects of social, macro- and microeconomics and political development on consumption patterns and other behavior; community programs to meet the socioeconomic needs of consumers.
3. Fifteen to 24 hours in cognitive or supporting courses (mainly from departments in other colleges in the University) including courses to give sufficient competence in statistics or research methods needed for dissertation research. Additional courses will complement the option emphasis and dissertation research area.

4. Doctoral research and dissertation will be based on a problem within the interdisciplinary option concentration.

**Food Science and food science with concentration in food systems administration:**

1. Three hours in research methods from Food Science 5510 or 5520 or Food Systems Administration 5210; 6 hours from Food Science 5610-30-40, 6110. Food Systems Administration 6110; and Zoology 5350 or equivalent.
2. Twenty-four hours in 5000- and 6000-level courses in food science or in food systems administration.
3. Nine hours in a collateral area (upon approval of student's faculty committee, 4000, 5000, and 6000 courses in collateral area may be substituted for 5000 and 6000 courses in food science or in food systems administration).
4. Minimum of 4 hours of credit in doctoral seminar.

**Nutrition option:**

1. Thirty hours of 5000 or 6000 courses in nutrition exclusive of research and Zoology 5350 or equivalent.
2. Nine hours in a collateral area (upon approval of student's faculty committee, 4000, 5000, and 6000 courses in collateral area beyond the 9 hours may be substituted for 5000 and 6000 courses in nutrition).
3. Minimum of 4 hours of credit in doctoral seminar.

**SPECIAL WORKSHOPS**

Workshops on special topics of current interest are offered periodically by the different departments in the College of Home Economics. These are of special interest to those desiring to work for advanced degrees. Announcements are sent upon request.

**GRADUATE PROGRAMS FOR HOME ECONOMICS EXTENSION**

Graduate programs at both the doctoral and Master's levels are available for students interested in home economics extension. At the doctoral degree level, programs of study may be planned in the interdisciplinary option or in the food science or the nutrition options. A Master's degree is important in Consumer Studies and Housing: Public Policy is particularly suitable for students interested in home economics extension, although Master's programs may be planned in any subject matter area of home economics with agricultural extension education as a collateral area. Additionally, four-week courses are offered in February each year for students particularly interested in home economics extension. Students interested in a graduate program and/or the four-week courses should contact the Associate Dean of the College of Home Economics.

### Departments of Instruction

#### Child and Family Studies

**MAJORS**

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**Professors:**

N. H. Belick (Dean), Ph.D. Michigan State; R. L. Highberger, Ph.D. Iowa.

**Associate Professors:**


**Assistant Professors:**

M. F. Kainowski, Ed.D. Massachusetts; P. Nowicki, M.S.M. home economics international; G. Peterson, Ph.D. Brigham Young; L. Southworth, Ed.S. Tennessee; S. Twardosz, Ph.D. Kansas.

**4110 Student Teaching in Preschool Settings (6)**

Increasing responsibility for planning and guiding groups of young children under supervision of head teacher includes 2 hr weekly seminar. Prereq: 1500, 3210, 3300, 3350, 3360 recommended. E

**4210 Family Finance (3)**

Analysis of alternative ways of meeting financial problems encountered during life cycle of family. E

**4220 Conserving Time and Energy in the Home (3)**

Application of management principles to homemaking activities; evaluation of equipment, work centers and work procedures, need for information and conservation of energy demands. Adaptations for the handicapped.

**4260 Adult Development and Aging (3)**

Adult life in our society. Adjustment to internal and environmental changes through the middle and aged years. Prereq: 2110 or Home Economics 1510 or equivalent background in adult development or consent of instructor.

**4350 Advanced Child Development (3)**

Survey of selected theories relevant to child development with emphasis on research literature and research methodology. Prereq: 4 hrs psychology and 6 hrs child development or equivalent. W

**4420 Learning Experiences with Parents (3)**

Dynamics of parent-child interaction. Emphasis on a variety of techniques for developing communication and working relationships between parents and teachers through experiences in a variety of settings. Prereq: 2110 or 3510. W

**4430 Family Relationships (3)**

Interpersonal relationships among family members and societal roles. Prereq: 3510 or 3515. Sp

**4510 Child in the Community (3)**

Needs of children, community agencies meeting these needs, visits to agencies contributing to the welfare of children. Prereq: 2110 or Home Economics 1510 or equivalent. W

**4520 Administration of Programs for Young Children (3)**

Planning, organizing, scheduling, and financing for day care of infants and young children, nursery school programs, and special education programs for deprived preschool children. Prereq: 3350 or 4110.

**4630 Field Work in Child, Family and Consumer Studies (3-15)**

Opportunity for students to work in nursery schools or community agencies; focus on families, children, and/or consumer concerns. Hrs arranged. Prereq: Consent of instructor. May be repeated. Maximum 15 hrs. S/NC only. E

**4710 Contemporary Developments (1-3)**

Student or staff-initiated course for study of special topic(s) pertinent to the field; topics selected to be determined by students and instructor with departmental approval. Elective credit only. Prereq: Consent of instructor. May be repeated with departmental approval. Maximum 9 hrs.

**4810 Afro-American Families (3)**

Historical background, contemporary family structure and relationships; emerging needs and programs. Prereq: 4 hrs in social sciences.

**4830 Consumers and the Market (3)**

Analysis of elements in marketplace which create problems for consumers. Special attention given to consumer decision making, social and political constraints and opportunities associated with government protection of consumers. Prereq: Economics 2110. W, Sp

**5000 Thesis (1-15)**

E
5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a 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

5060 Practicum (1-12) Field experience in selected agencies and organizations that focus on solutions to problems in consumer studies. Prereq: Consent of instructor. W, S, N

5110 Field Work in Family Life (3) School and community programs concerned with education for family living. Prereq: Consent of instructor. May be repeated. S/N only. E, F

5140 Consumption and Standards of Living (3) Economic and welfare aspects of consumption. Analysis of factors associated with changes in the standard of living. Review of major consumption studies. Prereq: 4830 or 5170 or consent of instructor.

5150 Assessment of Family Behavior (3) Methods of measurement related to study of family. Current methodological issues. Prereq: 5410 or 5630 or consent of instructor.


5170 Consumer Economics (3) Consumer functions in economy; structure of consumer markets; government action relating to consumers; factors affecting price of consumer goods.

5180 Family Financial Consultation (3) Analysis of family expenditure patterns; common financial difficulties; avenues by which families are assisted. Field experience with consumer consultant services. Prereq: 4210, 4830 or 5170. Sp

5190 Standards in Consumer Protection (3) Product and performance standards in consumer protection. Practical application of consumer rights and responsibilities; consumer disclosure and other consumer legislation. Prereq: 4830, 5170 or consent of instructor.

5210 Theories of Child Development (3) Prereq: 4350 or equivalent. W

5220 Family Life Programs (3) School and community programs in family life; survey and evaluation; students concentrate on type best suited to their experience and future professional orientation. Prereq: 3 hrs child development, 3 hrs family relationships, 3 hrs sociology. 2 hrs and 1 lab.

5310 Theory and Research on Human Sexuality (3) Cultural, social, and psychological dimensions of human sexuality; and contributions of anthropological, sociological, and personality theory and research. W

5410 Advanced Family Relationships (3) Problems in modern family life; individual adjustments; group relationships. Prereq: 5315, 4430, or consent of instructor.

5420 Parents and Children (3) Common problems of young children faced by parents and teachers; emphasis on methods available to modify problem behavior.

5430 Families in Crisis (3) Interpersonal transactions in disordered family behavior. Prereq: 5410 or equivalent. W

5510 Survey of Research in Child and Family Studies (3) Research literature: locating, abstracting, summarizing, and evaluating research findings. Prereq: 5155 or 4430 or consent of instructor. W


5540 Learning in Preschool Programs (3) Description, analysis and evaluation of various preschool models and programs. Prereq: 6 hrs in child and family studies. Consent of instructor.

5550 Supervision in Preschool Programs (3) Guidance of students working in nursery school and day care centers. Guiding students through seminar discussion, individual conferences, and various other evaluation techniques. Prereq: 3540, 3 hrs and 12-hr lab.

5610 Theories of Management in the Family Environment (3) Fundamental management concepts, development and application to current family situation.

5620 Nursery School Administration (3) Organization and operating schools and play groups for preschool children; child development, staff, schedules, programs, financing. Prereq: 4110 or equivalent.

5630 Seminar in Infant Development (3) Theory and research relating to development during infancy. Prereq: 4110 or consent of instructor.

5640 Teaching Child and Family Studies (5) Seminar and practicum in techniques for teaching child development and family relationships. Prereq: Consent of instructor. S/N only. E


5800 Problems in Child, Family and Consumer Studies (1-3) Advanced study of child development and family planning program internship in planned parenting programs and clinic. May be repeated. Maximum 9 hrs.

5850 Children's Effects on Parents and Marriage (3) Theories and research about how children change parents and influence marital relationships. Prereq: 4430 or consent of instructor.

5900 Seminar in Child and Family Studies (1-3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.


6250 Advanced Topics (3) Individual study and group discussion of current problems. Prereq: Consent of instructor. S/N only. Maximum 9 hrs.

6310 Individual and Family Development—Physiological Determinants (3) Family members' physiological potential, development, and status. Family's contribution to members' physiological potential for growth and development and to realization of human potential. Prereq: 6 hrs advanced child and family studies, 4 hrs nutrition, 4 hrs physiology, or equivalent. Sp

6320 Individual and Family Development: Cognition (3) Processes through which individual humans learn to recognize their world. Cognitive processes involved in development across life span, focus on research findings and methodology. Prereq: 5210, 5530, 5630. Sp

6330 Individual and Family Development: Socialization (3) Processes of socialization throughout life cycle. Family as primary socializing agent. Prereq: 5210, 5410, or equivalent.

6410 Theory Construction in Family Studies (3) Process and application of theory construction in contemporary research areas and family studies. Emphasis on understanding, criticizing and constructing theoretical models based on research findings. Prereq: 5410 or consent of instructor.

6450 Conceptual Frameworks for the Family (3) Theoretical perspectives; role of family. Prereq: 5000, 5540, 5630. W

6540 Seminar in Programs for Infants and Preschool Children (3) Research related to programs for infants and young children; an overview of models for education of infants and young children, methods of working with parents, and student training programs. Prereq: 4110 or equivalent.

6610-20 Applied Behavior Analysis in Natural Settings (3, 3) Individual supervision in application of applied behavior analysis in natural settings. Prereq: 5410 or consent of instructor.

6710 Elements of Consumer Choice (3) Analysis of consumer decision making, theory of consumer behavior, impact of affluence on consumption considerations, and case studies of consumer behavior. Prereq: Consent of instructor.

6720 Consumer Protection (3) Consumer, regulatory agencies, standards, information processes and protection legislation. Prereq: Consent of instructor. S/N only.

Food Science, Nutrition, and Food Systems Administration

MAJORS

Nutrition, and Food Science

DEGREES

M.S.

M.S.

M.S.

Ph.D.

Professors:

R. E. Beauchene (Head), Ph.D. Kansas State; A. M. Campbell, Ph.D. Cornell, G. E. Goertz, Ph.D. Kansas State; M. J. Hitchcock, Ph.D. Wisconsin; L. E. Lyon, Ph.D. California (Berkeley); S. M. Wilson, Ph.D. Wisconsin; S. W. Smith, Ph.D. Pennsylvania College of Technology; M. A. Smith (Memphis), Ph.D. Tennessee.

Associate Professors:


Assistant Professors:

F. E. Andrews, Ph.D. Ohio State; J. B. Hittle (Memphis), Ph.D. Tennessee; M. D. Brooker (Memphis), M. S. Alabama, G. W. Disney, Ph.D. Tennessee; J. D. Skinner, Ph.D. Oregon State.

Food Science

4000 Origin of Food and Foodways (3) Food origin and development of individual and group foodways. Prereq: 8 hrs social science or humanities. F, W

4010 Introductory Experimental Food Science (3) Physical and sensory evaluation in experimentation with fats, high protein foods, and batter and dough systems. Prereq: 3510, 2 hrs and 1 lab. W, Sp

4020 Experimental Food Science (3) Individual experimentation and analysis of food products. Prereq: 4010. Nutrition 3320 recommended. 1 hr and 2 labs. Su, A

4040 Food in Contemporary Society (3) Consumer's responsibility and potential influence with respect to food supply. F, W

4100 Food Preservation (3) Application of basic principles and research finding to food preservation in home. Prereq: 1010, 4 hrs microbiology, and Nutrition 3310 or equivalent. 2 hrs and 1 lab. F

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a 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

5140 Foods and Nutrition: Physiological Principles (3) Thermodynamics; physical properties of food. Prereq: 4500 or equivalent. Nutrition 3350 and Mathematics 1540 required. Sp, A

5510 Food Texture (3) Classification of foods according to textural parameters; instrumentation in evaluation of textural characteristics. Prereq: 4610 or Food Technology 4920. Plant and Soil Science 3610 or equivalent; or consent of instructor. W

5520 Food Sensory Testing Methods (3) Principles and methodology of sensory evaluation of food; application of methods; analysis of sensory data. Pre-
5530 Advanced Experimental Food Science (3) Application of basic principles to individual problems. Prereq: 5510-20 or consent of instructor. Su, A
5550 Food Behavior of the Individual (3) Development of and changes in choices of food and food habits of individual. Prereq: 4010, 4000, 3 hrs of nutrition, or consent of instructor. Sp, Su
5560 Foodways in the United States (3) Current foodways of selected subcultures in United States and historical basis for their development. Prereq: 4000, 3 hrs of nutrition, or consent of instructor. W, Sp
5610-20 Advanced Food Science (3, 3) Biochemical and biophysical interactions in food. Prereq: 4010. Nutrition 3320 or equivalent, or consent of instructor. W, Sp
5630 Carbohydrates and Fats in Relation to Food Science (3) Physical and chemical characteristics of sugars, starches, and fats with emphasis on their behavior in food. Prereq: 4010; Nutrition 3320-30 or equivalent.
5640 Proteins in Relation to Food Science (3) Physical and chemical characteristics of the proteins of milk, eggs, flour, and meat with emphasis on their behavior in food. Prereq: 4010; Nutrition 3320-30 or equivalent.
5700 Current Programs and Trends in Food Science (1-3) Recent advances in food science, impact on curricular considerations, and implications for teachers, extension workers, and dietitians. Prereq: Consent of instructor. May be repeated. 
5800 Problems in Food Science (1-3) Advanced study from field of food science. Prereq: Consent of department head and professor in charge of investigation. May be repeated.
5850 Field Experience (3-9) Experience in food-related industry or agency under supervision of faculty member. Prereq: Consent of instructor. 3 hrs. S/N only.
5900 Seminar (1-3) Prereq: Consent of instructor. May be repeated. Maximum 3 hrs. S/N only.
6000 Doctoral Research and Dissertation (3-15) E
6110 Advanced Topics in Food Science (3) Comprehensive individual study and group discussion of topics related to current problems in food science. Prereq: Consent of instructor. May be repeated.
6120 Food Dispersions (3) Physical characteristics of solutions, colloidal dispersions, and suspensions in relation to treatments applied. Prereq: 5530.
6130-20 Structure of Food Plants and Animal Tissues (3, 3) Histological structure of food plants and animal tissues related to physical characteristics and chemical properties of components. Prereq: 5640.
6150-20 Food and Sociocultural Change (3, 3) Critical evaluation of factors and interrelationships affecting food intake and consumption patterns. Must be taken in sequence. Prereq: 5520 or 5560, or consent of instructor. F, W
6900 Seminar (1-3) May be repeated. S/N only.

Nutrition
3310 Organic Chemistry (4) Emphasis on subjects leading to 3330-30, Textiles and Clothing 4220. Prereq: General Chemistry. 3 hrs and 1 lab. Not for graduate credit to departmental majors. F, Sp
3320 Food Analysis (4) Elementary quantitative analysis of food components. Prereq: 3310 or equivalent. 3 hrs and 1 lab. Not for graduate credit to departmental majors. W, Su
3330 Physiological Chemistry (3) Metabolism of carbohydrates, lipids, and proteins. Role of vitamins and minerals. Not for graduate credit to departmental majors. Sp, Su
3350 Physiological Chemistry Laboratory (1) Prereq: 3330. 3 hrs. Credit/no credit for graduate credit to departmental majors. Sp, Su
4010 Reproductive and Developmental Nutrition (3) Nutritive requirements for expectant mothers, infants, and preschool children. Prereq: 3020, 3050, or 3410. 2 hrs and 1 lab. F
4020 Nutrition for Children, Adolescents and Adults (3) Interdisciplinary study from field of nutrition, principles and research findings to good nutrition for children, adolescents and adults. Prereq: 3020, 3050, or 3410. 2 hrs and 1 lab.
4030 Community Nutrition (3) Nutrition problems and services in the community; supervised field experiences are integral part of the course. Prereq: 3020, 3050, or 3410.
4110 Introduction to Nutrition Research (3) Discussion of principles and laboratory experiences. Prereq: 3410 or equivalent. 2 hrs and 1 lab.
4231 Clinical Experiences in Dietetics (1) Planned clinical experiences applying principles of nutrition in disease. Coreq: 4230.
4240 Nutrition in Disease II (3) Interdisciplinary lectures and discussions on the metabolic processes of normal and diseased organs and/or tissues and the dietary or behavioral modifications required. Prereq: 3410, W, Sp.
5000 Thesis (1-15) E
5062 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. S/N only. E
5110 Advanced Physiological Chemistry (4) Bioenergetics and related metabolism of nutrients. Prereq: 3330 or equivalent. 3 hrs and 1 lab. F
5120 Advanced Physiological Chemistry (3) Nutritional factors in relation to body fluids, gas transport, and endocrine function. Prereq: 3330. W
5140 Foods and Nutrition: Physicochemical Principles (3) Thermodynamics; physicochemical properties of colloids; chemical interactions of colloidal state; chemical kinetics; specialized kinetics of enzymatic processes. Prereq: Nutrition 3330 and Mathematics 1546 or equivalent. Sp, A
5230 Experimental Methods in Nutrition (3) Use of small animals in experimental nutrition. Prereq: 3320-30, 3410. 2 hrs and 1 lab. F
5240 Research Techniques (3, 3) Analytical methods for assay of food and biological materials. Human metabolic balance experiments. Prereq: 3250. 3 labs. A
5310 Community Nutrition (3) Nutrition problems and practices in community; supervised field work. Prereq: 3410 and consent of instructor. 3 labs. F
5320 Community Nutrition (3) Observations and participation in nutrition programs of local and state agencies. Prereq: 5310 and consent of instructor. 3 labs. W
5330 Community Nutrition (3) Nutrition programs of state and federal agencies, preparation of material for nutrition education; supervised field work. Prereq: Consent of instructor. 3 labs. Su
5340 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: 5320 and consent of instructor. S/N only. Sp
5350 Mental Retardation or Other Developmental Disorders of Childhood (3) Multidisciplinary core course required of all full-time students in training at Child Development Center, UT Center for the Health Sciences, Memphis. Prereq: Consent of department head. F, W, Sp

5410-20 Human Nutrition (3, 3) Functions of carbohydrates, proteins, fats, minerals and vitamins. Nutritional requirements of humans throughout life span and practical problems in meeting requirements. Prereq: 5410-20. W, Su
5430 Physiological Bases for Diets in Disease (3) Developments in dietary treatment of disease in which nutrition plays a major role. Prereq: 5210 or equivalent. Su
5450 Survey Methods in Human Nutrition (3) Food consumption, food practices and nutritional status of population groups. Prereq: 5210 or 5410-20. 2 hrs and 1 lab.
5460 World Food Supply and Human Nutrition (3) Food supplies and food practices as related to human nutrition throughout world. National, national and international agencies concerned with food and nutrition problems. Prereq: 5210 or 5410-20. Sp.
5470 Nutrition and Aging (3) Nutritional problems of aging individual, nutritional requirements, dietary intakes, and effect of nutrition on rate of biological aging. Prereq: 5210 or consent of instructor. W
5510 Nutrition in Mental Retardation and Developmental Disorders (1-12) Interdisciplinary diagnosis and treatment of developmentally handicapped child. Effect of diet on development and experience and lectures at Child Development Center, Center for the Health Sciences, Memphs. Prereq: Consent of department head and professor in charge of investigation. May be repeated. Maximum 9 hrs.
5580 Problems in Nutrition (1-3) Recent developments in field of nutrition and implications for teachers, extension workers, dietitians, public health nutritionists, and others in related fields. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.
5690 Seminar (1-3) Prereq: Consent of instructor. May be repeated. Maximum 3 hrs. S/N only.
6000 Doctoral Research and Dissertation (3-15) E
6110 Advanced Topics in Food Science (3) Comprehensive individual study and group discussion of topics related to current problems in food science. Prereq: Consent of instructor. May be repeated.
6120 Food Dispersions (3) Physical characteristics of solutions, colloidal dispersions, and suspensions in relation to treatments applied. Prereq: 5530.
6130-20 Structure of Food Plants and Animal Tissues (3, 3) Histological structure of food plants and animal tissues related to physical characteristics and chemical properties of components. Prereq: 5640.
6150-20 Food and Sociocultural Change (3, 3) Critical evaluation of factors and interrelationships affecting food intake and consumption patterns. Must be taken in sequence. Prereq: 5520 or 5560, or consent of instructor. F, W
6900 Seminar (1-3) May be repeated. S/N only.

Food Systems Administration
4130 Food Systems Administration (3) Functions of management applied to food service systems. Prereq: 3110. F
4140 Food Systems Personnel Development (3) Development of training programs for food systems personnel. Prereq: 4130 or consent of instructor. W
4150 Design and Layout of Food Service Systems (3) Design of physical facilities and selection and purchasing of equipment for food service systems. Prereq: 5410-20 or consent of instructor. Sp
4250 Food and Lodging Managerial Cost Control (3) Cost analysis for control. Use of financial statements for decision making for food and lodging systems and consumer services. Prereq: 4130.
4250 Food and Lodging Physical Plant, Planning and Maintenance (4) Feasibility, planning, development and construction of food and lodging systems.
physical plant and maintenance. Electrical, mechanical, heating, plumbing, air conditioning and ventilation and illumination systems. Types of building materials and construction. Prereq: 3110, 4150 or consent of instructor. 3 hrs and 1 lab.

4270 Tourism, Food and Lodging Information Systems (3) Qualitative and quantitative analysis of information systems for decision making in food and lodging operations or other operations related to touristic industry. Prereq: 4130, 4250, Computer Science 1410, 1410.

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a 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

5110-20 Experimental Quantity Food Study (3, 3) Analysis of food production, holds, environments and service problems related to quality of food prepared in volume. Management resources. Prereq: 4130, 3110, or consent of instructor. Su, A

5210 Methods of Food Systems Research (3) Research methods applicable to food systems administration. Prereq: 4130, Statistics 5211 or equivalent. W

5220 Experimental Design of Food System Facilities (3) Environment in which food is prepared, held, and served in volume. Prereq: 4150. Su

5230 Food Systems Evaluation (3) Management research on food systems. Standards for control. Prereq: 4130, or consent of instructor. F


5310 Administration of Food Service Delivery Systems (3) Role and responsibilities of administrator in maintaining desired qualitative and quantitative standards in food systems. Prereq: 3110 or consent of instructor. W, A

5500 Clinical Training in Health Care Agencies (3) Instructional and supervisory techniques in clinical settings for trainees in entry-level health care providers. Prereq: Nursing 4760 or consent of instructor.

5700 Current Programs and Trends in Food Systems Administration (1-3) Recent advances in food systems administration and implications for dietitians, school food service directors, and others in related fields. Prereq: Consent of instructor. May be repeated.

5800 Problems in Food Systems Administration (1-3) May be repeated.

5850 Field Experience (3-9) Planned administrative experience in food service system. Prereq: Consent of instructor.

6000 Seminar in Human Resource Development (1-3) May be repeated. S/NC only.

6002 Doctoral Research and Dissertation (3-15) E

6110-20 Theoretical Issues in Human Resource Development (3, 3) Interdisciplinary approach to development of human resources. Prereq: 12 hrs of 5000-level courses representing 2 areas of home economics. Prereq: Consent of instructor. May be repeated.

6210 Professional Issues in Human Resource Development (3) Role and responsibilities of administrator in human resource development. Prereq: 12 hrs of 5000-level courses representing 2 areas of home economics. Sp

6310 Advanced Topics (3) Comprehensive individual study and group discussion of individual and family behavior, physiological development and well-being, environmental factors, and economic and social well-being. Prereq: 6110. May be repeated.

6500 Methodological Issues in Home Economics (3) Advanced methodology in home economics, interdisciplinary research methods and issues. Prereq: 1 graduate-level course in research methodology or consent of instructor.

6900 Seminar (1-3) May be repeated. S/NC only.

Home Economics Education
Graduate study in home economics education provides for an M.S. in Vocational-Technical Education (concentration in home economics education) and opportunity for participation in the Ed.D. program in Vocational-Technical Education in the College of Education. (See page 61 for staff and course offerings.)

Interior Design and Housing
MAJORS
Degree Requirements: M.S.
Consumer Studies and Housing:
Public Policy
Major:
Professor: R. G. Blakemore (Head), Ph.D. Florida State.
Associate Professor: V. S. Anagnost (Assistant Dean), M.S. Tennessee.
Assistant Professor: W. Moran, M.S. Wisconsin.
S/NC only. E

Interior Design and Housing
Graduate study in interior design as well as courses dealing with the broader aspects of design. All student programs include: Seminar in Design (5040), Advanced Design Studio (5050), and research methods.

The interdisciplinary program in Consumer Studies and Housing: Public Policy is available to students with interest in the social science approach to housing. Courses dealing with interior design and aspects of housing may be elected.

ACQUISITIONS AND EXHIBITIONS
For interior design majors, the department reserves the right of acquisition and exhibition of work completed in its studios under the guidance of the faculty.

Exhibitions. A student's course of study includes intensive training in interior design as well as courses dealing with the broader aspects of design. All student programs include: Seminar in Design (5040), Advanced Design Studio (5050), and research methods.

The interdisciplinary program in Consumer Studies and Housing: Public Policy is available to students with interest in the social science approach to housing. Courses dealing with interior design and aspects of housing may be elected.

ACQUISITIONS AND EXHIBITIONS
For interior design majors, the department reserves the right of acquisition and exhibition of work completed in its studios under the guidance of the faculty.

Exhibitions. A student's course of study includes intensive training in interior design as well as courses dealing with the broader aspects of design. All student programs include: Seminar in Design (5040), Advanced Design Studio (5050), and research methods.

The interdisciplinary program in Consumer Studies and Housing: Public Policy is available to students with interest in the social science approach to housing. Courses dealing with interior design and aspects of housing may be elected.
rals; search for aesthetic potential in depth.

5060 Practicum (1-12) Field experience in selected agencies and organizations that focus on solutions to problems in housing.

5120 Historic Interior Design (3) Research studies of historic interior design problems. Variable course content, emphasis on interior design, furniture and/ or accessories for England, Scandinavia, Medierrania, and various areas of North America. May be repeated. Maximum 18 hrs.

5210 Furniture Appreciation (3) Aesthetics qualities related to national housing objectives. Prereq: 4320 or equivalent and consent of instructor.

5310 Interior Design (3) Advanced problems in planning and design of interior space; application of research in making design decisions. Prereq: Consent of instructor.

5410 Advanced Problems (3) Individual development of techniques and appreciation. Prereq: 9 hrs related or equivalent.

5510 Environmental Factors in Interior Design (3) Human factors and associated research techniques related to design of interior architectural environments—derivation of design implications from past and present styles. Significant structural and functional aspects of past and present styles. Prereq: Consent of instructor.

5520 Environmental Factors in Interior Design (3) Synthetic design methodology as applied to the design of microenvironments using human factors information. Prereq: 6 hrs behavioral science, and 6 hrs natural science or consent of instructor.

5530 Environmental Factors in Interior Design (3) Human factors and systematic design methodology applied to analysis, synthesis, and evaluation of research-oriented interior design projects. Comprehensive design research project by 2- or 3-member teams. Prereq: 6 hrs behavioral science, and 6 hrs natural science or consent of instructor.

5610 Furniture Design (3) Analysis of human factors data in design of body support, task support, and storage furniture pieces and systems; production of complete furniture designs and scale models. Prereq: Consent of instructor. Sp

5613 Housing Management (3) Role and functions of housing management specialist in problems of private and assisted housing management. Prereq: 4320 or consent of instructor.

5614 Housing Regulations and Controls (3) Functions of regulations and other control practices and mechanisms as determinants of nature, availability and affordability of housing in local communities by various user groups. Prereq: 4320 or consent of instructor.

5615 Housing Programs and Policies (3) Analysis of private and public programs and policies related to realistic provisions of adequate homes and living environments for families. Economic and social problems related to national housing objectives. Prereq: 4320 or consent of instructor.

5620 Experimental Methods in Household Equipment (3) Research methods and techniques in determining performance of household equipment. Prereq: 2430 or consent of instructor. 1 hr and 2 labs.

5630 Environmental Requirements for Family Work Centers (3) Trend in planning work center areas such as kitchens and laundries; adequacy, convenience, surface treatment, facilities and costs; problems of installation and remodeling.

5815 Environmental Design Research (1-3) Evaluation and application of research methodologies to interior design problems. Hours and credit arranged. Prereq: 5810-20-30 or equivalent and consent of department head and professor in charge of investigation. May be repeated. Minimum 9 hrs.

5820 Interior Design (1-3) Advanced study in interior design. Hours and credit arranged. Prereq: Consent of department head and professor in charge of investigation. May be repeated. Minimum 9 hrs. E

5830 Problems in Housing (1-3) Advanced study in housing, hours and credit arranged. Prereq: Consent of department head and professor in charge of investigation. May be repeated. Minimum 9 hrs. E

5910-20-30 Seminar (1-4, 1-4, 1-4) Hours and credit arranged. Prereq: Consent of instructor.

6110 Contemporary Housing Issues and Problems (3) Individual study and group discussion of various issues and problems related to housing. Prereq: Consent of instructor.

6120 Advanced Topics in Housing Research (3) Various concepts, theories and methodologies of social science of housing research. Prereq: Consent of instructor.

6210 Environmental Design Analysis (3) Advanced methodology in psychobiology of environmental influences and associated research techniques and appreciation. Prereq: Consent of instructor.

6240 Perspectives in Interior Design (3) Historical influences related to contemporary concepts in interior design. Prereq: 5410. 6 hrs of graduate level interior design history, or consent of instructor.

Textiles and Clothing

MAJORS

5700 Current Programs and Trends in Textiles and Clothing (1-3) Pertinent developments and trends in textiles and/or clothing and implications for new types of programs, techniques and/or curricula approaches. Content and emphasis vary according to changes in field and needs of groups serviced. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. W

5800 Problems in Textiles and Clothing (1-3) Advanced study selected from field of textiles and clothing. Prereq: Consent of department head and professor in charge of investigation. May be repeated. Maximum 9 hrs. W

5900 Seminar in Textiles and Clothing (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. W


6110 Selected Issues in Textiles and Clothing (3) Advanced topics of current significance. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

6140 Selected Behavioral Theories in Clothing (3) Role of clothing in functioning of people, utilizing behavioral theories. Prereq: 5170. 6 hrs of graduate level sociology or psychology, or consent of instructor.

6150 Social-Psychological Theories of Clothing (3) Role of clothing in functioning of people, utilizing behavioral theories. Prereq: 5170. 6 hrs of graduate level sociology or psychology, or consent of instructor.

6160 Textile Flammability (3) Factors affecting textile flammability as consumer issue. Standards, regulations, test methods, economic impact. Prereq: 5120, 5190, 5250, or consent of instructor.

6170 Physical Performance Behavior of Textile Structures I (3) Fundamental yarn and fabric structures; relationship of structure to physical characteristics of textile materials. Prereq: 5120, or consent of instructor.

6910 Seminar in Textiles and Clothing (1-3) May be repeated. Maximum 6 hrs.

6950-60-70 Problems in Textile Chemistry (4, 4, 4) Theoretical and experimental study of chemistry of textile fibers including, polymerization, reactions, dyeing, and finishing. Prereq must be taken first. 5260 and 5270 need not be taken in sequence. 5250—Emphasis on structure; property relationships and reactions of fibers. 5260—Emphasis on fabric finishes. 5270—Emphasis on dyes and dyeing. Prereq: 3420 or equivalent. 1 qtr organic chemistry. 2 hrs and 2 labs.

5310 Fashion Analysis (3) Fashion as social and economic force; evolutionary theories of fashion operation. Prereq: 6 hrs each of sociology and economics.

5320 Problems in Historic Costume (3) Variable flow of styles in relation to cultural determinants. Prereq: 3480 or consent of instructor. May be repeated. Maximum 9 hrs. W

5900 Seminar in Textiles and Clothing (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. W

6110 Selected Issues in Textiles and Clothing (3) Advanced topics of current significance. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

6140 Selected Behavioral Theories in Clothing (3) Role of clothing in functioning of people, utilizing behavioral theories. Prereq: 5170. 6 hrs of graduate level sociology or psychology, or consent of instructor.

6150 Social-Psychological Theories of Clothing (3) Role of clothing in functioning of people, utilizing behavioral theories. Prereq: 5170. 6 hrs of graduate level sociology or psychology, or consent of instructor.

6160 Textile Flammability (3) Factors affecting textile flammability as consumer issue. Standards, regulations, test methods, economic impact. Prereq: 5120, 5190, 5250, or consent of instructor.

6170 Physical Performance Behavior of Textile Structures I (3) Fundamental yarn and fabric structures; relationship of structure to physical characteristics of textile materials. Prereq: 5120, or consent of instructor.

6910 Seminar in Textiles and Clothing (1-3) May be repeated. Maximum 6 hrs.

6950-60-70 Problems in Textile Chemistry (4, 4, 4) Theoretical and experimental study of chemistry of textile fibers including, polymerization, reactions, dyeing, and finishing. Prereq must be taken first. 5260 and 5270 need not be taken in sequence. 5250—Emphasis on structure; property relationships and reactions of fibers. 5260—Emphasis on fabric finishes. 5270—Emphasis on dyes and dyeing. Prereq: 3420 or equivalent. 1 qtr organic chemistry. 2 hrs and 2 labs.

5310 Fashion Analysis (3) Fashion as social and economic force; evolutionary theories of fashion operation. Prereq: 6 hrs each of sociology and economics.

5320 Problems in Historic Costume (3) Variable flow of styles in relation to cultural determinants. Prereq: 3480 or consent of instructor. May be repeated. Maximum 9 hrs. W

5700 Current Programs and Trends in Textiles and Clothing (1-3) Pertinent developments and trends in textiles and/or clothing and implications for new types of programs, techniques and/or curricula approaches. Content and emphasis vary according to changes in field and needs of groups serviced. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. W
Intercollegiate Programs

Aviation Systems

MAJOR
Aviation Systems

DEGREE
M.S.

Lead Professor:
M. A. Wright, Ph.D. Wales.

Professors:
W. Frost, Ph.D. Washington; W. F. Jacobs,
Ph.D. Rostingen (Germany); A. A. Mason, Ph.D.
Tennessee; J. M. Wu, Ph.D. California Institute of Technology; R. L. Young, Ph.D.
Northwestern.

Associate Professors:
F. G. Collins, Ph.D. California (Berkeley);
R. D. Kimberlin, M.S. Tennessee; J. R. Maus,
Ph.D. North Carolina State.

Assistant Professors:
W. B. Baker, Jr., Ph.D. Tennessee; W. J. Boaz,
M.S. Florida State; V. K. Smith, III, Ph.D.
Georgia Institute of Technology.

The University of Tennessee Space Institute offers a program leading to the Master of Science 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 who wish to study under a "systems philosophy" toward careers in research and development or administration in various phases pertinent to aviation. The program features 18 quarter hours major field credit in various aspects of aviation systems, 6 or more quarter hours credit in each of the areas of research, development and administration, and electives which permit further specialization to either area.

To qualify for admission to this program, the applicant must possess a Bachelor's degree in engineering or science from a recognized 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. Subject matter prerequisite to the program includes basic knowledge of computer utilization as represented by Computer Science 3150 or equivalent, a background in accounting as represented by Accounting 5030 or equivalent basic accounting courses, a basic knowledge of economics as represented by introductory economics or equivalent.

Both thesis and non-thesis programs are available. The thesis program involves satisfactory completion of the following minimum requirements:

1. 18 hours in the major field of aviation systems.
2. For the research and development area, 6 quarter hours in Industrial Engineering 5700 and 5710; for the administration area, 6 quarter hours in Economics 5030 and Accounting 5810, for a total of 12 quarter hours.
3. 6 hours of electives selected from the major field, engineering and/or the areas in item 2.
4. 9 hours in Aviation Systems 5000, Thesis, hence demonstrating the ability to conduct and report on an independent investigation.

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

1. 18 hours in the major field of aviation systems.
2. For the research and development area, 9 quarter hours in Industrial Engineering 5700, 5710, and 5720; for the administration area, 9 quarter hours in Economics 5030, Accounting 5810 and Finance 5010-20, for a total of 18 quarter hours.
3. 6 hours of electives in one of the areas in item 2.
4. 6 hours of electives in the major field, engineering and/or the areas of item 2.
5. Satisfactory completion of 3 quarter hours in Aviation Systems 5100, Project in Aviation Systems.
6. Satisfactory completion of a comprehensive final written examination on all course work submitted for the degree and defense of the project course paper.

The thesis program involves 45 quarter-hour credits minimum while the non-thesis program involves 51 quarter-hour credits minimum.

Courses suitable for credit in the major field include:
Aviation Engineering 5810 and 5820, Industrial Engineering 5840; Aviation Systems 5070, 5080, 5090, 5210, 5220, and 5910.

Electives typical of those suitable for credit in the area of aviation systems, research and development include: Aerospace Engineering 5150-60-70; Computer Science 3510-20, 4550 and 5655-65-75; Industrial Engineering 4060, 4150, 4230, 5720, 5730, 6700, 6730; Mathematics 4225-35-45, 4510-20-30; Metallurgical Engineering 5810-20-30; and Statistics 3450.

Electives typical of those suitable for credit in the area of aviation systems, administration include: Accounting 5020; Business Law 5010; Economics 5020; Management 5130; Marketing 5010-20; Transportation 5050, 5130, 5210-20, and 5910.

5000 Thesis (1-15) E

5070 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 the community, collection and distribution, demand requirement analyses, types of developments and their projections. Pre-req: Aerospace Engineering 5810.

5080 Collection and Distribution (3) Capabilities, technology, plans and developments for collecting and distributing passengers and freight to and from various types of airports. Ground, water, air and mixed transportation modes, present and future; requirements analysis, and model analysis of the system. Pre-req: Aerospace Engineering 5810.

5090 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 and administrative and enforcement procedures. Pre-req: Aerospace Engineering 5810.

5100 Project in Aviation Systems (3) In-depth study and formal report on aviation systems topic, normally performed during last quarter of work toward degree in non-thesis program. For aviation systems degree candidates only.

5210-20 Experimental Flight Mechanics (3, 3) Flight mechanics, experimental techniques. Specially equipped airborne laboratory allows active student
participation in series of experiments demonstrating acquisition of flight test data. Tests conducted concerning effects of aircraft performance, stability, and control characteristics. Development of theory necessary to support class experiments, test techniques, and course reduction methods. 5210 emphasizes performance; 5220 emphasizes stability and control. Prereq: Aerospace Engineering 5810, 5820, and Industrial Engineering 5840.

970 Special Topics in Aviation Systems (3) Current problems in aviation systems. Prereq: Consent of instructor. May be repeated with consent. See also course. Also see courses for Aerospace Engineering 5810, 5820, and Industrial Engineering 5840.

Ecology

MAJOR DEGREES
M.S., Ph.D.

J. Frank McCormick, Director, Ph.D., Emory

The Graduate Program in Ecology offers Master of Science and Doctor of Philosophy degrees. This interdisciplinary 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 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 which 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) at least 12 quarter hours of college chemistry, 9 quarter hours of college mathematics, and 4 quarter hours of ecology at the upper division level; (3) departmental application and 3 rating forms; (4) the Graduate Record Examination.

Application forms for admission should be obtained from the Graduate School. Inquiries concerning the admission requirements should be addressed to the Director, Graduate Program in Ecology, University of Tennessee, Knoxville, Tennessee 37916.

ADVISORS

Advisors are selected from ecologists in several departments 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 advisor who will become the chairperson of the student's faculty committee.

THE MASTER'S PROGRAM

The minimum 45 quarter hours of graduate credit shall include 18 hours of ecology courses (including 5100), of which 8 hours shall be in Ecology 5210-20-30 and at least 8 additional hours in ecology courses numbered above 5100. 9 hours of thesis in Ecology 5000. 18 additional hours in an ecology or supporting courses. To insure an interdisciplinary program, the required minimum 45 hours shall include no more than 18 hours of non-thesis courses from any one department of instruction.

The general requirements for this Master's degree are listed on page 9.

A minor in ecology shall include Ecology 5210-20-30 (6 hours) and at least 3 additional hours in approved ecology courses.

THE DOCTORAL PROGRAM

The requirements for this degree are in general the same as those of the Graduate School with the following two exceptions: (1) each student's faculty committee shall consist of at least two members from the department in which the dissertation is being supervised; at least two from outside this department; (2) this doctoral program must include Ecology 5210-20-30 and a minimum of 9 quarter hours of courses numbered above 6000. A student cannot enroll for dissertation until the research proposal has been discussed and approved by the doctoral committee.

Shared Faculty

H. Ambrose, Ph.D., Zoology; C. C. Amundsen, Ph.D., Botany; R. A. Ankeny, Ph.D., O.R.N.L.; E. Bacon, Ph.D., T.V.A.; J. W. Barrett, Ph.D., Forestry.


Courses

The following courses are those offered directly by the Ecology Program and those which, although listed in other departments, have been approved to satisfy Master's degree requirements. Additional ecology courses are described elsewhere in the catalog under the departments identified in the following list.

Agricultural Biology

4101 Biology of Soil Microorganisms (4)

Agricultural Economics and Rural Sociology

4330 Land Economics (3)

5420 Advanced Land Economics (3)

Anthropology

4360 Field Work in Physical Anthropology (3-9)

4640 Zoarcheology (3)

4690 Primate Paleontology (3)

4970 Human Paleontology (4)

5970 Emergence and Early Evolution of Man (3)

Botany

4510 Plant Ecology (4)

5340 Plant Geography (4)

5350 Analysis of Plant Communities (4)

5510-20-30 Systems Ecology (3, 3, 3)

5830 Field Methods in Plant Ecology (4)

6320 Ecosystems of the World (3)

Ecology

5000 Thesis (1-15) E

5100 Special Problems in Ecology (1-3) Individual investigations in ecology. May be repeated with consent of instructor. Credit shall include 18 hours of ecology courses numbered above 5100. 9 hours of thesis in Ecology 5000 of 15 hours of thesis in Ecology 5000. 3 rating forms; (4) the Graduate Record Examination.

5210-20-30 Principles of Ecology (2, 2, 2) Theories and problems in ecology. Comparisons between land, freshwater, and marine environments, including humanity's role in the world's ecosystems. Must be taken in sequence. Prereq: 4 hrs of ecology at the upper division level.

5310 Ecology for Planners and Engineers (3) Ecological principles and effects that human-caused changes have on living organisms. Lectures and field trips. For students in Graduate School in Planning and Environmental Engineering.

5320 Implementation of Environmental Policy (3) Goals and problems of environmental legislation, especially National Environmental Policy Act; purpose, preparation, and evaluation of environmental impact statements and similar multidisciplinary studies. Prereq: 5210 or 5310, or Environmental Engineering 4820.

5610 Environmental Toxicology (3) (Same as Biochemistry 5610)

5640 Techniques in Environmental Toxicology (2) (Same as Biochemistry 5640)

6000 Doctoral Research and Dissertation (3-15) E

6100 Special Topics in Ecology (3) Seminars on advanced topics and recent developments in ecology. Prereq: Consent of instructor. May be repeated.

6110 Seminar in Animal Behavior (2)

6120 Seminar in Aquatic Ecology (2)

6130 Seminar in Physiological Ecology (2)

6140 Seminar in Community Ecology (2)

6150 Seminar in Radiation Ecology (2)

6160 Seminar in Systems Ecology (2)

6431 Current Topics in Environmental Toxicology (1) (Same as Biochemistry 6431)

Economics

4260 Economics of Resources and Environmental Policies (3)

Environmental Engineering

4530 Sanitary Engineering Laboratory (3)

4600 Solid Waste Management (3)

4700 Air Pollution-Air Resources Management (3)

5593 Advanced Sanitary Engineering Laboratory (3)

5700 Planning and Air Pollution Control (3)

5710 Air Pollution Control Engineering (3)
The Master's and doctoral programs are offered jointly by the Department of Psychology and the Department of Management. They are designed to prepare students for personnel, professional, and organizational research, for university teaching, and for consulting relationships with industry. The emphasis is upon applied research utilizing a thorough theoretical background, including classical and modern organization theory, organizational behavior, psychology, and management. The programs are administered by a joint committee of the two departments, appointed by the Vice Chancellor for Graduate Studies and Research on recommendations from the two department heads.

It is intended that students entering the 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 which will assist the student to attain a reasonable level of sophistication in areas of deficiency.

ADMISSION PROCEDURE

Applicants for admission must request forms and materials from both the Graduate Office and the Chairperson, Industrial and Organizational Psychology program, 413 Stokely Center for Management Studies.

Two separate applications must be completed: one application for admission to the Graduate School and one application for admission to the Industrial and Organizational Psychology program.

Deadline: For fall entrance, all materials should be received by the Vice Chancellor for Graduate Studies and Research no later than March 1 if you wish financial assistance consideration. Standards: At least 9 quarter hours of college mathematics and one course in statistics are required. Ordinarily, an undergraduate grade-point average of 2.5 or above is required, with no evidence of special weakness in mathematics and physical sciences. Test scores on the Graduate Management Admission Test or on each section of the GRE are preferred.

The Ph.D. program requirements described in sections II A, II B, and II G comprise the major requirements for a Master's degree. An oral examination covering the thesis and related topics must also be completed.

THE DOCTORAL PROGRAM

I. Course Requirements

A. Minimum course requirements:
   1. Management or Psychology 5170, 5180, 5190.
   3. Minimum of three 6000-level seminars to be selected from Psychology or Management 6250, 6260, 6270, and Psychology or Management 6380*.
   4. 36 hours of Psychology or Management 6000.

B. Recommended electives:
   1. For preparation for advanced section (81) GRE: Psychology courses as appropriate.
   2. For students who require preparation in psychometrics: Applied psychometrics.
   3. For students who require preparation in management: Management 5110, 5120, 5220, 5230.
   4. For students who wish to pursue special research interests aside from their dissertation: Management 5250, 5260, 5270, Management or Psychology 5900.

C. Courses available in areas related to industrial and organizational psychology:
   a. Through College of Business Administration;
   b. Through College of Liberal Arts;
   c. Others as approved by advisor.

II. Program Requirements**

A. Attainment of a B average** in Management or Psychology 5170, 5180, 5190.

B. Completion of a comprehensive examination in general psychology within no more than two years of entry by attaining a score of 650 on the GRE Advanced Test in Psychology.

C. Completion of a general preliminary examination in the area of the student's major research and professional interest. A student is expected to take this examination by the end of twelve quarters. This examination may be repeated once, normally no later than six months after the first attempt, at the discretion of the student's doctoral committee.

D. By the end of nine quarters a student is expected to choose a major advisor (Chairperson of Doctoral Committee).

E. Completion of a special preliminary examination in the area of the student's major research and professional interest. A student is expected to take this examination by the end of twelve quarters. This examination may be repeated once, normally no later than six months after the first attempt, at the discretion of the student's doctoral committee.

F. Completion of an oral examination following the preparation of a doctoral dissertation. This examination covers the field of doctoral research and related topics, and must be passed at least four weeks prior to the awarding of the degree.

G. Maintenance of at least 3.0 grade point average.

*May be repeated for additional credit.

**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.

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Forestry, Wildlife, and Fisheries

4450 Game Mammals (4)
4460 Game Birds (4)
5210 Seminar in Wildlife Conservation (3)
5220 Seminar in Forest Tree Biology (3)
5240 Seminar in Forest Genetics (3)
5460 Predator Ecology (3)
Geography
4720 Data Mapping (4)
4740 Remote Sensing: Types and Applications (4)
5550 Topics in Geography of Land-Surface System (3)
5610 Topics in Climatology (3)
5740 Advanced Topics in Remote Sensing (3)
Zoology
4230 Paleoecology (4)
4240 Paleobotany (4)
4510 Principles of Geomorphology (4)
5200 Quaternary Problems (4)
5910 Geomorphology (4)
4510 Principles of Geomorphology (4)
5200 Quaternary Problems (4)

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Industrial and Organizational Psychology

MAJOR

4320 Soil Formation, Morphology and Classification (4)
5240 Soil Productivity and Management (3)
5250 Pedology (4)
5810 Crop Climatology (4)
5820 Advanced Crop Physiology and Ecology (4)

Psychology
4900 Aspects of Urban Environment (4) S/NC only.
5750 Ethological Psychology (3)
4110 Population Problems (4)
4330 Urban Ecology (4)
6000 Principles of Geomorphology (4)
4660-70 Limnology (4, 4)
4700 Arachnology (4)
5570 Animal Populations (3)
5560 Geographic Distribution of Animals (4)

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Management Science

MAJOR
Management Science

DEGREE
M.S.

Committee:
C. E. Bell (Chairperson), Management Science;
R. W. Boling, Management; J. S. Bradley, Mathematics;
R. L. Church, Civil Engineering;
R. S. Garfinkel, Management Science;
E. Giustof, Economics; R. E. Rosenthal, Management Science;
S. Seikow, Computer Science; R. E. Shrieves, Finance; C. C. Thigpen, Statistics.

THE MASTER'S PROGRAM

The M.S. program in Management Science is designed as preparation for a career in the application of quantitative techniques for the solution of management problems in large organizations. The program's flexibility also makes it appropriate as preparation for doctoral study in Management Science.

Management Science course work will expose students to both the theoretical development of quantitative techniques and their application to managerial decision making. In addition to the development of sufficient mathematical maturity for creative use of quantitative skills, the program allows concentrated study in an area of application within the College of Business Administration. With the widespread application of management science technology, the student may (with the approval of the Management Science Committee) choose an applied concentration in a field outside the College of Business Administration.

Applications are encouraged from all majors, but mathematics background equivalent to the completion of at least two years of college calculus and proficiency in a computer language (e.g. Computer Science 3150) is required. The program is designed to be completed in one calendar year of full-time study, but applications are also encouraged from prospective part-time students.

Course Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Quarter Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management Science 5310-20-30-35-40</td>
<td>14</td>
</tr>
<tr>
<td>Applied concentration area (approved by advisor)</td>
<td>12</td>
</tr>
<tr>
<td>Statistics 5110</td>
<td>3</td>
</tr>
<tr>
<td>Statistics elective (5000 level or above)</td>
<td>3</td>
</tr>
<tr>
<td>Mathematics (4000 level or above)</td>
<td>6</td>
</tr>
<tr>
<td>Electives selected from mathematics, statistics, computer science, and/or management science</td>
<td>6</td>
</tr>
<tr>
<td>Electives in any area approved by advisor</td>
<td>6</td>
</tr>
</tbody>
</table>

Total 50

A thesis option is available which substitutes 9 hours of thesis credit for the following 14 hours of course work:
Management Science 5335-40, and one 3-hour course in the applied concentration area and 6 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 quarter and must approve all courses on a quarter-by-quarter 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 50 hours for all non-thesis students and 45 hours for all thesis students; however, the number of hours of electives can be reasonably expected to vary between 6 and 18 as a function of prior background.

For course listings and description of the Ph.D. program in Management Science, refer to the Department of Management Science, College of Business Administration.

Water Resources Development

William F. Brandes, Director, Water Resources Research Center

<table>
<thead>
<tr>
<th>Course</th>
<th>Quarter Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>3410 Principles of Ground Water Geology (3) (Same as Geology 3410.)</td>
<td></td>
</tr>
<tr>
<td>3565 Introduction to Public Administrative Organization and Management (4) (Same as Political Science 3565.)</td>
<td></td>
</tr>
<tr>
<td>4110 Managerial Economics (3) (Same as Economics 4110.)</td>
<td></td>
</tr>
<tr>
<td>4810 Water Law (3) (Same as Environmental Engineering 4810.)</td>
<td></td>
</tr>
<tr>
<td>5000 Thesis (1-15) E</td>
<td></td>
</tr>
<tr>
<td>5130 Planning Research Methods I (2) (Same as Planning 5150.)</td>
<td></td>
</tr>
<tr>
<td>5160 Planning and Utilities (3) (Same as Environmental Engineering 5160 and Planning 5160.)</td>
<td></td>
</tr>
<tr>
<td>5340 Hydrology of Agricultural and Forest Lands (3) (Same as Agricultural Engineering 5340.)</td>
<td></td>
</tr>
<tr>
<td>5410-20-30 Interdisciplinary Seminars (3, 3, 3) Problems relating to comprehensive water resource development; flood management, hydroelectric power, navigation, recreation, alternatives in water resource planning, tomorrow in today's planning, project formulation and justification, direct and indirect economic consequences, state and local participation, and municipal and industrial uses of water developments.</td>
<td></td>
</tr>
</tbody>
</table>
The College of Liberal Arts offers programs leading to eight advanced degrees.* See page 9 for degrees and majors.

**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 1-12 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.

**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, working in political campaigns, etc. Credit per quarter will vary from 1-12 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.

**THE MASTER'S PROGRAM**

The Department of Anthropology offers the Master of Arts and the Doctor of Philosophy degrees with concentrations in physical anthropology, cultural anthropology, archaeology, zoarchaeology, and folk culture.

**DEGREES**

**Anthropology**

**MAJOR DEGREES**

**Anthropology**

M.A., Ph.D.

**Professors:**

W. M. Bass (Head), Ph.D. Pennsylvania; C. H. Faulkner, Ph.D. Indiana; A. K. Guithe, Ph.D. Michigan; P. W. Parmalee, Ph.D. Texas

A. & M.

**Associate Professors:**

J. E. Harrison, Ph.D. Syracuse; R. L. Cantz, Ph.D. Kansas.

**Assistant Professors:**


The Department of Anthropology offers the Master of Arts and the Doctor of Philosophy degrees in the following fields:

- Physical anthropology
- Cultural anthropology
- Archaeology
- Zoarchaeology
- Folk culture

**THE MASTER'S PROGRAM**

The formal requirements for the Master's degree include:

1. A minimum of three quarters of residence at The University of Tennessee, Knoxville.
2. A minimum of 45 quarter hours for graduate credit, including preparation of a thesis. Thirty-six of these 45 hours must be in anthropology, 9 hours may be taken in closely related disciplines (at least one-half of the courses must be at the 5000 level).
4. A thesis. In addition to the two (2) copies required by the Graduate School, one bound copy of the thesis is to be presented to the department and a bound copy to the student's thesis advisor.

**THE DOCTORAL PROGRAM**

Although there is no minimum credit hour requirement for the Ph.D. degree, students in this program should plan to devote to its attainment no less than 3 years beyond the B.A. level and to complete the following requirements:

1. Admission to Ph.D. program through passing Graduate Evaluation Examination at completion of first year of study, or through departmental acceptance of a previously earned M.A. degree in Anthropology.
2. Formation of an advisory committee and establishment in consultation with that committee of a program of study. Delineation of field(s) of competence by the student and subsequent presentation to graduate advisor.
3. Demonstration of competence in a foreign language as determined by the student's committee.
4. Successful completion of oral and written comprehensive examinations and admission to candidacy.
5. Successful completion of the dissertation and final oral examination.

**3070 Genetics and Society** (3) (Same as Botany 3070)

**3410 Principles of Cultural Anthropology** (3) Basic concept and objectives in study of culture. Range of cultural phenomena and approaches to its study. Recommended prerequisite: 2530. F or W

**3440 Religion of Primitive Peoples** (3) Religions of nonliterate peoples. Place of religion in their social and cultural systems. Recommended prerequisite: 2530. (Same as Religious Studies 3440) F or Sp

**3450 Community Studies in Complex Culture** (3) Review of cross-cultural comparative urban and village communities and methodologies used in community studies. Recommended prerequisite: 2530. A
lineages, emphasizing the earliest Hominid and related forms. Prereq: 2510. Recommended prereq: Zoology 3430. W


4975 Human Paleontology Laboratory (1) Detailed examination of fossils and other materials pertinent to study of human paleontology. Prereq or coreq: 4970. Sp

5000 Thesis (1-15) E

5010 Graduate Research (1-6) Independent investigation of special problems in anthropology. E 5100 Seminar in Cultural Anthropology (3-9) 5101 Foreign Study (1-12) See page 95. 5102 Off-campus Study (1-12) See page 95. 5103 Independent Study (1-12) See page 95. 5140 Seminar in Zooarchaeology (3) Approaches to analysis and interpretation of archaeological faunas. Intensive reading, evaluation and discussion of major faunal studies, guides to identification, methods of preparation of faunal data. May be repeated. Maximum 6 hrs. A

5149 Laboratory Studies of the Vertebrate Skeleton (4) Examination and comparison of skeletons of mammals, birds, reptiles, amphibians, and fishes. Emphasis on identification of archaeologically derived faunas. May be repeated. Maximum 6 hrs. A

5159 Laboratory Study of the Mollusca (4) Examination and identification of terrestrial and freshwater mollusks of eastern U.S. Emphasis on living and archaeologically derived pelecypods. Prereq: Zoology 1101, 1 hr and 3 labs. Sp

5160 Seminar in Archaeology (3-9) Theoretical and practical issues central to contemporary archaeology. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

5200 Special Topics in Anthropology (3) Lecture and/or seminar course for advanced students on selected topics of current interest to field of archaeology as a whole. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

5210 Community Anthropology: The Local Community (3) Ethical issues, researcher models and research methods on local communities. Prereq: 4440 or consent of instructor. A

5340 Fieldwork in Archaeology (3-9) Practicum work surveying, excavating, processing, and analyzing archaeological materials. Prereq: 9 hours of introductory anthropology and consent of instructor. May be repeated. Maximum 9 hrs.

5400 History of Anthropological Theory (3) Theoretical contributions of more influential anthropologists. Prereq: Consent of instructor. A

5440 Peasant Societies (3) Critical analysis of existing literature and theories regarding rural-urban polarities, interactions, and different cultural manifestations of agricultural populations. Prereq: Consent of instructor. A

5450 Comparative Social Organization (3) Social structure of small-scale societies. Kinship, age, sex, locality, and other factors in determining relations between individuals and groups. Prereq: At least one area course. A

5460 Quantitative Methods in Anthropology (3) Application of quantitative methods to anthropological data. Correlation and derivative procedures, distance analysis, discriminant analysis, and implementation of computer routines. Prereq: Statistics 2100 or equivalent. F

5470 The Healer in Cross-cultural Perspective (3) Guest lectures on healing including with socialization methods of diagnosis, and therapeutic modes of healingers in predominantly non-European American milieu. Prereq: 4260 Y

5600 Theory in Archaeology (3) Review of development of archaeological theory. Coverage up to and including recent systems approaches. F

5610 Problems in North American Archaeology (3) Seminar to explore specific research problems in North American archaeology. Research topics on prehistoric ecology and settlement patterns in North America. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. A

5620 Problems in Old World Archaeology (3) Selected topics and research problems in European, Asian, and African prehistory investigated in depth. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. (Same as Classics 5620.)

5630 The Maya (3) Intensive survey of Mayan culture of Yucatan and Guatemala from pre-Columbian times to the present. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. W

5660 Seminar in Prehistoric Lithic Technology (3) Analysis of techniques employed in production of prehistoric stone industries; raw materials employed; resultant implements, morphology and functional analyses of prehistoric stone artifacts. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. W

5690 Seminar in Prehistoric Agriculture (3) Historical analysis and interpretation of archaeological evidence of early agriculture. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

5700 Theory in Folk Culture Studies (3) Seminar analyzing major theoretical viewpoints of European and American folklore and folklife studies from inception through recent developments. Prereq: 3900 and/or consent of instructor. Lecture and 3 labs. Sp

5710 Problems in Folk Culture Studies (3) Topical seminar dealing with selected problems and aspects of traditionai behavior in Euro-American culture. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

5800 Dental Anthropology (3) Dental anatomy, theories of dental evolution, genetic and environmental influences controlling dental morphology, comparative primate dental morphology, dental trait analyses, use of dentition for skeletal aging, and dentistry. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. W

5900 Dental Anthropology (3) Dental anatomy, theories of dental evolution, genetic and environmental influences controlling dental morphology, comparative primate dental morphology, dental trait analyses, use of dentition for skeletal aging, and dentistry. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

5909 Measurement of Man (3) Techniques of measuring and describing skeletal material and human subject with emphasis upon practical applications to growth, nutrition and human engineering. Prereq: Consent of instructor. A

5920 Advanced Physical Anthropology (3) Intensive investigation of theory and problems in physical anthropology. Prereq: Consent of instructor. A

5930 The Human Skeleton in Forensic Medicine (3) Application of physical anthropology to problems in human identification. Determination of age, race, and sex of skeleton and preparation of reports for legal authorities. Prereq: Consent of instructor. A

5940 Skeletal Biology of Early Human Population (3) Practical and theoretical approaches to analysis of prehistoric human skeletal populations. Demographic, life history, pathological, nutrition, and studies of biological relationships as they relate to population as adaptive unit. Prereq: 3900 F

5945 Comparative Primate Anatomy (4) Laboratory and field course dealing with functional anatomy of primates. Musculoskeletal system and evolution of various primate adaptive patterns. Prereq: Osteology and one discharge course in zoology. F

5950 Paleopathology (4) Identification and descriptive analysis of pathological conditions affecting human skeletal material. Prereq: 3900 and/or consent of instructor. Lecture and lab.

5960 Dermatoglyphics (3) Methods of dermatoglyphic analysis; genetics and population variation of various dermatoglyphic elements, forensic applications: relationships to various genetic and chromosomal abnormalities. Prereq: Consent of instructor. F

5970 Emergence and Early Evolution of Man (3) Ancestry and evolutionary significance of Australopithecines. Prereq: 4970 or consent of instructor. F

5980 Neanderthal Man and Human Evolution (3) Morphology, distribution, and evolutionary relationships of Neanderthals. Prereq: 4970 or consent of instructor. A

5990 Human Variation (3) Nature of human biological variation with emphasis on microevolutionary processes responsible for establishment and maintaining variation and relationships of variation to population structure. Prereq: 3930 or consent of instructor. A

6000 Doctoral Research and Dissertation (3-15) E

6140-23-30 Seminar in Cultural Anthropology (3, 3, 3) Offered each quarter primarily for doctoral candidates. Prereq: Consent of instructor. Lecture and 3 labs. Sp

6160 Seminar in Archaeology (3-9) Theoretical and practical issues central to contemporary archaeology. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

6170 Seminar in Archaeology (3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

6180 Seminar in Anthropology (3) Seminar to explore specific research problems in anthropology. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

6190 Fieldwork in Archaeology (3-9) Internship work surveying, excavating, processing, and analyzing archaeological materials. Prereq: 9 hours of introductory anthropology and consent of instructor. May be repeated. Maximum 9 hrs.

6210 Seminar in Archaeology (3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

6250 Seminar in Archaeology (3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

6270 Seminar in Archaeology (3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

6290 Seminar in Archaeology (3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

6970 Seminar in Human Paleontology (3) Prereq: Consent of instructor. A

6980 Archaeology—Greek and Roman See Classics

Art

MAJOR DEGREES

Art

Professors:


Associate Professors:


Assistant Professors:


Instructor:

F. Bahou, M.F.A. California (Los Angeles). The Art Department offers two graduate degrees: Master of Arts and Master of Fine Arts. In order 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.
2. Three letters of recommendation from former professors or professionals in the field.
3. An undergraduate major in art or evidence of equivalent proficiency.

College of Liberal Arts 97
Application forms and further information are available by writing to the Department of Art.

MASTERS OF ARTS

Curriculum: communication design, drawing, fiber-fabrics, painting, printmaking, sculpture, and watercolor. One year of residence is required.

Quarter Curricular

| Thesis                                      | 9     |
| Area of concentration                      | 12    |
| Drawing and composition                    | 3     |
| Electives                                  | 12    |
| Total                                      | 45    |

The thesis is a critical essay relevant to the area of concentration. The M.A. thesis may not be used to fulfill the project in lieu of thesis requirements for the M.F.A. A graduate exhibition is required. Final examination is oral.

MASTERS OF FINE ARTS

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

Six quarters beyond the baccalaureate degree are required in residence. Residence is defined by the Department of Art as (1) a minimum enrollment of 6 hours per quarter, and (2) use of Department of Art facilities so that students are available for discussion and criticism. Final examinations are oral, concurrent with project exhibition.

Quarter Curricular

| Project in Lieu of Thesis                   | 30    |
| Major area                                 | 30    |
| Art history                               | 12    |
| Electives                                 | 10    |
| Seminar in Art Criticism                  | 4     |
| Seminar in Art History                    | 4     |
| Total                                     | 90    |

DEGREE REQUIREMENTS FOR M.F.A.

1. Successful completion of 30 hours of studio in concentration area. Inter-area studies must normally be approved by the faculty no later than the third quarter in residence. Fifteen hours of the major must be in second year courses.

2. Twelve hours of art history for graduate credit.

3. Seminar in Art History (4 hours) and Seminar in Art Criticism (4 hours).

4. Ten hours of electives which may consist of any committee-approved combination of graduate credit courses outside the student’s departmental concentration.

5. First year evaluation: At the end of the three quarters in residence the student must present work for evaluation by the faculty and receive permission to continue in the program.

6. Second year evaluation: With completion of all course work the student must present work for evaluation by the faculty and receive permission to register for Projects in Lieu of Thesis (Art 5999)

7. Art 5999, Projects in Lieu of Thesis (30 hours) is a third year of semi-independent study.

8. 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 the work, must satisfactorily complete an oral examination.

GRADUATE MINOR IN THE HISTORY OF ART

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

3516 Typography (4) Techniques and theories of typesetting and printing as fine art medium. Creative problems using type and printing presses. May be repeated. Maximum 12 hrs.

3517 Airbrush (4) Technique of airbrush. Emphasis on skill and creative applications. For art majors only. F, Sp.

3704 Medieval Art (4) Byzantine and western art of Middle Ages: manuscript illumination, mosaic, Romanesque pilgrimage church, Gothic cathedral. F.

3705 Northern European Painting: 1350-1600 (4) From courtly art of late Middle Ages to Northern Renaissance. Jan van Eyck, Roger van der Weyden, Bosch, and Dutch early printmakers. A.


3726 The Art of Northern Europe, 1550-1675 (4) Concentrated study of Bruegel, Rubens, Rembrandt, Georges de La Tour, Vermeer, Poussin and Hals.


3736 History of Twentieth-century Painting in Europe and America (4) Fauvism, Die Brücke, Cubism, Blaue Reiter, Futurism, Dada and Surrealism, geometric abstraction, social commentary painting, Abstract Expressionism in the U.S.A. and parallels in Europe: Pop, Op, Minimal, and Concept Art. F.

3745 History of Modern Architecture in Europe and America (4) Survey of nineteenth-century styles, Sullivan and skyscraper, Twentieth century: Viennese leaders, the Bauhaus, Gropius, Van der Rohe, Le Corbusier, Mies van der Rohe, Wright, Alvar Aalto, Kahn, Tange and Metabolism, Archigram, Soleri, and Venturi. F, W.

3746 History of Modern Sculpture in Europe and America (4) From 1800 to 1900; Neoclassicism to Rodin. From Greek sculpture to present. Focus on emphasis on Cubism, Constructivism, Expressionism, Assemblage, Pop, Primary Forms, Environments, and Earthworks. Sp.

3753 Crafts in America (4) Craft movement: growth and development, including educational, economic, and aesthetic values. Role of designer in society as producer and teacher.

3765 History of North American Art (4) Survey of landmarks in painting, architecture, sculpture, and design from prehistoric to 1900. F.

3766 History of Twentieth-century American Art (4) Analysis of developments in architecture, painting, sculpture, and design from 1900. W.

3775 Art of Indian Asia (4) History of Indian art with consideration of art of Central Asia and Southeast Asia. Sp.

3776 Chinese Art (4) F

3777 Japanese Art (4) F

3611 Introduction to Museology (3) Concepts, practices and historical development of museum practice, archaeology, anthropology, and science. (Same as Anthropology 3611)


4005 Special Topics in Art (6) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Max 16 hrs.

4015 Individual Problems (4) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

4106 Special Topics in Drawing (6) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 16 hrs.

4115 Drawing IV (6) Individualized pursuit of personal drawing techniques and concepts; individual and group critiques; weekly life drawing sessions. Prereq: 12 hrs. 3115. May be repeated. Maximum 16 hrs.

4119 Advanced Design Studio (4) To explore strengths, structural variability and form potentials of design materials, aesthetic potential. Prereq: Senior or graduate standing or consent of instructor.

4206 Special Topics in Painting (4) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 16 hrs.

4215 Painting IV (6) Individual concepts of personal expression with varied media on canvas. Prereq: 12 hrs. 3215 for art majors; consent of instructor for non-majors. May be repeated. Maximum 12 hrs. E.

4256 Special Topics in Fibber and Fabrics (4) Student- or instructor-initiated course to be offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 16 hrs.


4315 Watercolor IV (6) Individual concepts in personal expression with varied water-based media in paper. Prereq: 12 hrs. 3315 for art majors; consent of instructor for non-art majors. May be repeated. Maximum 12 hrs. E.

4405 Special Topics in Sculpture (4) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 16 hrs.

4415 Sculpture IV (6) Individual development of sculptural problems and techniques. May be repeated. Maximum 12 hrs. E.

4470 Wood Design: Advanced Practical Construction (4) Application of laminations, carving and joinig techniques in designing and construction of contemporary furniture. Prereq: 2450 or consent of instructor. May be repeated. Maximum 12 hrs.

4506 Special Topics in Communication Design (4) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 16 hrs.


4516 Portfolio and Exhibition Techniques (4) Application of design principles to promotion, construction, display and evaluation of portfolio and three dimensional artists. Prereq: Senior or graduate standing or consent of instructor. Sp.
5616 Graduate Printmaking-Intaglio I (2-6) May be repeated. Maximum 18 hrs. F, W, Sp
5617 Graduate Printmaking-Intaglio II (2-6) May be repeated. Maximum 18 hrs. F, W, Sp
5625 Graduate Printmaking-Intaglio II (2-6) Individually with sufficient course work in the area of
pathology, audiology, psychology, and related fields, the student may be required to make up such deficiencies.

Students may elect either the thesis program or the non-thesis option. Students in both programs are required to take 5110 and 5119. The Master's program with the thesis will include a minimum of 45 quarter hours of approved graduate credit, including 9 quarter hours of 5000 credit in the preparation of an acceptable thesis representing original independent work, and a final oral examination. At least one-half of these total courses must be at the 5000 or 6000 level, no more than 9 hours of which may be thesis courses. Students in the non-thesis option program must present a total of 48 quarter hours of approved graduate credit and pass a final written examination. A minimum of 24 quarter hours must be at the 5000 or 6000 level. The decision as to the choice of the thesis or non-thesis program is normally made following completion of 5110 and a conference with the student's advisor.

THE DOCTORAL PROGRAM

The Ph.D. program in Speech and Hearing Science seeks to develop individuals for research or college teaching careers in the field of speech and language pathology, audiology, or speech and hearing science. This degree program is designed to provide an individual with primary emphasis upon developing the scientific and cognitive skills which allow individuals to identify and independently study important questions concerning the human act of oral and aural communication. Students will be expected to master the accumulated knowledge in the area 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 course work and the last year to full-time research culminating in the doctoral dissertation. Specific programs of study will be determined by the student in consultation with his/her faculty committee. In addition to the general Graduate School requirements, specific requirements for the degree of Doctor of Philosophy in Speech and Hearing Science will include:

1. Successful completion of course work in the study of one or more research tools, or other specific scientific or technical skills pertinent to the research interests of the candidate. The choice of research tool(s) is subject to departmental approval.
2. A minimum of 9 quarter hours of graduate credit in research work in a cognate field outside the Department of Audiology and Speech Pathology. These hours are in addition to those required in item 1 above.
3. Sufficient course work within the department but outside the area of specialization to give a broad foundation and understanding.

Audiology and Speech Pathology

MAJORS

DEGREES

Audiology
Ph.D., M.A.

Speech and Hearing Science
Ph.D., M.A.

Speech Pathology
M.A.

Professors:
H. L. Lupker (Head), Ph.D. Ohio State; S. Adler, Ph.D. Ohio State; C. W. Asp, Ph.D. Ohio State: P. J. Carson, Ph.D. Indiana; H. J. DeWitt, Ph.D. University of Washington; J. Nabeleck, Sc.D. Prague; H. A. Peterson, Ph.D. Illinois; B. Silverstein, Ph.D. Purdue. Associate Professors:
S. B. Burchfield, Ph.D. Michigan State; C. G. Maisel, M.Ed. Texas.

Speech Pathology
Ph.D., M.A.

Speech Pathology
M.A.

Therapy: A minor is offered in each of the two areas when approved by the department. The intent of each major program is to provide the student with the scholarly and professional skills necessary for functioning as an independent professional clinician in any clinical environment. Within this broad coverage of course work in audiology or audiology, it is possible for a student to specialize to some extent. For example, in the M.A. in Audiology program, a student may emphasize audiological assessment, aural habilitation or rehabilitation, medical or pediatric, or industrial audiology. Within the M.A. in the Speech Pathology program, a student may emphasize language disorders, cultural language differences, or speech disorders such as aphasia or stuttering.

Students interested in specializing beyond the typical broad M.A. program should consult the Department of Audiology and Speech Pathology regarding specific programs of study. 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 course work and the last year to full-time research culminating in the doctoral dissertation. Specific programs of study will be determined by the student in consultation with his/her faculty committee. In addition to the general Graduate School requirements, specific requirements for the degree of Doctor of Philosophy in Speech and Hearing Science will include:

1. Successful completion of course work in the study of one or more research tools, or other specific scientific or technical skills pertinent to the research interests of the candidate. The choice of research tool(s) is subject to departmental approval.
2. A minimum of 9 quarter hours of graduate credit in research work in a cognate field outside the Department of Audiology and Speech Pathology. These hours are in addition to those required in item 1 above.
3. Sufficient course work within the department but outside the area of specialization to give a broad foundation and understanding.
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Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

5600 Independent Study in Audiology (1-6) Special reading, consultation, and research activities in field of audiology. May be repeated. Maximum 6 hrs. E

5610 Practicum: Language Pathology in Children (3) Seminar and/or practicum involving discussion and utilization of testing tools and analyses of habilitation/education for language differences of culturally different children. Prereq: 4560. Su

5631 Seminar in Language Differences (2) Significant topics in language pathology and evaluation of speech production. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

5730 Hearing Disorders (3) Advanced study of auditory disorders commonly encountered in medical environment. Etiology, pathology and eva luation procedures to differentiate lesions of auditory mechanism. Field trips may be required. Prereq: 4720 or equivalent and 5070. Su

5740 Pediatric Audiology (3) Advanced study of theoretical and practical considerations of procedures to evaluate hearing of infants and small children. Prereq: 4720 or equivalent. Sp

5750 Educational Audiology (3) Advanced case management and interdiscipline teamwork in studying the acquisition of language and certain disorders of language. Prereq: Consent of instructor. (Same as Psychology 5750.) Sp

5900 The Verbo-Tonal System (3) Theory, procedures and instrumentation of Verbo-Tonal System in habilitation, rehabilitation, diagnosis, speech therapy, and foreign languages. Prereq: 3716. Recommended prerequisite: 3050, 4720, and 4930. F, W, Su

6000 Doctoral Research and Dissertation (3-15) E

6010 Experimental Phonetics (3) Acoustical and physiological analyses of speech production and perception. Prereq: 5119 or consent of instructor. F

6019 Experimental Phonetics Laboratory (2) Must be taken concurrently with 6010. W

6020 Psychoacoustics (3) Auditory reception and perception of nonspeech stimuli. Prereq: 6010. W

6029 Psychoacoustics Laboratory (2) Must be taken concurrently with 6020. W

6060 Applied Anatomy and Physiology of Speech Mechanism (3) Dissection and related readings. Prereq: 5060 or equivalent. Sp

6069 Laboratory in Applied Anatomy & Physiology of Speech Mechanism (2) Must be taken concurrently. F, W

6070 Experimental Techniques in Cochlear Physiology and Neurophysiology (3) Prereq: 5070 or equivalent. A

6080 Seminar in Speech Science (3) Advanced study of experimental areas such as speech physiology, acoustic analysis, recognition, perception and intelligibility of speech, communication theory, and psycholinguistic measurement of speech and language. Prereq: 3050, 4720, and 4930. T

6090 Seminar in Hearing Science (3) Advanced study of perception of non-speech acoustic signal: detectability, pitch, loudness, differential threshold, analysis, and synthesis. Prereq: 6020 or consent of instructor. May be repeated. Maximum 9 hrs. Sp, A

6100 Experimental Design in Speech and Hearing (3) Analysis of experimental design in theses and related journals. Prereq: Psychophysical methods for data acquisition. Generation of experimental design based on parametric and nonparametric statistics. Prereq: 5110 or equivalent and consent of instructor. S

6117 Theories of Hearing (3) Physiological process basic to classical theories of hearing related to sensitivity, loudness, pitch, and discrimination of acoustic stimuli. Prereq: 5070 or consent of instructor. W, A

6119 Advanced Instrumentation in Speech and Hearing Science (3) Selection, use and calibration of instrumentation used in speech and hearing research. Prereq: 5117, 5119 or equivalent. W, A

6500 Advanced Seminar in Audiology (3) Prereq: Consents of the Major or Minor may be repeated. Sp, A

6520 Advanced Seminar in Speech and Language (3) Topics vary from quarter to quarter but include advanced study of aberrations of voice, articulation, speech disorders, language development or use, and language symbolism. Prereq: Consent of instructor. May be repeated. F, Sp, Su

6560 Directed Research (1-6) Participation in ongoing or non-dissertational research. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. E

6570 Directed Study in Speech Pathology (1-3) May be repeated. Maximum 9 hrs. E

6580 Directed Study in Audiology (1-3) May be repeated. Maximum 9 hrs. E

6590 Directed Study in Speech Science (1-3) May be repeated. Maximum 9 hrs. E

6600 Directed Study in Hearing Science (1-3) May be repeated. Maximum 9 hrs. E

Biochemistry

MAJOR

DEGREES

Biochemistry

M.S., Ph.D.

Professors: K. J. Monty (Acting Head), Ph.D. Rochester; J. E. Churchill, Ph.D. Sheffield (England); T. P. Salo (Associate Head), Ph.D. Michigan.

Associate Professors: S. W. Hightower, Ph.D. Chicago; J. G. Joshi, Ph.D. Poona (India).

Assitant Professors: L. B. Brattsten, Ph.D. Illinois; R. Bryant, Ph.D. Illinois; H. F. Feinberg, Ph.D. California (Berkeley); L. Huang, Ph.D. Michigan State.

The graduate program consists of an orientation examination to determine the most suitable course work for the incoming graduate student, successful completion of a series of graduate courses and seminars, and a qualifying examination at the end of the first year. In addition, the Ph.D. degree requires research leading to the writing and oral defense of a thesis, while the Ph.D. degree requires successful completion of preliminary examinations, and extensive research leading to the Ph.D. dissertation and its oral defense.

The orientation examination: Given fall quarter at 9:00 a.m. on the Thursday prior to the week in which classes begin, is taken by all incoming students without exception. The purpose of the examination is to aid in placing students in the proper courses to help ensure their success in the graduate programs. The examination will cover analytical, organic and physical chemistry and biochemistry. If the student's undergraduate program does not show appropriate courses in one of the subjects, the student will not take that part of the examination but will be enrolled in a suitable course. The results of the examination will help determine appropriate course work.

The qualifying examination: At the conclusion of the first year's work in 5510-20-30, 5310-20-30 and 4230, a comprehensive qualifying examination covering all of the material will be taken by all first year graduate students, with the exception, in the first week of the summer quarter. On the basis of results of the examination, the student will be counseled concerning his/her future in the biochemistry program.

THE MASTER'S PROGRAM

This program requires about two years of full-time study and provides both breadth and depth of training by mixing classroom instruction and related laboratory experience. Students completing this program will have a sound foundation in modern biology and chemistry and will be equipped to follow and absorb future advances in biochemistry. Students preparing for this program are now involved in such occupations as industrial pharmaceutical research, junior college and high school teaching, hospital laboratory work, cancer research, scientific journalism, and pursuit of Ph.D. degrees.

Candidates usually should offer course work covered by an undergraduate major in either biology or chemistry. Departmental requirements consist of the satisfactory completion of 45 credit hours of graduate work and the mastery of the subject matter of the following courses:

1. Introductory Organic Chemistry with laboratory (at least one quarter of analytical chemistry, and a minimum of three quarters of approved physical chemistry.
2. A minimum of 12 quarters of approved graduate biology courses beyond the introductory level, including at least 3 hours of genetics and 3 hours of physiology.
3. An orientation examination as described above.
4. Biochemistry 5510-20-30, 5310-20-30, 4230; and at least one special topics course (5450), or 5610 or 5110 or 5120 or 5130 or 5210.
5. A qualifying examination as described above.
6. At least 9 hours of advanced lecture-seminar courses from the following: Biochemistry 6410, 6010.

5. At least 9 hours of Master's research and a thesis.
6. A final comprehensive examination which will cover both the thesis endeavor and the subject matter of the course requirements.

THE DOCTORAL PROGRAM

An incoming student must present course work covered by an undergraduate major in either chemistry or biology. Departmental requirements for the awarding of the Ph.D. include mastery of the subject matter indicated in the following list of courses. Course contents listed in Items 1 and 3 are prerequisites to taking preliminary examinations: applicants usually should expect to complete these requirements within the first two years of graduate school.

1. Introductory Organic Chemistry with laboratory (at least 1 year), at least one quarter of analytical chemistry, Chemistry 4510, Introductory Physics*. Differential and Integral Calculus (at least one year of approved graduate courses in chemistry or physics, for example: Chemistry 5110-20-30, 5310-20-30, 5440, Physics 5210-20-30, Physics 5440, Physics 5510-20-30; plus minimum of three quarters

*Though completion of these courses or the equivalent is required, they may not be taken for graduate credit.
4230 Introduction to Physical Biochemistry (3) Physical characterization of macromolecules: polarized light, absorption and fluorescence, sedimentation and transport hydroniums; electrophoretic mobility and characterization of macromolecules by two- and three-dimensional x-ray crystallography of proteins and nucleic acids. Prereq: 4220 or Chemistry 3430, or equivalent. Sp
4500 Thesis (1-15) E
5010 Biochemical Techniques (2) Theory and laboratory practice in chromatographic and electrophoretic techniques in isolation and characterization of macromolecules of importance in biochemistry and molecular biology. Prereq: 4110 or equivalent. Open to undergraduates with consent of department.
5120 Biochemistry of Mitochondria and Selected Organelles (3) Organization of compartmented metabolic systems in mitochondria and other cell organelles. Supramolecular organization, bioregulatory, transport systems, drug metabolism, oxygen toxicity and defense mechanisms, nitrogen fixation and photosynthesis. Emphasis on experimental approaches. Prereq: 4120 or 5010 or equivalent.
5130 Protein Structure and Enzyme Function (3) Physicochemical properties of proteins; primary, secondary, tertiary, quaternary structure; denaturation, renaturation and other conformational change; structure-function correlation; coenzymatic specificity of catalysis; stability, transient, relaxation, and allosteric kinetics of catalysis. Prereq: 4110 and either 4220 or Chemistry 3430.
5210 Structure and Function of Biological Membranes (1) Structural organization of biological membrane components. Dynamic properties as studied biochemically and biophysically. Selective topics of membrane functions related to structural organization.
5220 Structures and Functions of the Nucleic Acids (3) Chemistry of nucleic acids; hydrogen bonding and double-stranded structures; coiling, supercoiling, and other higher order structural considerations; biosynthesis of DNAs and RNAs; repair mechanisms; degrading mechanisms; mechanisms of genetic information storage and retrieval. Prereq: 4110-20 or equivalent.
5230 Protein Synthesis and Its Role in Metabolic Regulation (3) Mechanism of assembly of peptide chains; ribosome structure and function; deciphering and genetic code; regulation of transcription and translation in eukaryotic systems (induction, repression, etc.). Prereq: 4110-20.
5300 Graduate Research Participation (3-9) May be repeated. Maximum 12 hrs.
5310-20-30 Experimental Techniques (2, 2, 3) Tutorial laboratory course in modern experimental methodology and instrumentation. Intended primarily for departmental majors. F; W; Sp
5450 Special Topics (1-3) Registration only by prior arrangement with department. May be repeated.
5510 Properties of Biomolecules Related to Function (3) Structures, chemical and physical properties of biomolecules developed from theoretical and experimental points of view to explain actions and interactions. Prereq: Chemistry 3211-21-31; Chemistry 2140 recommended. Prereq or coreq: 4210. Chemistry 4910 or equivalent. F
5520 Molecular and Cellular Basis of Metabolic Regulation (3) Regulation of metabolic pathways dependent on energy demands of organism and on developmental processes (e.g., growth, development, reproduction). Prereq: 5510 or consent of department. Coreq: 4220 or Chemistry 4920 or equivalent. W
5610 Environmental Toxicology (3) Basic concepts in toxicity interactions at subcellular, cellular, organism, organismal, population, and environmental levels, legal aspects. Major emphasis on biochemical toxicology. Prereq: 4110-20; Chemistry 3211-31; Chemistry 4910-20-30, or consent of instructor. (Same as Ecology 5610.) W
5640 Techniques in Environmental Toxicology (2) Survey of experimental techniques for assessment of presence, toxicity, and impacts of pollutants in ecological systems. Laboratory exercises focus on analytical, biochemical, and biassybath methods employed in toxicological studies. Prereq: Chemistry 4140-2149 and 3211-21-31, or yr of physics; or consent of instructor. (Same as Ecology 5640.) Sp
6000 Doctoral Research and Dissertation (3-15) E
6010 Advanced Biochemistry Seminar (1) Topics to be covered posted in spring quarter for following year. Invited speakers of note will participate. May be repeated. Maximum 9 hrs. S/NC only. F, W, Sp
6410 Current Topics in Biochemistry (1) Seminars and lectures dealing with current advances in field of biochemical research. May be repeated with consent of department. S/NC only. F, W, Sp
6420 Current Topics in Biological Membrane Research (1) Current literature on biological membrane research. Prereq: 4110-20 or equivalent. May be repeated. Maximum 9 hrs. S/NC only. (Same as Microbiology 6420.) F, W, Sp
6431 Current Topics in Environmental Toxicology (1) Critical review of research problems and methods in environmental toxicology: behavioral toxicology, biochemical and ecological effects, biostatistics and epidemiology. Presentations by students, faculty and guest lecturers from academia and industry. May be repeated with consent of department. Maximum 6 hrs. (Same as Ecology 6431.) S/NC only. F, W, Sp
6450 Advanced Special Topics (1-3) Registration only by prior arrangement with department. For students who have passed Ph.D. preliminary examination or are in advanced state of graduate studies. Topic title posted in advance. May be repeated. Maximum 9 hrs.

**Biology**

**MAJOR DEGREE** MACT

The Master of Arts in College Teaching program is administered by an interdepartmental committee composed of one representative from each of the following departments: Biology, Botany, Chemistry, Microbiology and Zoology. Inquiries regarding the program should be addressed to the chairperson of the committee. The admission requirements are:

1. Bachelor's degree with satisfactory record.
2. Nine quarter hours of college mathematics.
3. Twelve quarter hours of physical sciences.
4. Twelve quarter hours of general biology, general botany, or general zoology.
5. Eighteen quarter hours of advanced biology courses.

**Requirements for the degree**:

All candidates for the MACT degree in Biology will meet a minimum distribution of graduate and undergraduate courses as follows:

1. Eight quarter hours in each of the following:
   - Anatomy and/or Ecology.
   - Morphology, Developmental Biology and Anatomy.
   - Physiology and/or Biochemistry.
   - Genetics, Cytology and/or Cytogenetics.

2. Eighteen quarter hours of graduate credit in each of two of the following four fields: biochemistry, botany, microbiology,
zology or 36 quarter hours of graduate credit among the four fields as specified by the interdepartmental committee administering the MACT program in Biology.
3. At least 21 quarter hours of course work in requirement 2 (not including special projects and thesis) numbered at the 5000 or 6000 level.
4. At least 9 quarter hours of Master's research and an acceptable thesis.
5. Total graduate credit in the biological sciences (or appropriate supporting fields) of 57 quarter hours (including that in items 1, 2, 3, and 4).
6. A three-quarter, 1-hour seminar (or seminar series) on the problems and techniques of college teaching.
7. Six quarters of part-time, supervised college teacher-internship training.
8. A final comprehensive oral examination covering the thesis endeavor and the subject matter of the course requirements.

**Botany**

**MAJOR for the B.S. degree**

- Ph.D., Ph.D.

Professors:
- R. W. Holton (Head), Ph.D. Michigan
- E. E. Clebsch, Ph.D. Duke, H. R. DeSelm
- Ph.D. Ohio State, Ph.D. Indiana, Ph.D. Illinois, Ph.D. Virginia
- D. R. McConkey, Ph.D. Emory, H. F. Norris
- Ph.D. Ohio State, J. S. Olson, Ph.D. Chicago
- R. H. Petersen, Ph.D. Columbia; A. J. Sharp

Associate Professors:
- C. C. Amundsen, Ph.D. Colorado, J. D. Caponetti, Ph.D. Harvard; A. M. Evans, Ph.D. Michigan
- A. S. Heilmann, Ph.D. Ohio State; R. R. Hinke, Ph.D.
- Ph.D. Miami (Ohio); K. W. Hughes, Ph.D.
- Utah; O. J. Schwarz, Ph.D. North Carolina State; H. H. Shugart, Ph.D. Georgia.

Assistant Professors:
- J. G. Hickox, Ph.D. Massacusetts; B. Mullin, Ph.D.
- Ph.D. North Carolina State; E. E. Schilling, Ph.D.
- Ph.D. Indiana; D. K. Smith, Ph.D. Tennessee.
- W. O. Smith, Ph.D. Duke.

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

**Requirements for admission:** In addition to the general Graduate School requirements (see page 11) the botany department also strongly recommends submitting aptitude and advanced scores from the Graduate Record Examination, at least three letters of recommendation from academic or professional persons, a short statement describing probable areas of interest in botany, and the following specific courses:
1. general botany or biology, 12 quarter hours;
2. advanced botany or closely related sciences, 18 quarter hours;
3. physical sciences; general inorganic chemistry, 12 quarter hours of organic chemistry and physics highly recommended;
4. college mathematics, 9 quarter hours.

General degree requirements are given on pages 8-9. Special departmental requirements include successful completion of the following.

**THE MASTER'S PROGRAM**

A. **Thesis Program**
1. Satisfactory preparation of a written formulation and oral defense to the student's committee of a research proposal suitable for a thesis proposal. Must be completed before enrollment in Botany 5000.
2. Satisfactory performance on an examination in one modern foreign language or an A or B in French 3303 or German 3303 (can also be applied to the doctoral program).
3. Satisfactory completion of 2 credit hours at the 6000 level.
5. Presentation of a thirty-minute departmental seminar.
6. 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.
7. **Non-Thesis Program**
1. Satisfactory completion of 51 quarter hours of approved graduate courses of which 30 quarter hours must be in botany including Botany 5003 and 5004.
2. Satisfactory completion of 2 credit hours at the 6000 level.
3. 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.
4. Satisfactory performance on a final written examination on all work offered for the degree. The department may or may not follow this examination with an oral examination.

**THE DOCTORAL PROGRAM**

1. Satisfactory presentation of a written formulation and oral defense to the student's committee of a research proposal suitable for a dissertation proposal. Must be completed before enrollment in Botany 6000.
2. Satisfactory performance on a written comprehensive preliminary examination.
3. Presentation of one or more cognate areas outside of the department totaling 9 graduate credit hours with at least a B average.
4. Satisfactory performance on an examination in one modern foreign language or an A or B in French 3303 or German 3303.
5. Satisfactory completion of 6 credit hours at the 6000 level (excluding dissertation).
7. Presentation of a one-hour departmental seminar near the end of the doctoral program.
8. 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.

**Note:** Graduate School requirements are denoted by an asterisk. These requirements should be interpreted as minimal requirements and specific stipulations or requirements such as additional foreign languages, additional oral preliminary examinations may be required by the individual's committee of a research proposal.

**3010-20 Plants in Evolution (4, 4) Monera to angiospermae; emphasis on evolutionary relationship**

**3030 Field Botany (4) Study of plants in natural environments including plant identification, collection, preservation and basic ecological concepts. Prereq: 6 hrs in biological sciences. Sp, Su**

**3051-32 Field Botany (4, 4) Emphasis on fall and winter flora respectively. Prereq: 3030. Need not be taken in sequence. W**

**3050 Socioeconomic Impact of Plants (3) Significance of plants in origin and development of human cultures, evolution of role and use of plants in present civilizations. Occasional field trips. Sp, Su**

**3070 Genetics and Society (3) An introduction to genetics, anthropology and evolution with emphasis on their implications for human society. (Same as Anthropology 3070)**

**3090 Biology and Human Affairs (3) Basic biological principles involved in deterioration and preservation of an environment in which human cultures may survive. F**

**3130 Introductory Plant Pathology (4) (Same as Agricultural Biology 3130)**

**3210 Introductory Plant Physiology (4) Organismal physiology of plants: water, minerals, nutrition, morphology, genetics, elements of metabolic processes, effects of age, light, natural rhythms, temperature and other environmental factors. Lectures and laboratory.**

**4017 Field Mycology (3) Field experience on identification of higher fungi, field trips, field recognition of species and habitats; laboratory sessions. Prereq: 6 hrs botany. Recommended prereq: Botany 3010-20 or equiv. Su, A**

**4021 Field Bryology (3) Field experience on identification of mosses and liverworts. Field trips, field recognition of species and habitats, laboratory sessions. Prereq: 6 hrs botany. Recommended prereq: Botany 3010-20 or equiv. Su, A**

**4022 Field Lichenology (3) Field experience on identification of lichens. Field trips, field recognition of species and habitats, laboratory sessions. Prereq: 6 hrs botany. Recommended prereq: Botany 3010-20 or equiv. Su, A**

**4023 Field Agrostology (3) Field experience on identification of grasses. Field trips, field recognition of species and habitats, laboratory sessions. Prereq: 6 hrs botany. Recommended prereq: Botany 3010-20 or equiv. Su, A**

**4030 Mechanisms of Plant Speciation (4) Processes of plant speciation emphasizing population genetics, isolation, drift, hybridization, variation in populations, establishment of population barriers and other aspects of plant speciation. Prereq: 3010-20 and Biology 3110. W, A**

**4045 Aquatic Vascular Plants (3) Field experience on identification of aquatic vascular plants. Frequent field trips, field recognition of species and habitats. Prereq: 6 hrs botany. Recommended prereq: Botany 3010-20 or equiv. Su, A**

**4050 Synanthrology (3) Field experience on identification of composites. Frequent field trips, field recognition of species and habitats, laboratory sessions. Prereq: 6 hrs botany. Recommended prereq: Botany 3010-20 or equiv. Su, A**

**4055 Identification of Woody Plants (3) Field identification of native trees, shrubs and woody vines of Southern Appalachian ecosystems, recognition of key characteristics, significant aspects of natural history of local species. Prereq: 3010-20 and Biology 3110. W, A**

**4061 Field Physiology (3) Field experience on identification of freshwater algae. Frequent field trips, field recognition of species and habitats, laboratory sessions. Prereq: 6 hrs botany. Recommended prereq: Botany 3010-20 or equiv. Su, A**

**Not for graduate credit for botany majors.**
cycles as applied to evolution in group. Cultures and specimens in laboratory. Prereq: 3010 or equivalent. F, A

5120 Agroecology (4) Collection, identification, classification, and analysis of systematic problems. Cytotaxonomy, regula-
tory physiology, floral development, pollination, relationships, embryology and deviations, seed and fruit development. Prereq: 3030-30 or 4120, 3020 or consent of instructor. Sp, A

5150 Advanced Morphotopy of Flowering Plants (4) Vascular and non-vascular plants, types of floral, geobotanical research. May be repeated with consent of department. F; A; W

5210 Advanced Plant Physiology (4) Plant physiology, response of plants to light: photo-chemistry, photosynthesis, and photomorphogenesis. Prereq: consent of instructor. 1 hr and 2 labs. W

5220 Advanced Plant Physiology II (4) Photosynthesis, photorespiration, and plant or animal carbon dioxide cycle. Prereq: 5210 or consent of instructor. 1 hr and 2 labs. W

5235 Advanced Plant Biology I (3) The influence of plants on each other. Field and laboratory. Prereq: consent of instructor. 1 hr and 2 labs. W

5245 Advanced Plant Biology II (3) The influence of plants on each other. Field and laboratory. Prereq: consent of instructor. 1 hr and 2 labs. W

5250 Quaternary Problems (4) (Same as Geology 5250 and Zoology 5250) Field trips. Prereq: 3010, 3110 or equivalent. 2 hrs and 2 labs. W

5340 Plant Geography (4) Distribution of ecosystems with emphasis on American types. Vegetation, climatic and historical aspects. Prereq: 4310. 2 hrs and 2 labs. W

5350 Analysis of Plant Communities (4) Plants as species and ecosystems considered from standpoint of geneology, ordination, and ecosystem function. Prereq: 4310. 2 hrs and 2 labs. W

5360 Marine Ecology (3) The relations of marine organisms to the environment and their interactions with each other. Field and laboratory. Prereq: permission of the instructor. 1 hr and 2 labs. W

5410-20-30 Seminar in the Teaching of College Botany (1, 1, 1) Objectives in teaching of general botany. Supervised teaching in general botany. Prereq: 3010 or consent of instructor. 2 hrs and 2 labs. W

5460 Advanced Topics in Cryptogenic Botany (2-4) An advanced course in the study of plants from the cryptogenic group. Prereq: 3020, 4120, 5910-20 or equivalent. May be repeated with consent of instructor. 5 to 12 hrs. F; A; W

5470 Principles of Biological Illustration (3) Principles and application of photography, including plant morphology and plant morphology, drawing, photography, and illustration. Prereq: permission of the instructor. 3 hrs. W

5500 Thesis (1-15) E

5502-03-04 Non-Thesis Graduation Completion (3-9) Recommended registration not less than 3 and not more than 9 during the quarter in which a student is registered during any quarter when such a student uses university facilities and/or faculty time before degree completion. Not for the degree of Doctor of Philosophy. Prereq: 3010 or consent of degree requirements. May be repeated. S/N only. E

5503-04 Non-Thesis Research (3, 3) Library, field, or laboratory research under supervision of staff members. Prereq: 3010 or equivalent. F, A

5511 Mycology (4) Intensive survey of fungi, including major classes, utilizing lecture, laboratory and field information. Occasional field trips. Prereq: 3010, 3 hrs and 1 lab. Sp

5521 Bryology (4) Taxonomy, phycology, ecology, physiology, and developmental morphology of bryophytes with emphasis on field studies and current research. Prereq: 3020. 1 hr and 3 labs. W

5522 Lichenology (4) Taxonomy, phycology, ecolog-ery, economics and symbiosis of lichens with emphasis on field studies and current research. Prereq: 3010, 3110 or 4017. Recommended prereq: 3010. 1 hr and 3 labs. W

5531 Vascular Plant Taxonomy (4) Family charac-
teristics and ecology of flowering plants, classification, classification, field and laboratory studies. Prereq: 3030 or equivalent. 4 hrs and 2 labs. Sp

5561 Phytophylacton Ecology (4) Interaction between environment and phytolithon. Nutrient uptake, primary production, competition, ecological theory applied to phytolithon communities, and physiological adaptations by populations to environmental stresses. Prereq: 3010 or consent of instructor. 1 hr and 2 labs. Sp

5565 Phytophylacton Ecology (4) Interaction between environment and phytolithon. Nutrient uptake, primary production, competition, ecological theory applied to phytolithon communities, and physiological adaptations by populations to environmental stresses. Prereq: 3010 or consent of instructor. 1 hr and 2 labs. Sp

5570 Principles of Biological Illustration (3) Principles and application of photography, including plant morphology and plant morphology, drawing, photography, and illustration. Prereq: permission of the instructor. 3 hrs. W

5570 Principles of Botanical Illustration (3) Principles and application of photography, including plant morphology and plant morphology, drawing, photography, and illustration. Prereq: permission of the instructor. 3 hrs. W

5580 Peridotics (4) Evolutionary study of lower vascular plants. Prereq: 3010 or equivalent. 3 hrs and 2 labs. Sp, A

5590 Morphology and Evolution of Vascular Plants (4) Structure and function of somatic and sexual life

organisms. Principles and application of various analytical and electron microscopic techniques; cell fractionation and isotope labeling of subcellularorgans; distribution and analytical centrifugation; photomicrography and microcinematography. Prereq: 3010 or equivalent. 2 hrs and 2 labs. F, A

5580 Phycology (4) Chromosome structure and behavior during mitotic and meiotic divisions in reoviral and non-reoviral organisms. Prereq: 3010 or equivalent. 1 hr and 2 labs. F

5581 Cytogenetics (4) Chromosome structure and behavior during mitotic and meiotic divisions in reoviral and non-reoviral organisms. Prereq: 3010 or equivalent. 1 hr and 2 labs. F

5582-21-22-23-24 Methods and Instrumentation in Laboratory Investigation (1, 1, 1, 1, 1) Laboratory course providing project experience and theoretical background in various research methods. Ion-exchange resins, adsorption spectrophotometry, disc electrophoresis, polarography, zonal and ultracentrifugation, gas chromatography, automatic analyz-
ers, and automatic methods, use and detection of radioisotopes, and others. Prereq: Course in plant physiology, Chemistry 3211-31 or equivalent, Physics 2210-20 or equivalent. S/N only. E

5583 Field Methods in Plant Communities and Ecosystems (4) Analysis of plant communities and ecosystems, including field experience. Prereq: 4310, 5340, 5350. 2 hrs and 2 periods (field trips). Sp

5584 Advanced Topics in Field Methods and Instrumentation in Field Investigations (1, 1, 1, 1, 1) Intensive field work using appropriate methods and instrumentation. Topics vary according to needs of students. May be repeated with consent of instructor. S/N only. E

5587 Experimental Plant Genetics (4) Genetics of plants stressing molecular aspects and including mechanisms of gene action, controlling elements, translocation, cytoplasmic inheritance, and adaptation. Prereq: Biology 3110 and Chemistry 3231. 3 hrs and 1 lab. W

5590-20 Developmental Plant Morphology (3, 1) Devel-
opmental morphology and basic principles of development and differentiation, cell-type specialization, and regeneration. Prereq: 3010, 3110; Biochemistry 4110-20. May be repeated with consent of instructor. 3 to 5 hrs. F, A; W

6000 Doctoral Research and Dissertation (3-15) E

6010 Advanced Topics in Morphology of Vascular Plants (2-4) Needs of students determine content. Topics selected from broad categories of experimental morphology, anatomy, and morphology. Prereq: 3020, 4120, 5910-20 or equivalent. May be repeated with consent of department. 1 to 4 hrs. F, A; W

6050 Advanced Topics in Cryptogenic Botany (2-4) Advanced studies and current research in experimental physiology, mycology, phycology, pteridology, or developmental morphology. Prereq: 3010 or equivalent. May be repeated with consent of department. 1 to 4 hrs. F, A; W

6120 Photobiology (3) Interaction of nonirradiating with living systems. Prereq: 3020, 4120, 5910-20 or equivalent. May be repeated with consent of department. W

6130 Advanced Topics in Cytology and Cell Biology (2-3) Requirements and interests of students determine topics, such as actions of chemicals on actively dividing cells, current ultrastructural research in selected cytoplasmic organelles and cellular systems, experimental cytology, cellular control of nucleic acid synthesis, and selected topics in life science. Prereq: courses in cell biology or equivalent. 3 to 5 hrs. F

6230 Ecosystems of the World (3) Classification and characterization of world’s regional ecosystems. Interactions of climate, topography, soil, vegetation, and fauna. Prereq: 5540. E

6240 Advanced Topics in Genetics (2-4) Literature survey of selected topics in plant or animal genetics. Prereq: Biology 3110; Biochemistry 4110-20. May be repeated with consent of department. F, A

6260 Seminar in The History of Botany (3) E

6280 Advanced Topics in Plant Physiology (4) Re-quirements of student determine content, including
Chemistry consist of the satisfactory inorganic chemistry, organic chemistry, and paleoecology; radiation ecology; and system science.

THE MASTER'S PROGRAM prerequisite is two years of chemistry with a satisfactory record. Students must be removed without graduate credit.

2. Chemistry 4160-70 and two of the following: 5511, 5521, 5531.

3. Participation in seminar (5911-21-31) during the entire period of graduate study.

4. Participation in seminar (5911-21-31) during the entire period of graduate study.

5. A final oral examination.

THE DOCTORAL PROGRAM The department offers specialization in nine areas for the Ph.D. degree: analytical chemistry, chemical physics, environmental chemistry, energy, inorganic chemistry, organic chemistry, polymer science, and theoretical chemistry. For the Ph.D. degree in Chemistry with specialization in analytical, organic, physical, or their related chemistry, the satisfactory completion of the following is required:

1. Research and a dissertation to give at least 56 hours of graduate credit (6000).

2. Chemistry 4160-70 and two of the following: 5511, 5521, 5531.

3. Participation in seminar (5911-21-31) during the entire period of graduate study.

4. Participation in seminar (5911-21-31) during the entire period of graduate study.

5. A final oral examination.

THE DOCTORAL PROGRAM The department offers specialization in nine areas for the Ph.D. degree: analytical chemistry, chemical physics, environmental chemistry, energy, inorganic chemistry, organic chemistry, polymer science, and theoretical chemistry. For the Ph.D. degree in Chemistry with specialization in analytical, organic, physical, or their related chemistry, the satisfactory completion of the following is required:

1. Research and a dissertation to give at least 56 hours of graduate credit (6000).

2. Chemistry 4160-70 and two of the following: 5511, 5521, 5531.

3. Participation in seminar (5911-21-31) during the entire period of graduate study.

4. Participation in seminar (5911-21-31) during the entire period of graduate study.

5. A final oral examination.
6. Demonstration of a reading knowledge of one of the following languages: French, German, Russian, or an approved alternate.

7. A final oral examination for the Ph.D. degree in Chemistry with specialization in chemical physics, the satisfactory completion of the following is required:

- Research and a dissertation to give at least 36 hours of graduate credit (6000).
- Two courses 4160-70, 5511, 5140-50, 5160 or 5170, Polymer Engineering 4910.
- Participation in Chemistry Seminar (5911-21-31) and the Polymer Seminar Program during the entire period of graduate study.
- Thirty hours of additional graduate course work, including at least 6 hours at the 6000 level and at least 12 hours from the Department of Chemistry offerings.
- Demonstration of an advanced examination in polymer science.

8. Demonstration of a reading knowledge of one of the following languages: French, German, Russian, or an approved alternate.

*3211-21-31 Organic Chemistry (3, 3) Compounds of carbon and their reactions, reaction mechanisms, spectroscopic and other physical properties. Must be taken in sequence. Corresponding laboratory (3219-29-39) is a coreq for students not having credit for the laboratory.

*3219-29-39 Organic Chemistry Laboratory (1, 1, 1) Experiments on topics discussed in 3211-21-31. Corresponding lecture (3211-21-31) is a coreq for students not having credit for the lecture.

*3410-20-30 Physical Chemistry (3, 3, 3) 3410—Behavior of gases. First, second, and third laws of thermodynamics. Introduction to chemical equilibrium. 3420—Chemical equilibria, phase equilibria and properties of solutions. Irreversible processes. Kinetic theory of gases. 3430—Kinetics of chemical reactions. Introduction to quantum mechanics, applications of quantum mechanics to understanding of inorganic and organic chemistry; quantum theory of the atom, principles of molecular structure, and elementary nuclear chemistry. Prereq: 3410, 3420. Corresponding laboratory (3219-29-39) is a coreq for students not having credit for the laboratory.

*3429-39 Physical Chemistry Laboratory (1, 1) Gases, liquids, chemical equilibria, solutions, phase equilibria, reaction kinetics and electrochemistry. Prereq or coreq: 3410-20-30. Corresponding lecture in sequence. Prereq: 1110-20-30. Corresponding laboratory: 3219-29-39 or 3219, 3529-39 as a coreq; latter is recommended.

*3529-39 Organic Chemistry Laboratory (1, 1) Experiments on 3211-21-31. Similar to 3219-29-39 except designed for students who have need for operating knowledge of various spectroscopic and other analytical techniques. Corresponding lecture (3219-29-39 or 3221-31) is coreq for students not having credit for the lecture.

*3810 Radioactivity and its Application (3) Radioactive materials and their use in chemical equilibria, Gaseous, liquid, and solid state; phase transitions, tracer procedures and safety precautions in agriculture, biology, medicine, nutrition. Not for credit by chemistry or physics majors or minors. Prereq: 1 yr of general mathematics or equivalent, 1 yr of general chemistry. 2 hrs and 1 lab. Sp.


4119 Physical Chemistry Laboratory (1) Solutions, phase equilibria, reaction kinetics and spectroscopy. The corresponding course 4110 is coreq. F, W.

4160-70 Intermediate Physical Chemistry (3, 3) (Designed for entering graduate students who have had one year of physical chemistry.) 4160—The three laws of thermodynamics, chemical potentials and solutions, and chemical equilibria. 4170—Gases and kinetic theory, chemical kinetics, molecular spectroscopy, and introduction to chemical statistics. F, W

4210 Advanced Analytical Chemistry (3) Chemical separations including chromatography, ion exchange and solvent extraction, spectrophotometric techniques. Prereq: Analytical chemistry. W

4219 Advanced Analytical Chemistry Laboratory (1) Experiments on topics discussed in 4210. Coreq: 4210. W

4220 Advanced Analytical Chemistry (3) Electroanalytical methods of analyses (including potentiometry, coulometry, polarography, and voltammetry); use of atomic absorption and mass spectroscopy; x-ray absorption and fluorescence techniques. Prereq: Analytical chemistry. Recommended. 3430 or 4220.


4430 Intermediate Inorganic Chemistry (3) Application of theoretical concepts to inorganic elements, their chemical states, and their reactions. Prereq: 4420. F, W.

4510 Organic Qualitative Analysis (3) Identification of pure organic compounds and mixtures. Prereq: 3211-21-31, 3219-29-39 or 3219, 3529-39, 3 labs. Not open to students who have completed 4610. F

4560 Organic Reaction Mechanisms (3) Prereq: 1 yr of organic chemistry. W

4610-20 Advanced Chemical Experimentation (2) Laboratory course in application of modern experimental techniques to solution of chemical problems. Prereq: 1 yr of 3200-level physics and Mathematics 1860, 2840-50 or equivalent. Prereq: 3430. Coreq: 4620. F, W


5000 Thesis (1-15) E


5140 Introductory Polymer Chemistry (3) Fundamental principles, role of chemistry in interdisciplinary field of polymer science: relation of molecular structure to bulk properties of polymers. Prereq: 1 yr each undergraduate organic and physical chemistry. Sp.

5150 Kinetics of Polymerization (3) Kinetics of formation and molecular weight distributions of polymers, homogeneous and heterogeneous step growth and chain growth polymerizations. Prereq: 4119 and 4160-70 or equivalent.

5160 Organic Chemistry of Polymers (3) Synthesis of monomers; mechanism, stereochemistry, and sequence distribution of polymerizations. Formation of fiber, plastic, and rubber products. Prereq: 4119 and 4160-70 or equivalent.

5170 Physical Chemistry of Polymers (3) Rubber elasticity, solution properties of macromolecules; structural, conformational, and conformational statistics of polymers. Prereq: 5150. A

5220 Analytical Chemistry of Environmental Pollution (3) Applications of modern analytical chemistry to problems in aquatic and atmospheric pollution. Prereq: 5230-60-70 or consent of instructor. Sp.

5240 Electronics for Chemists (4) Includes material of Chemistry 4640 plus special project. Prereq: Consent of instructor.

5250-60-70 Advanced Analytical Chemistry (3, 3, 3) 5250—Absorption and emission spectropho- tometry, structure elucidation by IR, NMR, UV, and mass spectra. 5260—Chemical separation methods: solvent extraction, chromatography, electrophoresis; radiochemical methods, fluorescence; x-ray methods. 5270—Electroanalytical, magnetic and thermal analytical methods; on stream and automatic analysis. Prereq: 1 yr of physical chemistry. F, W, Sp.


5340 Quantum Chemistry (3) Postulate approach to fundamental principles of quantum mechanics. Accurate solutions to Schrodinger equation; approxi- mate (ab initio and semiempirical) molecular orbital methods; calculation of molecular properties. F

5350 Quantum Chemistry (3) Electronic excited states; introduction to group theory; perturbation theory; reactivity of organic molecules. Prereq: 5340. W


5511 Survey of Inorganic Chemistry (3) Atomic structure and molecular structure, ionic and covalent bonding, periodic relationships of elements, inorganic stereochemistry, coordination chemistry, descriptive chemistry of the elements. F

5521 Survey of Analytical Chemistry (3) Volumetric and gravimetric analysis; acid-base, oxidation-reduction, complexation and precipitation equilibria, spectroscopy, electroanalytical, and separa- tion methods. F
5531 Survey of Organic Chemistry (3) Bonding in organic chemistry of heterocyclic, polycyclic, and aromatic systems. Prereq: satisfactory performance on the College of Liberal Arts Chemistry Placement Exam (CPLC). A, A; A

5550 Industrial Chemical Research (3) Practice of modern industrial research taught by case studies and visiting lecturers. Course content varies with good past and current industrial research practices. Prereq: Completion of a 5000 chemistry course sequence.

5610-20-30 Chemical Basis of Energy Conversion (1, 1, 1) Emphasis on high-resolution spectroscopic methods. Theory of currently important topics in the conversion of chemical energy into electrical and electromagnetic energy. Prereq: 5410 and one 5000 sequence. F, W, S.


5710 Nuclear Chemistry (3) Nuclear properties, radioactivity, radioactive decay processes, nuclear structure and reaction mechanisms, nuclear decay processes, radioactivity, and matters and radiation detection. Prereq: 1 yr of physical chemistry. A

5911-21-31 Chemistry Seminar (1, 1, 1) Discussion of current research literature and general topics. May be repeated. Registration required each quarter except summer resident graduate students. SINC only. F, W, Sp.

6000 Doctoral Research and Dissertation (3-15) E

6110 Theoretical Organic Chemistry (3) Subject matter varies among important topics of current significance. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. A

6120 Natural Product Chemistry (3) Structure, synthesis, and natural occurrence of substances of biological or environmental significance. Course content may vary with each offering to reflect areas of current chemical interest. Prereq: Two of 5110-20-30-35.


6165 Orbital Symmetry Control (3) Application of Woodward-Hoffmann rules and other theories to mechanism and stereochemistry of concerted organic reactions. Prereq: Two of 5110-20-30-35.

6175 Organic Photochemistry (3) Physical and chemical effects of electron excitation of organic molecules. Experimental and theoretical techniques of photochemistry,光电子光谱, inter- and intramolecular reactions of amines, ketones, dienes, dienes, aromatics compounds, and other photoreactive species. Prereq: Two of 5110-20-30-35.

6190 Organometallic Chemistry (3) Structure, bonding and synthesis of organometallic reagents. Application to current problems in organic synthesis. Prereq: Two of 5110-20-30-35.

6210 Advanced Analytical Spectroscopy (3) Newer methods of spectroscopic analysis, including: transform methods, lasers in spectroscopy, fiber optics, and spectrophotometric and spectrometric techniques for remote sensing. Prereq: 5250.

6211 Selected Topics in Analytical Chemistry (3) Subject matter varies among important topics of current significance: analytical energy chemistry, spectroelectrochemistry, modern liquid chromatography, new electroanalytic methods, biotechnological methods, and microminiaturization and miniaturization in chemical instrumentation. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. A

6311 Selected Topics in Polymer Chemistry (3) Subject matter varies among important topics of current significance. Prereq: Two of 5140-50-60-70 or consent of instructor. May be repeated.

6320 Natural Polymers (3) Structure, modification, and nonbiochemical utilization of natural polymers and polymers derived from naturally-occurring monomers. Prereq: 5140 or two of 5110-20-30-35.

6411 Selected Topics in Physical and Theoretical Chemistry (3) Subject matter varies among important topics of current significance. Prereq: Two of 5410-20-30-50. 5340-50. May be repeated. A

6420 Nuclear Magnetic Resonance (3) Theory of nuclear magnetic resonance spectroscopy with emphasis on high-resolution methods. Applications to problems in molecular structure and behavior. Prereq: Two of 5110-20-30-35.

6430 Photochemistry and Radiation Chemistry (3) Fundamental physical and chemical processes present to excitation of molecules by photons and electrons; multiphoton processes and use of lasers; fluorescence and phosphorescence; radiationless transitions as studied by optoacoustic spectroscopy; chemical reactivity of excited states; ion-molecule and free radical reactions; electron capture and electron-transfer processes. Prereq: 5430.

6450 Electrochemistry (3) Electrical double layer; electrode kinetics; transport properties of electrolytes. Electrodynamical methods. Prereq: 5430 or 5270.

6475 Electronic Structure of Radicals (3) Application of quantum mechanics to study of molecular conformation, structure, and bonding in organic and inorganic radicals; comparison of experimental results with theoretical predictions based on Walsh rules and on INDO molecular orbital calculations. Prereq: 5540-50 and 6520.

6480 Statistical Thermodynamics (3) Application of statistical mechanical methods to systems of chemical interest such as isotope effects on equilibrium and rate processes, phase equilibria, condensation phenomena. Prereq: 5410, 5450.

6495 Advanced Chemical Kinetics (3) Mechanism of elementary chemical reactions at molecular level including topics such as dynamics of molecular collisions, potential-energy surfaces, reactions cross-sections, "direct" vs "complex" modes of reaction, transition states, nuclear reaction mechanisms, potential-energy surfaces, reactions cross-sections, "direct" vs "complex" modes of reaction, transition states, nuclear reaction mechanisms, and electron capture and electron-transfer processes. Prereq: 5410.

6510 Thermodynamics of Solutions (3) Theory of chemical relations of electrolyte solutions; measurement of activity coefficients and other thermodynamic properties; selected topics from literature. Prereq: 5540 and 6520.

6550 Magnetic Resonance (3) Principles of magnetic resonance spectroscopy underlying nuclear magnetic resonance and electron spin resonance. Chemical applications to solid and liquid systems. Prereq: 5340.

6711 Selected Topics in Inorganic Chemistry (3) Subject matter varies among important topics of current significance: photoelectron spectroscopy, transuranium chemistry, organometallic compounds, inorganic solution kinetics and mechanisms, crystal chemistry, nonaqueous chemistry, chemistry of halogens and compounds. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. A

6730 Topics in Quantum Chemistry (3) Application of newer methods to complex systems including metal complexes, polymers, and molecules of biological significance. Time dependent phenomena. (Effect of external fields and collision processes.) Recent theories of chemical reactivity. Prereq: 5340.

6750 Molten Salt Chemistry (3) Structure, spectroscopic properties, solution thermodynamics, electrochemistry and phase equilibria of molten salts. Solutions of metals in molten salts. Prereq: 4110 and 5410 or equivalent.

6810 Vibrational Problems in Molecular Spectra (3) Same as Physics 6810.

6811 Selected Topics in Nuclear Chemistry (3) Subject matter varies among important topics of current significance: nuclear decay schemes, nuclear models, nuclear reaction theory, nuclear detection techniques, activation analysis. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. A

6820 Molecular Vibrations-Rotation Theory (3) Same as Physics 6820.

Classics

Professors: H. C. Rulledge (Head), Ph.D. Ohio State; A. Rapp (Emeritus), Ph.D. Illinois

Associate Professors: G. C. Geisel, Ph.D. North Carolina; M. L. Henbest, M.A. Arkansas, J. E. Shelton, Ph.D. Vanderbilt

Assistant Professors: B. J. Levy, Ph.D. Texas; P. J. Nissen, Ph.D. Ohio State.

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

Greek

3010 Plato (3) A

3020 Herodotus (3) A

3030 Euripides (2) A

4020 Aeschylus, Sophocles (3) A

4030 Lysias (3) A

4040 Aristophanes (3) A

4050-60 Selected Readings in Greek (3, 3, 3) F; W; Sp

Latin

3440 Livy (3) A

3450 Pliny and Martial (3) A

3460 Eligae Poets (3) A

4120 Horace, Satires and Epistles (3) A

4310 Selected Readings from Latin Literature (3, 3) A

4320-30 Selected Readings from Latin Literature (3, 3) May be repeated. A; A

4340 Horace, Odes (3) A

4350 Tacitus (3) A

4360 Lucretius (3) A

4370 Readings in Medieval Latin (3) A

5410-20-30 The Latin Epic: Lucretius, Vergil, Lucan (3, 3, 3) A; A; A

5510-20-30 Roman Comedy: Plautus, Terence (3, 3, 3) A; A; A

GENERAL COURSES

3210 Early Greek Mythology (3) Comprehensive study of Greek myths through readings, lectures, and discussion with emphasis on significance for Greek thought and religion. Slides and tapes illustrate influence of Greek myths on art, music, and literature of ancient Greek and later cultures. (Same as Religious Studies 3210.) F

3220 Greek Mythology in the Classical Period (3) A study of use of myth in literature, history, religion, philosophy, and other Classical Age of Greece, and of change of attitude toward myth from earlier periods. Familiarity with basic Greek myths is assumed. Readings, lectures, and discussion. (Same as Religious Studies 3220.) W
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3320 Roman Mythology (3) Study of myths created by Romans, as well as those the Romans borrowed from the Greeks, with reference to Roman attitude toward history, religion, and society. Reading, lectures, studies, and discussion. (Same as Religious Studies 3320.) F, W, Sp

3330 Art and Archaeology of the Aegean Bronze Age and Early Greece (3) Troy, the Cyclades Islands, Greek mainland, and Crete. Emphasis on palaces, tombs, and temples, as well as the role of art in their fall, the following Dark Age, and rebirth of Greek civilization. Illustrated lectures.

3340 Cities of the Greek and Roman World (3) Archaeological survey of Greek and Roman cities from 3000 B.C. to 500 A.D. with emphasis on development of urban planning. Such cities as Mycenae, Athens, Priene, Alexandria, Rome, and Lepcis Magna will be studied.

3345 Lit of the Ancient Near East (5) Survey of the ancient Near East (Mesopotamia, Egypt, Canaan, Israel) from the origins to 400 B.C. Emphasis on architecture, art, literature, history, religion.

3346 Art and Archaeology of Archaic and Classical Greece (3) Troy, the Cyclades Islands, Etruscan, and Roman sculpture, and painting with attention to city planning. Illustrated lectures.

4010 Greek Drama in English Translation (3) Survey of dramatic masterpieces of Greek literature.

4120 Teaching of Latin (3) Applies educational theory to the classroom situation. Prep: a minimum of five years of study of the language. F, W, Sp

4140 Teaching of Modern Languages (3) Preparation of the teacher for the modern language classroom by means of the study of teaching aids and techniques. Prep: a minimum of five years of study of the language, or the permission of the instructor. F, W, Sp

4510 Selected Readings in Latin Literature (3) Content varies; may be repeated with the consent of the department.

4560 Problems in Old World Archaeology (3) Same as Anthropology 5620.

4700 Comparative Literature (3) Survey of major shrine systems in Greek and Roman world with emphasis on architectural remains. Such shrines as Olympos, Epidauros, Paestum, Cumae, Praeneste, and Rome may be considered. Readings selected classical authors will add to understanding of place of shrines in Greek and Roman world.

4710 Latin Drama in Translation (3) Survey of plays of the Roman dramatists, with attention to city planning. Illustrated lectures.


5022 Approaches in Comparative Literature (3) Comparative approaches to literature with attention to origins, development, and logical foundations of computer science.

5095 Discrete Structures (3) Introduction to discrete structures useful in computer science. Sets, set logic, relations, functions. Proof techniques, induction, recursion, numerical representations and algorithms. Prep: 2860 or 3150 or equivalent.

5273 Advanced Discrete Structures (3) Advanced topics in discrete structures useful in computer science.

5303 Management and Control of General Computer Systems (3) Architecture of computer systems. Timesharing utility and statistics programs; StatPack, editors, and FORTRAN. Not for computer science majors. Prereq: 3155 or equivalent. (Same as Mathematics 3715.) F, W

5304 Advanced Assembly Language Programming (3) Principles of assembly language programming, machine organization and assembler language programming.

5400 Computer Organization and Programming I (3) Problem formulation and advanced programming in FORTRAN; operation and control of digital computers.

5405 Number Systems for Digital Computers (3) Floating-point number representation, mixed-radix number representation, multiple-modulus residue number representation, finite-segment p-adic number representation, and error analysis in floating-point computation, finite fields and exact computation using digital computers.

5425 Numerical Solutions to Equations and Numerical Approximations (3) Same as Mathematics 4225.

5426 Numerical Methods for Ordinary Differential Equations (3) Same as Mathematics 4235.

5427 Numerical Linear Algebra (3) Same as Mathematics 4245.

5430 Statistical Data Processing (3) FORTRAN language for organization and analysis of scientific data. SPSS and SAS programs for standard statistical analyses; frequency distribution, percentiles, data reduction, regression and analysis of variance. Not for credit for computer science majors.

5700 Independent Study in Computer Science (1-3) Special project in area of student's primary interest. To be directed by Computer Science faculty; perhaps jointly with student's faculty advisor. Prep: Consent of instructor. May be repeated. Maximum 9 hrs.

5705 Interactive Statistical Data Processing (3) Statistical data processing using interactive computer system; Timesharing utility and statistics programs; StatPack, editors, and FORTRAN. Not for credit for computer science majors. Prep: Statistics 2100 or equivalent.

5780 Programming Languages (4) Comparison and analysis of programming languages, design, features and implementation, and language constructs. Sequence control, data control, and storage management. Detailed discussion and programming experience in ISUP and either SIMULA, FDL, or SIMULA. Prereq: 4510.

5781 Data Structures and Non-Numeric Programming (3) Data structures and algorithms for numerical applications. Arrays and lists, stacks, queues, doubly-linked lists, trees, dynamic scheduling, selection, sorting, and data organization; compilation of files, programming languages for information structures. Prereq: 2710 and 1610 or 2610.
5460 Compiler Construction (3) Practical experience in writing a complete compiler for a small block-structured language. Prereq: 4510. W


4750 Interactive Computer Graphics (3) Plotting vector graphics, interactive graphical techniques, two- and three-dimensional transformation, perspective depth, hidden line elimination, shading, software and hardware system design. Discussion of use of these techniques in design, problem solving, mapping, architecture, and many other areas. Prereq: Senior standing in Computer Science, Electrical Engineering or Geography and a knowledge of computer programming, or consent of instructor. (Same as Geography 4755.)

4820 Introduction to Pattern Recognition (3) (Same as Electrical Engineering 4820) W

4830 Digital Image Processing (3) (Same as Electrical Engineering 4830) Sp

4850 Small Computer Systems (3) (Same as Electrical Engineering 4850) Sp

4910 Analysis and Management of Computer Installations (3) Analysis and design of computer systems; implementation, justification, personnel in systems, perspective on system. Prereq: 3520 or equivalent. W

4980-90 Special Topics in Computer Science (1-4, 1-4) Credit determined at registration. Prereq: Recommendation of Computer Science staff. May be repeated for degree credit. Maximum 9 hrs.

5000 Thesis (1-15) E

5002 Non-Thesis Graduate Completion (3-15) Required for the non-thesis student not otherwise registered. This requirement may be fulfilled when such student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. SINC only. E

5010 Computer-assisted Instruction (3) History and development of CAI systems. Emphasis on studying success and failure of major projects, future role of CAI in instructional programs. Components: (a) computer language to implement a CAI course. Prereq: 3510 or consent of instructor.

5060 Computer Modeling and Simulation of Physical Systems (3) Computer modeling and simulation. Inputs, driving functions, errors, outputs, interactive simulations as applied to physical systems. Emphasis on computer models to represent spatial relationships. Prereq: 3150 or 3155, and 3520 and Statistics 3450. A

5210 Artificial Intelligence (3) Simulation of intellectual behavior on computer. Techniques sent from optimization, search, and manipulation for various areas: problem solving, game playing, pattern perception, control of information. Prereq: 4510 or consent of instructor. (Same as Electrical Engineering 5690.) W

5250 Medical Computing (3) Achievements and problems associated with application of computer technology to field of health care. Various areas of medical computing; laboratory data systems, patient monitoring systems, diagnostic assistance, patient records, automatic history taking, and hospital administration systems. Prereq: 4510. Sp

5430 Theory of Computing (3) Development of major components of compiler using constructs provided by formal language theory. Recognizers, symbol tables, semantic rules, allocation of storage, code optimization. Prereq: 4510, 4550, and 5750. A

5455 Finite Difference Methods for Partial Differential Equations (3) (Same as Mathematics 5455.) F

5465 Finite Element Methods (3) (Same as Mathematics 5465.) W

5475 Advanced Topics in Numerical Partial Differential Equations (3) (Same as Mathematics 5475) Sp

5570 Advanced Data Base Management Systems (3) Data model theory, comparison of several existing data base systems, implementation techniques, selection and evaluation techniques, integrity, security, authorization and protection, hardware architecture, and software monitors. Comparison of good heuristic scheduling algorithms with best possible schedules; scheduling anomalies. Case studies of virtual memory systems. Analysis of page swapping and placement strategies. Prereq: 4610 or equivalent or consent of instructor. Sp, A


5730 Computability and Computational Complexity (3) Computability and decidability; Turing machines and halting problem. Register machines. Recursive functions and recursively enumerable sets; partial and total recursive functions. Time and space bounded computations; the P vs NP problems. Prereq: 4710. Sp, A

5750 Theory of Formal Languages (3) Phrase-structure languages, their processors and processors. Type 0, 1, 2, and 3 languages; operations on languages and grammars; deterministic context-free languages. Theory of translation. Prereq: 4710. W

5775 Combinatorial Algorithms (3) Algorithms for solving optimization problems in graphs, networks and matrices. Examples: shortest path, maximum matching, minimum spanning tree and graph coloring. Prereq: 4730. (Same as Mathematics 5775.) A


5910-20-30 Special Topics in Computer Science (1-6, 1-6, 1-6) May be repeated. Maximum 9 hrs.

5940-50 Advanced Small Computer Systems (3, 3) (Same as Electrical Engineering 5940-50)

5970 Independent Study in Computer Science (1-3) Specified project; no credit; facilities guidance. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

Cultural Studies

Asian Studies

4101-20-30 Readings in Asian Literature (4, 4, 4) Prereq: Mastery of intermediate level of Japanese, Chinese, or Arabic and consent of instructor.

4120 Selected Topics in Asian Studies (4) Content varies. May be repeated. Maximum 12 hrs.

4351-32-33-34 Advanced Chinese (4, 4, 4, 4) Taped language program. Prereq: 3351-32 or equivalent or consent of instructor. Must be taken in sequence.

4361-32 Advanced Japanese I, II, (4, 4) Reading in grammar with written exercises. Conversation, drill and composition practice with native speaker. Must be taken in sequence. Prereq: 3362 or equivalent.

Black Studies

3140-50-60 Directed Readings in Black Studies (1, 1, 1) Designed for students who are interested in doing intensive reading in some area of Black Studies which is defined by the student and the instructor. Prereq: 2010 or 2020 and consent of instructor.

4280 Senior Seminar on Pan-Africanism (4) Explores concepts and philosophers of Pan-Africanism and implication of this ideology for various societal institutions.

4300 Resource Materials in Black Studies (4) Introduction to basic references such as bibliographies, indices, and listings of audiovisuals in Afro-American history, African history, and children's literature. Prereq: 2010 or 2020 and consent of instructor.

4310 Research in Black Studies (4) Deals with Black experience and research process.

4650 Current Issues and Topics in Black Studies (3-4) Topics, problems and issues in area of Black Studies. Content and credit determined by instructor. May be repeated. Maximum 12 hrs.


4880 Afro-American Psychology (4) (Same as Psychology 4880)

Cultural Studies

5101 Foreign Study (1-12) See page 95.

5102 Off-campus Study (1-12) See page 95.

5103 Independent Study (1-12) See page 95.

Linguistics

4000 Topics in Linguistics (3) Content varies. May be repeated. Maximum 9 hrs.

4200-30 Historical Linguistics, Neogrammarian School, and Growth of Structuralism (3, 3) Historical development of a scientific approach to linguistic from Jacob Grimm and Franz Bopp through Mursell 19th century. 4300—Changes in linguistic...
and/or 6000-level courses in English, (5) evidence of proficiency in one foreign language, (6) final examination, and (7) a program of supervised teaching approved by the department.

THE DOCTORAL PROGRAM

The departmental requirement for the Ph.D. degree in English is completion of a minimum of three academic years of resident graduate study. This includes an advanced program of at least 72 quarter hours (or the equivalent) in English: 36 hours at the 6000 level; 12 hours for graduate credit at any level, including the 5000-6000 level. In addition, 9 (or 8) hours approved by the department must be taken for graduate credit in a subject or subjects other than English. Normally a student with the M.A. from another university may transfer at least 36 quarter hours.

After all, or most, of the course work has been taken and after the two language requirements have been satisfied, the student will take four preliminary comprehensive examinations from several areas divided as the department directs. Successful completion of these examinations will be followed by the writing of the dissertation and by an oral examination in the field of the dissertation. Any course in the 5000 or 6000 series may be repeated for credit with the permission of the department.

*1211 Written and Oral English for Foreign Students (6) Requirements include understanding of English grammatical structures and pronunciation with intensive oral, aural, and written drill. Required during the first quarter for the residence of all foreign students (graduates, undergraduates and transfer students) who are not excused from it on the basis of the English Proficiency Examination required of every new foreign student. A, B, C, F, W grading. Students registered for this course are permitted to register for only 2 other courses.

*1211 Written and Oral English for Foreign Students (6) Emphasis on the more advanced structures of English grammar and on paragraph writing. Required during the first quarter of residence of all foreign students who on the English Proficiency Examination demonstrate need for work in English structure, but not at the intensive level of English 1211. Required also of foreign students who complete 1211 A, B, C, F, W grading. Students registered for this course are permitted to register for only 2 other courses. E

3070 Modern British Poetry (3) From Housman to Thomas and more recent poets.

3080 Modern American Poetry (3) From Robinson to Stevens and more recent poets.


3189 Tessyson and His Successors (3) includes such poets as that of the Pro-Raphtasites, humorists, and Decadents.

3136 Browning, Arnold, and Hopkins (3) F

3150 Melville (3) A

3210-20 English Literature and Culture of the Nineteenth Century (3, 3) Survey of literature dealing with leading movements in politics, science, religion, and the arts. 3210—1800 to 1835, 3220—1835 to 1900. A

3411-12-20 Modern Drama (3, 3, 3, 3) 3411—Continental drama of the 19th century from Henrik Ibsen to George Bernard Shaw, 3420—British. 3430—American.

3510 Sixteenth-century Prose and Poetry (3) More and Wyatt to Spenser. A

3520 Elizabethan Drama (3) Marlowe, Jonson, and others. A

3530 Jacobean Drama (3) Beaumont and Fletcher to Shakespeare and Shylock. A

3610 Restoration and Eighteenth-century Poetry (3) Emphasis upon Dryden and Pope.

3620 Restoration and Eighteenth-century Drama (3) Dryden through Sheridan.

3630 Restoration and Eighteenth-century Prose (3) Defoe, Addison, Steele, Swift, and others.

3670 The Age of Johnson (3)

3710 Literature of English Bible (3) Types of Old Testament literature, excluding Wisdom literature. W

3711 Literature of the English Bible (3) Old Testament Wisdom literature and types of New Testament literature. Sp

3721 Introduction to Folklore (3) Essential terms and concepts in modern folklore-folk life studies. Emphasis on North American materials; folk tale, folktale, myth, legend, proverbs, riddles, superstitions, dances, games, and architecture.

3910-20-30 Comparative Literature (3, 3, 3) 3910—Ancient; 3920—Medieval and Renaissance. 3930-40-41

3940 The Novel of the Contemporary Western World (3) Proust, Joyce, Mann, and others.

4010-20 Shakespeare (3, 3) 4010—Early plays, c. 1590-1601, including Henry IV, Twelfth Night, and Hamlet; 4020—Later plays, 1601-1613, with emphasis upon tragedies and romantic comedies. E

4042-43 Topics in Mode and Genre (3, 3) Content varies. Special topics in principal forms and modes of British and American Literature, e.g., comedy, tragedy, epic, lyric, satire, etc. May be repeated with consent of department. Maximum 6 hrs each.

4045-46 Topics in Literary Theory and Criticism (3, 3) Content varies. Special topics in theoretical and practical approaches to British and American Literature. May be repeated with consent of department. Maximum 6 hrs each.

4050-60-70 American Novel (3, 3, 3) 4050—From earliest seminal novels through Brown, Cooper, and Kennedy, and major figures to 1875. 4060—Henry James and Mark Twain through early works of Faulkner, and Hemingway, 4070—Early thirties to present. F; W; Sp

4090 Topics in Film Study (3) Content varies. In-depth study of particular directors, film genres, national cinema movements, or other topics. May be repeated with consent of department. Maximum 6 hrs each.

4140-50 Technical Writing (3, 3) 4140—For students planning careers in the physical, life and health sciences, engineering, agriculture, and forestry. Writing of proposals, laboratory and progress reports, abstracts and journal articles. 4150—Writing of scientific feature articles in which data are marshalled and analyzed for human interest. F, W, Sp; W

4250 Advanced Fiction-Writing (3) Further development of skills acquired in basic Writing Fiction course. Prereq: 3450 or consent of instructor.

4254 Writing the Detective and Mystery Story (3) Instruction and writing cover entire crime field—suspense, police procedural, private eye, spy, and adventure fiction. Recommended prerequisite: 3450-70-80 or consent of instructor.

4256 Writing Science Fiction and Fantasy (3) Survey of general development and basic texts of Science Fiction, Speculative Fiction and Fantasy. Exercises in writing in genres, in accordance with technologies defined in basic Writing Fiction course.

4270 Advanced Poetry Writing (3) Further development of skills acquired in basic Writing Poetry course. Prereq: 3470 or consent of instructor.

4310-20-30 The British Novel (3, 3, 3) 4310—Defoe to Jane Austen. 4320—Scott to Thackeray. 4330—George Eliot to Galsworthy. 4340—James Joyce to present.
5103 Independent Study (1-12) See page 95. E
5104 Foreign Study (1-12) See page 95.

5100-5130 Teaching Business and Technical Writing (1) Required of all first-year Teaching Assistants. S/NC only. Sp, A
5110 Teaching Expository Writing (1) Using essays of the student's choosing to examine the nature of language upon culture, and vice versa. Prereq: 3300 or consent of instructor. (Same as Linguistics 4450.)

5120 Teaching Writing about Literature (1) Variety of strategies to develop research, fieldwork and analysis. Prereq: 3340 or consent of instructor. (Same as Linguistics 4450.)
5130 Special Topics in English Linguistics (3) May be repeated with consent of department. (Same as Linguistics 4460.)
4471-81 English as a Second or Foreign Language (3, 3) 4471—Applied linguistics in teaching and learning of English as a second or foreign language. Phonological and grammatical structure of English and other languages. Prereq: 3000 or consent of department. (Same as Linguistics 4471-81.)

5140 Major Study in Language (3, 3, 3) Elements of English dialectology with emphasis on implications for cultural pluralism. Prereq: 3300 or consent of instructor.

5150 Milton (3) Emphasis on major poems. A

5160 Seventeenth-century Prose and Poetry (3) Bacon and Donne to Marvell. A

4910-20 Chaucer (3, 3) 4110—Early poems and Troilus and Cressida. 4920—The Canterbury Tales.

5000 Thesis (1-15) E
5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise engaged in research. Prereq: 4471. (Same as Linguistics 4471-81.)

6110-30 Studies in Elizabethan English (3, 3, 3) A
6140 Studies in Old English Language and Literature (3) For students who know Old English well and wish to do research in literature, structure of language, paleography, Anglo-Latin backgrounds and sources, and related topics.

5170-80 History of the English Language (3, 3) 5170—Phonetic transcription. Old English, development of oral and written tradition. 5180--Middle and Early Modern English, developments in pronunciation and vocabulary. F, W

5210-20 Reading in American Literature of the Colonial Period to the Present (3, 3, 3) F, A, W, A
5240 Readings in Black American Literature (3) Critical analysis of works by African-American writers such as Welty, O'Connor, and Porter. W; Sp

5310 Rhetoric and Composition: Theory and Practice (3) Composition on stylistics and types of expository writing.

5410-20 Readings in Middle English Literature (3, 3) 5510-20 Readings in Literary Criticism from Plato and Aristotle to the Present Day (3, 3)

5610-30 Readings in English Literature of the Nineteenth Century (3, 3, 3)
5710-20 Readings in English Literature of the Eighteenth Century (3, 3, 3) A
5810-20 Readings in English Literature of the Renaissance (3, 3, 3)
5860 Introduction to Literary Research (3) Critical examination of aims of English studies; profession of English teacher, theory of literature, and methods of research, including collecting of information, evaluation of material, and transmitting of results of research.

6000 Doctoral Research and Dissertation (3-15) E
6010-30 Studies in Medieval English (3, 3, 3)

6110-82 Studies in English Language (3, 3, 3) A
6120-30 Studies in American Literature (3, 3, 3) F, W; Sp

6241-42 Studies in Colonial American Literature (3, 3) 6241—From Thomas Harlot through Increase and Cotton Mather. 6242—From Jonathan Edwards to adoption of Constitution.

6270.80 Studies in American Fiction (3, 3) A

6310-30 Studies in Victorian Literature (3, 3, 3) 6410-30 Studies in Chaucer (3, 3, 3)

6510-20 Studies in Spenser and Milton (3, 3, 3) A
6550 Studies in Mode and Genre (3) Content varies.

6690 Special Topics (3) Content varies. May treat drama, novel, short story, poetry, or satire, the comic, the tragic, etc., depending on professor.

6710-20 Studies in Eighteenth-century Literature (3, 3, 3)
6860 Textual Bibliography and Criticism (3) Study of evidence gathered from printing process to make critical judgments about text or literary work. Prereq: 5860 or consent of instructor.

7850-78 Studies in Twentieth-century Literature (3, 3, 3) A

111 College of Liberal Arts

Geography

MAJOR

DEGREES

Geography

M.S., Ph.D.

Professors: S. R. Jumper (Head), Ph.D. Tennessee; C. S. Aiken, Ph.D. Georgia; E. Hammond, Ph.D. California (Berkeley); R. G. Long, Ph.D. Northwestern; C. W. Minnich, Ph.D. Wisconsin. Associate Professors: T. L. Bell, Ph.D. Iowa; L. W. Brinkman, Jr., Ph.D. Wisconsin; J. R. Carter, Ph.D. Georgia; C. T. Peladan, Ph.D. Denver (Ut Space Institute); J. B. Rahder, Ph.D. Louisiana State. Assistant Professors: W. N. Cherry, M.S. Tennessee; B. Raistin, Ph.D. Northwestern.

The Department of Geography offers the degrees of Master of Science and Doctor of Philosophy with concentrations in cartography and remote sensing (M.S. only), physical geography and human systems, urban geography, geography of Anglo-America, and rural and nonmetropolitan geography.

THE MASTER'S PROGRAM

The department requires a minimum of 45 quarter hours beyond completion of a sound undergraduate major program. At least one half of the total hours in the graduate program must be at a level above the 5000 level, of which no more than 9 hours may be thesis courses, and must include 5150, 5160, either 5170 or 4210, and (at each offering during residency) 5160. Thesis and final examination required.

THE DOCTORAL PROGRAM

The doctorate is a research degree and is granted only to those persons who demonstrate proficiency in conducting independent research. Students must have achieved the equivalent of a comprehensive Master's program before they will be admitted to the doctoral program. Course requirements for the degree shall be determined by the student's faculty committee in accordance with specific interests and needs. The program of study must include sufficient course work within the department, but outside the areas of specialization, to give a broad foundation and understanding of the discipline. The program must include 5160, 5170, 5170, and (at each offering during residency) 5170. A minimum of 15 hours in credit must be earned in related fields outside the department. Competence in a foreign language, cartography, and quantitative techniques is required. Other techniques pertinent to the student's areas of specialization may be required. The language will be French or German unless otherwise approved by the student's faculty committee. Preliminary examinations required for admission to candidacy include a written comprehensive examination, written examinations on two special fields, and an oral examination on the dissertation proposal. Also required is a final oral examination on the dissertation and on other aspects of the program as determined by the student's doctoral committee.

3410 Intermediate Economic Geography (4) Conceptual, theoretical, and practical techniques in location planning: Local patterns in agriculture, manufacturing, and service activities. F or W

3430 Urban Geography (4) Concepts and theories concerning development and significance of systems of cities and internal morphology of cities. F
3450 Rural Geography (4) Geographical appraisal of rural areas of the United States, including small towns and urban fringes. Problems and potentials of rural America. F

3490 Geography of Resources (4) Study of factors related to variations in resource availability from time and place and their geographical expression, with special emphasis upon energy and metallic resources. F

3520 The Atmospheric System and Man (4) Overview of general circulation system leading to world patterns of climate, weather, plant, animal, and human life. F

3530 The Land-Surface System and Man (4) Nature and regional variations in relationships among surface form, water, vegetation, and surface materials. Human as evaluator and agent of change. W, Su

3610 Political Geography (4) Importance of geographic factors for understanding political relationships with and between nations; spatial implications of political decision-making process; geography of administrative units. F

3660 Cultural Geography (4) Basic concepts of culture; methods and background of geographical assessment; world patterns of cultural phenomena. A

3790 Geography of Middle America (4) Covers Mexico, Central America, and the West Indies. W

3900 Geography of South America (4) F

3870 Geography of Asia (4) A survey of the physical, cultural and economic characteristics of the countries of Asia, excluding the Soviet Union. Sp

3910 Regional Geography of the United States and Canada (4) Major physical, economic, and social distinctions are related to distinctive character of regions of United States and Canada. W

3920 Geography of the American South (4) Geographical appraisal of southeastern United States, including physical environment and human resources. Origin and development of contemporary geographic and cultural traits of the area. F

3940 Geography of Appalachia (4) Interrelation of physical, economic, and social patterns to give distinctive character to the region and its parts, especially Southern Appalachia. Appalachia in perspective in the current American scene. F

4075 Geography of Transportation (4) Geographic examination of transportation systems, emphasizing transport of people on highways and by public facilities. Relationship of these systems to changing geography of cities and urban hinterlands. Sp

4100 Quantitative Methods in Geography (4) Geographic applications of statistical techniques, point pattern analysis and analysis of areal units. Prereq: Mathematics 3000 or consent of instructor. W

4210 Problems in Geographic Method (4) Examples of problems and approach in geographic analysis and synthesis. Emphasis on character of geographic phenomena, generalization, classification, regionalization, and questions of scale. A

4240 Historical Geography of the United States (4) Survey of changing human geography of the United States during four centuries of settlement and development. Emphasis upon changing population patterns, development of agricultural regions and patterns of urban development. Sp

4510 Principles of Geomorphology (4) (Same as Geology 4510.)

4550 Geography of Soils (4) Soils as physical systems and their relationship to environment. Involving the spatial distribution of soil, the classification of soil, and the management of environmental systems. F

4610 Industrial Geography (4) Factors affecting location of manufacturing activities, with emphasis on the United States. Prereq: 3410 or consent of instructor. A

4630 Geography of Agriculture (4) A

4710 Cartographic Design and Production (4) Principles and practice of design, construction, and reproduction of cartographic materials. Recommended prereq: 2700 2 hrs and 2 labs. Sp

4720 Data Mapping (4) Automated techniques of representing surfaces, using geographic information systems. Recommended prereq: 3700 and knowledge of cartography. F

4730 Advanced Cartography (4) Map production from design through color proofs. Prereq: 3700, 4710, and 4720 or consent of instructor. W

4740 Remote Sensing: Types and Applications (4) Basic principles and uses of aerial photography and other remote sensing techniques. Emphasis upon value of various types of imagery for geographic interpretation and simple mapping. Prereq: Consent of instructor. W

4750 Interactive Computer Graphics (3) (Same as Computer Science 4750.)

5000 Thesis (1-19) E

5100 Colloquium in Geography (1) Discussion of departmental research, current research literature, and general topics. Registration at each offering required of resident graduate students. May be repeated. Maximum 8 hrs. S/NC only. W, Sp

5101 Foreign Study (1-12) See page 95. E

5102 Off-campus Study (1-12) See page 95. E

5150 Introduction to Geographical Research (3) Aims of geographical research; survey of printed research findings; methods and background of research. W

5160 Research Design and Field Problems (4-6) Determination of research problems, preparation of appropriate study designs, and practical field application. W

5170 Geographic Concept and Method (3) Traditional and modern thought regarding nature, scope, problems, and methods of geography. A

5200 Special Problems in Geography (2-6) Reading and research on problems or topics of interest to individual students. Students must define topic and receive instructor's approval of study plan before registering for course. May be repeated with consent of instructor. E

5250 Topics in Historical Geography (3) Examination of trends, concepts and methods in historical geography. Prereq: 4240 or consent of instructor. May be repeated with consent of instructor. Maximum 9 hrs. F

5290 Advanced Cultural Geography (3) Geographic analysis of rural settlement in Eastern United States, with emphasis upon New England, Tidewater East, and Upland South, and specific application to Southern Appalachia. Includes field work and final paper. Prereq: 3660 or consent of instructor. W

5310 Topics in Regional Geography of the United States (3) Interrelations of problems and trends in one or more regions of United States, excepting American Southwest. May be repeated with consent of instructor. Maximum 9 hrs. A

5320 Topics in the Geography of the American South (3) Geographic perspective on economic and cultural aspects of southeastern United States. Topics vary. May be repeated with consent of instructor. Maximum 9 hrs. A

5410 Advanced Topics in Economic Geography (3) Examination of trends, problems, and methods in modern economic geography. Prereq: 3430 or consent of instructor. May be repeated. Maximum 9 hrs. A

5520 Advanced Urban Geography (3) Analysis of research on urban systems, internal morphology, urban problems and urban spatial behavior. Prereq: 3430 or consent of instructor. A

5550 Topics in Geography of Land-Surface System (3) Examination of trends, problems, and methods in geography of land-surface system. Prereq: 3550 or consent of instructor. May be repeated with consent of instructor. A

5610 Topics in Climatology (3) Examination of trends, problems, and methods in modern climatology. Prereq: 3550 or consent of instructor. May be repeated with consent of instructor. F

5710 Seminar in Geography (3) A

5730 Topics in Quantitative Geography (3) Multivariate analysis applied to problems in geography, research problems utilizing appropriate packaged computer programs; usefulness to geographic research. Prereq: 4730 or consent of instructor. May be repeated with consent of instructor. Maximum 9 hrs. A

5915 Regional Geomorphology (4) (Same as Geology 4915.)

6600 Doctoral Research and Dissertation (3-15) E

6110-20 Seminar in Economic Geography (3, 3) A

6220-30 Seminar in Urban Geography (3, 3) A

6240-50 Seminar in Historical Geography (3, 3) A

6260-70 Seminar in Cultural Geography (3, 3) A

6310-20 Seminar in Rural Geography (3, 3) A

6410-20 Seminar in Regional Geography of the United States (3, 3) A

6610-20 Seminar in Regional Geography of Latin America (3, 3) A

6710-20 Seminar in Physical Geography (3, 3) A

NOTE: Registration in 6000-level courses may be repeated with department consent.

Geological Sciences

MAJOR DEGREES

Geology

M.S., Ph.D.

Professors: K. R. Walker (Head), Ph.D. Yale; G. Briggs (Associate Dean), Ph.D. Wisconsin; H. J. Kiepfer (Emeritus), Ph.D. Ohio State; O. C. Kopp, Ph.D. Columbia; R. E. McLoughlin, Ph.D. Tennessee; D. H. Roeder, Ph.D. (Geography), Germany; L. A. Taylor, Ph.D. Lehigh; J. G. Wallis (Emeritus), Ph.D. North Carolina.

Associate Professors: G. M. Clark, Ph.D. Pennsylvania State; K. C. Mira, Ph.D. Western Ontario.


THE MASTER'S PROGRAM

The department requires a minimum of 45 quarter hours including at least 18 hours in courses (other than thesis) numbered above 5999. A minimum of 24 hours in geology courses, in addition to thesis, is required. Students who enter without having had an acceptable field camp are required to take Geology 4440, or an equivalent course elsewhere, as part of the above department requirements. One year of general physics is required, if not taken before graduate admission. Thesis committee and topic must be approved by graduate program committee. Qualifying examination is given the second quarter.

THE DOCTORAL PROGRAM

Specific course program and thesis topic determined by candidate's faculty committee.

1. Program to be determined by faculty committee. Requirements include a minimum of 45 hours in courses for graduate credit, in addition to dissertation. These courses must include a minimum of 45 hours in the 5000 or 6000 series, of which at least 15
hours must be in the 6000 series. Up to one-third of the required hours may be taken in related fields. A Master's degree is recommended.

2. Any written examination will be both written and oral. The exam must be taken by the end of the second academic year.

3. Each Ph.D. student must satisfy a research tool requirement which will be demonstrated by his/her faculty committee and which will consist of one of the following:
   a. Demonstration by examination of a reading knowledge in one modern foreign language in which there is a significant body of geological literature.
   b. Completion of course 3030 in an appropriate foreign language with a B or better.
   c. Courses (minimum of 6 hours) at 3000 level or higher taken for undergraduate credit and completed with a B average in appropriate mathematics, statistics, or computer science courses. The courses must be taken during a student's graduate program and must be approved by the student's entire committee.

In no case will option c above be available unless the student has had reading training as a college-undergraduate in an appropriate foreign language.

3160 Introduction to Earth Materials (4) Study of minerals and rocks. Laboratory includes both hand specimen and analytical methods of identification. Prereq: 1410, 1120, 2 hrs and 1 lab.

3180 Mineralogy (4) Introduction to crystallography and study of minerals. Laboratory includes hand specimen, chemic and x-ray methods of identification. Prereq: 1410, Chemistry 1110-20 or equivalent. 3 hrs and 1 lab.

3210-20 Invertebrate Paleontology (4, 4) Systematic review of important recent invertebrate fossil groups. 3210--Perifera to Annelida, including cnidarians, echinoderms, and coelenterata. 3220--Mollusca through lesser Chordata, including arthropods and echinodermata. May be taken separately or in sequence. Prereq: 3260; Biology 1210-20 or consent of instructor. 3 hrs and 1 lab.

3250 Micropaleontology (4) Microscopic remains of animals and plants with special emphasis on stratigraphically important groups. Prereq: 3210 or consensus of instructor. 3 hrs and 1 lab.

3260 Paleobiology (4) Introduction to principles and materials of paleontology as applied to interpretation of earth history. Prereq: 1420. 3 hrs and 1 lab.

3270 Geological History of Land Organisms (4) Geologic history and development of terrestrial biota and ecosystem with special emphasis on fossil record of land plants and vertebrates. Prereq: Biology 1210-20 or consent of instructor. 3 hrs and 1 lab or field period.

3310 Introductory Petrology (4) Introduction to classification and properties of igneous and metamorphic rocks, processes which produce them, and tectonic environments in which they form. Laboratory emphasizes both hand specimen and microscopic study of important rock types. Prereq: 3180. 3 hrs and 1 lab.

3320 Geology of East Tennessee (4) Lectures and field trips. Prereq: 12 hrs of geology and consent of instructor.

3360 Stratigraphy-Sedimentation (4) Introductory study of stratigraphic principles and practices and of methods for interpreting depositional environments. Prereq: 1420 and 3260. 3 hrs and 1 lab or field period.

3370 Structural Geology (4) Introductory discussion of structures such as folds, faults, joints, cleavage, and primary structures. Laboratory work includes depth and thickness problems, structure
5470 Photogeologic Interpretation (4) Advanced photogeologic techniques to obtain geological measurements from aerial photographs. Practice in photogeologic coverage of selected geologic features. Prereq: Consent of instructor.

5480 Plate Tectonics and Orogeny (4) Geometry and kinematics of plate motion are used to devise Plate Tectonics and Orogeny (4) Geometry measurements from aerial photographs. Practice in photogeologic coverage of selected geologic features. Prereq: Consent of instructor.

5503 Metamorphic Petrology (4) Physical and chemical characteristics of metamorphic environment, and effects on texture, chemical composition, and mineral equilibria. Laboratory emphasis on petrographic description and interpretation of metamorphic rocks. Prereq: 3310 and 4550. 2 hrs and 2 labs.

5530 Petrophysics (3) Fluid and heat flow through clastic rock types, role of transport and depositional processes in affecting sediment texture and composition. Prereq: 3370 and 4550. 2 hrs and 2 labs.

5540 Terrigenous Clastic Sedimentary Petrology (4) Field and microscopic analysis of terrigenous clastic rocks, with emphasis on sedimentary processes in affecting sediment texture and composition. Prereq: 3360 or equivalent. 3 hrs and 1 lab.

5550 Carbonate Sedimentology (4) Environments of deposition of modern and ancient carbonates. Prereq: 4130 or consent of instructor. Recommended: 4550. 3 hrs and 1 lab.

5620 Electron Microprobe and X-Ray Spectrographic Analysis: Theory and Application (4) Theory and application of electron microprobe and x-ray spectrographic analysis to chemical analysis, emphasis on geologic sciences. Prereq: 3180 or consent of instructor. 2 hrs and 2 labs.

5630 X-Ray Diffraction: Theory and Application (4) Production and use of x-rays in identifying crystalline substances, powder camera, diffractometer, Gandolfi camera, and single crystal methods. Prereq: 3180 or consent of instructor. 2 hrs and 2 labs.

5635 X-Ray Diffraction: Single Crystal Techniques (4) Single crystal diffraction techniques, emphasis on precision and Weissenberg photography. Crystal symmetry and diffraction, reciprocal lattice and Ewald sphere constructions, space group determination and application to geological problems. Prereq: Knowledge of introductory crystallography and chemistry or equivalent.

5640 Crystallization and Mineralogy (4) Origin of clay minerals; structures and properties; application of mineralogical techniques in clay mineral studies. Prereq: 3160 or equivalent. 3 hrs and 2 labs. To be offered on alternate-year basis.

5650 Thermodynamics for Geologists (3) Principles of chemical thermodynamics related to geologic processes. Prereq: Chemistry 1110-20-30 and Mathematics 1650 and calculus of a single variable or equivalents.

5670 Geochemical Prospecting (3) Theory and practice of geochemical prospecting for metallic ore deposits, i.e., use of chemical analyses of rock, soil, plants, water, and stream sediment for locating ore. Prereq: 4110 and Chemistry 1110-20-30-40-50 or equivalents.

5690 Cathodoluminescence Petrography (2) Application to geological problems. Prereq: 3180 and 4560 or consent of instructor. 1 hr and 1 lab.

5710 Advanced Paleontology (4) Fossil invertebrates. 3 hrs and 1 lab.

5720 Paleontological Nomenclature and Techniques (4) Codification of biologic nomenclature as it applies to paleontology; basic techniques in preparation and illustration of paleontologic materials and manuscript preparation for publication. 3 hrs and 1 lab.


5820 Strata-bound and Stratiform Sulfide Deposits (4) Classification, distribution, characteristics and genesis of strata-bound and stratiform sulfide deposits. Mississippi Valley-type Pb-Zn deposits, strata-bound massive Cu-Zn Pb deposits of volcanic and sedimentary associations, and stratiform Cu deposits. Prereq: 4110 or consent of instructor. 2 hrs and 2 lab/field/seminar periods.

5830 Magmatic Mineral Deposits (4) Classification, distribution, characteristics and genesis of magmatic deposits related to magmatic processes. Magmatic segregation deposits of ultramafic-mafic association and porphyry Cu deposits. Prereq: 4110 or consent of instructor. 2 hrs and 2 lab/field/seminar periods.

5840 Ore Petrology (4) Ore mineral assemblages by reflected-light microscopy. Identification of ore minerals and interpretation of paragenesis from textures. Typical samples from different types of ore deposits, suite of choice. Prereq: 4110 and 4550, or consent of instructor. 2 2-hr labs.

5850 Regional Studies in Geology (1-3) Literature study and seminars on specific regions of geologic interest, supplemented by field trip. Prereq: Consent of instructor.

5915 Regional Geomorphology (4) Selected geomorphologically-related areas, which have common elements such as history or development, related processes which have produced generally similar landscapes of landforms. May be repeated with consent of department. (Same as Geography 5915.)

6000 Doctoral Research and Dissertation (3-15) E *6110 Seminar in Stratigraphic Geology (3) *6210 Seminar in Paleontology (3) *6310 Seminar in Structural Geology (3) *6410 Seminar in Mineralogy (3) *6510 Seminar in Petrology (3) *6610 Seminar in Economic Geology (3) *6710 Seminar in Geochemistry (3) Prereq: 4510 or consent of instructor.

*6810 Seminar in Geomorphology (3) Prereq: 4510 or consent of instructor. May be repeated for credit. Requires of at least 18 hours must be chosen from the four seminars. Prereq: Consent of instructor.

6310 Seminar in German and Russian literature, and will be expected to show familiarity with major works of world literature. The candidate will be required to defend the dissertation in an oral examination, which will cover also the general area of the dissertation. Central emphasis is put on the doctoral dissertation as a final test of the candidate's scholarly qualifications.

6610 Seminar in Economic Geology (3) Seminar in Geochemistry (3) Prereq: 4510 or consent of instructor.

NOTE: Registration for 6000-level courses may be repeated with consent of department. Maximum of 6 hours per course.

Germanic and Slavic Languages

MAJORS

DEGREES

German

M.A. MACT

German Language and Literature

Emeritus Professors:

E. T. Hankamer, Ph.D. Honolulu (Germany); R. L. W. Nordsieck, Ph.D. Ohio State.

Professors:

H. Kratz (Head), Ph.D. Pennsylvania; H. W. Fuller, Ph.D. Wisconsin; R. L. Hiller, Ph.D. Cornell; J. C. Osborne, Ph.D. Northwestern.

Associate Professors:

J. L. Elliott, Ph.D. Michigan; N. A. Lauckner, Ph.D. Wisconsin; D. E. Lee, Ph.D. Stanford; M. P. Rice, Ph.D. Vanderbilt.

Assistant Professors:

D. M. Fiere, Ph.D. Indiana; C. J. Mellor, Ph.D. Chicago; U. Werner, Ph.D. Copenhagen.

The Department of German and Slavic Languages offers three advanced degrees. They are the Master of Arts (M.A.) in German, the Master of Arts in College Teaching (MACT), and the Doctor of Philosophy (Ph.D.) in German Language and Literature.

THE MASTER'S PROGRAM

In addition to the general Graduate School requirements as stated on page 19, the department requires 36 quarter hours in approved courses, including at least 18 hours in courses numbered above 5000. In addition to course work, the student is required to write a thesis, for which he/she may get a maximum of 9 hours credit. The minimum quarter hour credit for the M.A. is 45 quarter hours.

MASTER OF ARTS IN COLLEGE TEACHING PROGRAM

The MACT program is essentially an expanded M.A. program. The minimum requirement is 60 hours of graduate study, including 9 hours of thesis and a 3 quarter-hour seminar in college teaching. The aim of this program is to prepare highly qualified college teachers. Students receiving the MACT degree would be well prepared to go to the Ph.D.

THE DOCTORAL PROGRAM

The student must fulfill the general requirements for the Ph.D. degree set by the Graduate School. The candidate for the doctoral degree must complete a minimum of 81 quarter hours of course work beyond the Bachelor's degree in addition to 36 hours of doctoral research and dissertation. At least 45 quarter hours of the minimum must be taken in 5000 or 6000 courses. Of these 45 hours, a minimum of 18 hours must be chosen from the same research area of theprossembar (5200) and the literary or philological seminars (6210-20-30-40-50-60 and 6310-20-30). At least 9 hours must be taken in a cognate field. Students are encouraged to take additional work in allied fields. A minor in an allied field must consist of at least 18 hours of 5000 or 6000 courses. Students must show a fluent command of German, Russian, or knowledge of two foreign languages, French and another language, such as Italian, Latin or Russian, appropriate to the field of research. A preliminary comprehensive examination, both written and oral, on German language and literature and the minor field or fields, must be passed before the student may be admitted to candidacy. The student will be examined on an extensive reading list which covers the whole range of German literature, and will be expected to show familiarity with major works of world literature. The candidate will be required to defend the dissertation in an oral examination, which will cover also the general area of the dissertation. Central emphasis is put on the doctoral dissertation as a final test of the candidate's scholarly qualifications.

The field of study is divided into (1) German literature and (2) German (or Germanic) philology or linguistics. A student may concentrate on one or the other. Dissertation and seminar research topics will be chosen in accordance with the varying preferences and specific interests of the faculty. Detailed programs will be established in each case by the student's faculty committee.

3010-20-30 Elements of German for Upper Division and Graduate Students (3, 3) Elements of language, elementary and advanced readings. Open to graduate students preparing for language examinations, and upper division students desiring reading knowledge of the language. Undergraduate credit only. No credit for students having completed elementary German.

3210-20-30 German Literature in English Transla-
4260 Introduction to Historical and Comparative Linguistics (3) (Same as German, French, and Spanish 4260.) F

5570 German Realism and Naturalism (3) A
5580 Modern German Literature (1889-1945) (3) A
5590 Modern German Literature (1945-Present) (3) A
5600 German Literary Theory and Criticism (3) W
5610-20-30-50-60 Directed Readings in German Language and Literature (3, 3, 3, 3, 3, 3, 3) E
5710 Introduction to Old Norse (3) Phonology, morphology and syntax of Old Norse. Representative readings in Old Norse. A
5720 Readings in Old Norse Prose (3) Intensive readings of Old Norse prose works. Icelandic sagas as literary form. A
5730 Readings in Old Norse Poetry (3) Intensive reading of Eddic poems as a literary genre and repository of ancient Germanic customs, legends, and mythology A
6000 Doctoral Research and Dissertation (3-15) E
6100 Gothic (3) Phonology, morphology, and syntax of Gothic language. Relationship to Indo-European languages and other Germanic languages. Readings from Gothic Bible. A
6120-30 Old High German (3,3) 6120—Introduction: phonology, morphology, and syntax of Old High German of eighth and ninth centuries. Dialects. Representative readings. 6130—Literature and Linguistics; prose and poetry of period from linguistic and literary point of view. Development of language and literary expression of this period. A
6140 Old Saxon (3) Phonology, morphology, and syntax of Old Saxon. Representative readings. A
6210-20-40-50-60 Seminar in German Literature (3, 3, 3, 3, 3, 3, 3, 3) May be repeated. E
6310-20-30 Seminar in German and Germanic Philology (3, 3, 3, 3, 3) May be repeated. E

Russian
3010-20-30 Elements of Russian for Graduate Students and Seniors (3, 3, 3) For graduate students preparing for language examinations and seniors desiring reading knowledge of a second foreign language. Prereq: 2 years of some foreign language. F, W
3210 Nineteenth-century Russian Literature in English Translation (3-4) Realism and the novel; selections from works of Pushkin, etc. F
3220 Works of Leo Tolstoy in English Translation (2-4) War and Peace, Anna Karenina, and other works. W
3230 Twentieth-century Russian Literature in English Translation (3-4) Russian modernism and literature under the soviet. Sp
3240 The Russian Drama in English Translation (3-4) Selections from works of Gorky, Ibsen, Ostrovsky, Turgenev, Chekhov, and others. F
3250 The Works of Ivan Turgenev and Anton Chekhov in English Translation (3-4) Sp
3260 Russian Folklore in English Translation (3-4) Sp
3270 Russian Philosophical and Theological Thought (4) A survey of the development of philosophical and theological thought in Russia from the Middle Ages to the Revolution. Special emphasis on the expression of this thought in Russian literature and literary criticism up to the period of Russian reformation. (Same as Philosophy 3270 and Religious Studies 3270.)
4010 Selected Topics in Russian and East European Studies (3) Interdisciplinary seminar on selected topics using comparative approach.
4250 Introduction to Descriptive Linguistics (3) (Same as German, French, and Spanish 4250.) F
4260 Introduction to Historical and Comparative Linguistics (3) (Same as German, French, and Spanish 4260.) W
4270 Introduction to Slavic Linguistics (3)
3100-20-30 Advanced Studies in Russian Language and Literature (3, 3, 3) intended primarily for students majoring in Russian who are interested in language and linguistics. Includes problems in morphology and syntax, stylistics and translation techniques, and history of Russian language as well as other special problems for advanced students of Russian. May be repeated. Maximum 9 hrs each.
4290 Directed Readings in Russian (3, 3, 3) intended primarily for students participating in program in Russian and East European Area Studies, course will involve individual study relating to student's major field. Prereq: 9 hrs of 3000 courses in Russian (exclusive of 3010-20-30, 3210-20-30-40-50-60-70, 3310) or equivalent.

Greek
See Classics

History
MAJOR

DEGREES

History
M.A., M.A.T., Ph.D.

Professors:

Associate Professors:

Assistant Professors:

THE MASTER'S PROGRAM

Master of Arts—Plan I: Course requirements include History 5240, and either 5250 or 5260, one M.A. reading course; at least 6 additional hours 5300 or above of 6000 level courses; 9 additional hours 5300 or above. Total hours, including thesis—45.

Plan II: History 5240, and either 5250 or 5260; two M.A. reading courses; 12 additional hours 5300 or above, at least 2 of which must be 6000 level courses; 9 additional hours 5300 or above. Total hours—45. Plan I and Plan II require evidence of proficiency in one foreign language before the M.A. degree is granted.
Courses numbered 6300 or above for the degree may substitute 9 quarter hours of thesis-60. Students seeking the MACT Higher Education 5110. Students must spend 5240-50-60, 5271-72-73, and Continuing and College Teaching 116. These exams should normally be taken before beginning the ninth quarter of work toward the doctorate. The committee may also specify any other languages as may be determined by the student's committee. Under normal circumstances, those specializing in European history will need two languages. The committee may also specify any other research tools, such as statistics, essential for the student's preparation. Upon student completion, a final oral examination will be ready to take a language examination he/she must possess a reading knowledge of one language a B or better performance in the student's preparation. Upon student satisfaction requires that a student must have at least a B in the final quarter. 

4. Preliminary Examinations and Committee: Incoming students will be advised by the department head. The preliminary examinations must be taken after all course work is completed, language requirements fulfilled, and at least three months before the degree is expected. These exams should normally be taken before beginning the ninth quarter of work toward the doctorate. The candidate must present four fields, distributed as follows: one major field (history); two minor fields (history); and one minor field which may be either in history or outside the department. In any case, the student is required to have 9 hours of graduate work outside the History Department. Three of the four areas listed below must be represented by a major or a minor field. Under normal circumstances:

I. Ancient and Medieval
   (1) Ancient Near East
   (2) Greece
   (3) Rome
   (4) Early Middle Ages, 375-1122
   (5) Latin Middle Ages, 1095-1450

II. Early Modern
   (1) Europe, 1615-1714
   (2) European World Since 1714
   (3) United States, 1815-present
   (4) Latin America, 1899-1926

III. Modern
   (1) Europe, 1815-1914
   (2) European World Since 1914
   (3) Germany, 1859-1918
   (4) France, 1879-present
   (5) Germany, 1855-1918
   (6) Germany, 1800-1945
   (7) Russia, 1600-1800
   (8) Russia, 1800-present
   (9) Colonialism and Imperialism
   (10) Diplomatic History of the States

The student must be recommended by the Department of History.

V. National, Sectional and Topical

1. England, 1485-1763
2. Great Britain, 1760-present
3. France, 1599-1815
4. France, 1789-present
5. Germany, 1555-1806
6. Germany, 1806-present
7. Russia, 1600-1800
8. Russia, 1800-present
9. Colonialism and Imperialism
10. Diplomatic History of the States

11. Social and Cultural History of the United States
12. The South
13. Frontier and Westward Movement
14. Afro-American

5. Dissertation and Final Examination:

Original research forms the basis for the dissertation. After the dissertation has been completed, a final oral examination will be given on the dissertation in its historical context.

3060-70-80 History of Western Religious Thought and Institutions (3, 3, 3) Same as Religious Studies 3060-70-80.
3140-50-60 History of England (3, 3, 3) 3140—To 1688. 3150—1689 through the Reform Bill of 1832. 3160—1832 to the present.
3311-21-31 History of Tennessee (3, 3, 3) Eighteenth Century to Civil War Era. 3321—1865 to present.
3411-12-13 Renaissance and Reformation (3, 3, 3) 3411—Renaissance. 3412—Reformation 1517-1550. 3413—Catholic Reformation and Wars of Religion. (Same as Religious Studies 3411-12-13.)
3470-80-90 History of Russia (3, 3, 3) 3470—To 1801. 3480—Nineteenth Century. 3490—Twentieth Century.
3610-20 The American Colonies and the American Revolution (3, 3) 3610—Settlements to 1754. 3620—1755-1799.
3710-20-30 History of Germany (3, 3, 3) 3710—First Reich to 1713. 3720—Habsburg and Hohenzollern and the imperation. 3730—To a divided Germany, 1890 to present.
3740 The City in Europe, ca. 1200-1900 (3) Survey of European urban growth with comparative study of the major periods of urbanization of the thirteenth and nineteenth centuries. Emphasis on the relationship between demographic, economic, and social foundations of cities and political and cultural development.
3751-52 Ancient Near Eastern Civilization (3, 3) 3751—Early and Middle Bronze Ages. 3752—Late Bronze to the present.
3760-70 The Ancient World (3, 3) 3760—Greece. 3770—Rome.
3870-90 History of the Middle East (3, 3) 3760—Rise and spread of Islamic Civilization to the 16th Century. 3760—The impact of the West on the Middle East from the sixteenth century to World War I.
3795 Contemporary Middle East (4) Background of current problems in the area, from World War I to the present.
3800 North Africa since 1830 (3) Morocco, Algeria, Tunisia, and Libya in the nineteenth and twentieth centuries.
3810-20 History of East Asia (3, 3, 3) 3810—Traditional China and Japan, ancient to mid-nineteenth century. 3820—Modern China, Japan, and Korea, mid-nineteenth century to 1920s. 3830—Contemporary China, Japan, and Korea, 1920s to the present.
3870-90-99 History of Latin America (3, 3, 3) 3870—Exploration, conquest, settlement and Colonial life to 1800. 3880—New countries of South America, 1800 to 1914. 3890—Mexico, Central America and the Caribbean, 1800 to present.
4015 Studies in History (3-4) Variable content course affording opportunity to offer subject matter not covered in an existing course. May be repeated.
4120-30 History of Colonialism and Imperialism (3, 3) 4120—Background; age of discovery and exploration to the nineteenth century. 4130—Nineteenth century to the present.
4200-60-70 European Intellectual and Cultural History (3, 3, 3) 4250—From Reformation to the Scientific Revolution, 1500-1700. 4260—From the Enlightenment to the Age of Realism, 1700-1870. 4270—From Subjectivism to Relativism, 1870-1930.
4280 Women in European History (4) Comparative analysis of role and images of women in Medieval, Renaissance, and Victorian periods. Attention given to parallel changes in structure of family as well as relationship between Western culture and women's protest movements.
4290 Women in American History (4) Approaches of 4280 applied to American Society.
4360 The United States in World War II (4) Military, diplomatic, and domestic experience.
4370 U.S. Military History, 1775 to the Present (4) Examination of nature and means used and means used to attain them, shifting strategy, tactics and weaponry involved in our wars, and relationship between American society and its armed forces.
4380 Civilian-Military Relationships in the Modern Western World (3) Civilian-military affairs from about 1900 to 1965 in Western Europe, Russia and America; emphasis on Western Europe: e.g., Dreyfus Affair, Army in Nazi Germany, and Truman-MacArthur controversy.
5016 Periods in American History (3) May be repeated. Maximum 9 hrs.
5101 Foreign Study (1-12) See page 95. E
5102 Off-campus Study (1-12) See page 95. E
5103 Independent Study (1-12) See page 95. E
5211-5225 M.A. Reading Courses (3 hrs each) Directed reading courses in preparation for fields required on student's oral examination. 5211, Ancient; 5212, Medieval; 5213, Early Modern Europe; 5214, Europe Since 1789; 5215, American History to 1815; 5216, American History Since 1789; 5217, Latin America; 5218, Far East; 5219, Colonialism and Imperialism; 5221, England; 5222, Russia; 5225, Germany; 5226, France; 5228, Middle East. Open only to Master's candidates in history. S/NC only. E
5240 Introduction to Historical Research (3) Principles and techniques of research in the study of history. Required of all candidates for advanced degrees who do not present evidence of similar training elsewhere. F
5250 European Historiography (3) Introduces the student to the historical literature of leading European nations. W
5260 American Historiography (3) Like 5250 in the American field. W
5271-72-73 The Teaching of College History (0, 0, 3) Introduction to teaching at the college level. Place of history in curriculum, types and levels of courses, and techniques of teaching. Prereq: Consent of instructor. Open only to candidates for the M.A.C.T. Credit will be withheld until the completion of 5273, with grades of "S" or "NC" submitted at end of each of first two quarters. E
5280 Philosophy and Methodology (3) Philosophies of history and their relationship to milleux from which they emerge; modern trends in historical methodology. Sp
5290 Quantitative Analysis of Historical Data (3) Prereq: Sociology 5320 and 5330, or consent of instructor. Sp
5300 Topics in History (3)
5310 Topics in Women's History (3)
5320 Topics in Historical Editing (3) Principles and practice of editing documents.
5360 Topics in American Foreign Relations (3)
5410 Topics in Early Modern European History (3)
5440 Revolution and Restoration in Central Europe, 1780-1850 (3) Reform, resistance, and the advent of Liberalism and Nationalism.
5444 Topics in French History (3)
5445 Topics in Nineteenth-century European History (3)
5450 Topics in Twentieth-century European History (3)
5480 Topics in Russian History (3)
5510 Topics in Tudor-Stuart England (3)
5520 Topics in Modern English History (3)
5550 Reaction and Reform in England, 1789-1848 (3)
5560 Anglo-Irish Relations (3)
5580 Topics in American Social and Cultural History (3)
5645 Topics in American Urban History (3)
5650 Topics in the American Westward Movement (3)
5660 Topics in Negro History (3)
5670 Topics in American Colonial History (3)
5675 Topics in the Early National Period of American History (3)
5680 Topics in Nineteenth-century American History (3)
5690 Topics in Twentieth-century American History (3)
5720 Topics in Medieval History (3)
5740 Topics in European Urban History (3)
5750 Topics in Ancient History (3)
5790 Topics in German National Socialism (3)
5790 Topics in Middle Eastern History (3)
5810 Topics in Andean History (3)
5820 Topics in Mexican History (3)
5850 Topics in Chinese History (3)
5860 Topics in Japanese History (3)
5910-20 Topics in Southern History (3, 3) 5910—Old South, 5920—New South.
6000 Doctoral Research and Dissertation (3-15) E
6210-20-30-40 Directed Readings (3, 3, 3, 3) Individual readings directed toward preparation for preliminary examination fields. Open only to candidates for Ph.D. degree who are in residence and who have been in residence at least two quarters. Only one course may be taken in preparation for each of four fields. Depending on field in which he is reading, student will be assigned to appropriate member of department. S/NC only. E
6300 Seminar in Special Studies (3)
6310 Seminar in Tennessee History (3)
6350 Seminar in American Diplomatic History (3)
6410 Seminar in Western Europe (3)
6444 Seminar in French History (3)
6480 Seminar in Russian History (3)
6510 Seminar in English History (3)
6610 Seminar in American Colonial History (3)
6620 Seminar in the Era of the American Revolution (3)
6630 Seminar in Early National Period of American History (3)
6635 Seminar in Jacksonian Period (3)
6640 Seminar in Social and Cultural History of the United States (3)
6650 Seminar in the American Westward Movement (3)
6710 Seminar in Medieval Institutions (3)
6770 Seminar in Central European History (3)
6810 Seminar in Latin American History (3)
6910 Seminar in the Civil War Era (3)
6930 Seminar in Twentieth-century America (3)
6940 Seminar in the History of the South (3)

Latin

See Classics

Mathematics

MAJOR

DEGREES

Mathematics

M.M., M.A., M.S., Ph.D.

Professors:

L. K. Barrett (Head), Ph.D., Pennsylvania; G. E. Albert (Emeritus), Ph. D., Wisconsin; J. S. Bradley, Ph.D., Iowa; J. H. Carruth, Ph. D., Louisiana State; R. E. Clime, Ph. D., Purdue; A. J. Davermer, Ph. D., Wisconsin; D. F. Dessart, Ph.D., Maryland; E. D. Hayes (Emeritus), Ph.D., Texas; H. Frandsen, Ph.D., Illinois; D. A. Gardiner, Ph.D., North Carolina State; R. T. Gregory, Ph.D., Illinois; T. G. Hail, Ph. D., Missouri; D. B. Hinton, Ph.D., Tennessee; A. S. Householder (Emeritus), Ph. D., Chicago; G. H. Hush, Ph.D., Florida State; R. M. McConnel, Ph.D., Duke; H. T. Mathews, Ph.D., Tulane; D. D. Miller, Ph.D., Michigan; R. F. Flamion, Ph.D., Auburn; K. C. Reddy, Ph.D., Indian Institute of Technology (India);
Math 3050, 3060, 3090, 3100, 3110, 3320, 3330, 3510, and 3720, are intended primarily for students preparing to teach in secondary or elementary schools. Any 3000 or 4000 course in the department whose course number ends in "O" may be offered as an honors version. In this case, the course will begin with an "O" and the title will be preceded by the word "Honors" both in the timetable and on the student's transcript. Honors courses listed in the Graduate Catalog are acceptable for graduate credit. Such courses may be offered upon the initiative of interested faculty, students, or the department head (though in all cases subject to the approval of the department head).

MOUNT OF APPLIED MATHEMATICS PROGRAM

The Master of Mathematics degree is intended primarily for teachers of high school mathematics.

Before admission to this program, the applicant must have either (a) certification for teaching secondary mathematics in at least one of the states of the United States, or (b) threeterms of college mathematics in an elementary or secondary school teaching experience. Evidence of the requirement being met must be supplied by the student.

Admission to this program must take the Graduate Record Examination (aptitude portion), and have had at least one year of college mathematics including analytic geometry.

The following requirements must be met:

1. Completing 45 hours of course work, of which at least 9 must be at the 5000 level. The course work must include:
   a. 36 hours of mathematics courses numbered 3050 or above.
   b. 9 hours of additional work from mathematics courses numbered 3050 or above or from courses in other departments selected in consultation with the advisor.

2. Passing an oral examination upon completion of all course work.

THE MASTERS PROGRAMS

The Master of Arts degree and the Master of Science degree are designed to prepare students for industrial employment and for teaching at the high school and junior college level.

The department offers two options for these degrees. The first option requires a thesis for which 9 hours must be earned along with 36 additional hours of work in acceptable courses numbered above 4000. Of the additional hours, 9 may be in an area outside the department and 18 must be in courses in mathematics numbered above 5000.

After two quarters of graduate study, a student whose supervisory committee gives its approval may choose the non-thesis option, for which 45 hours of work in courses numbered above 4000 are required. Of these, 27 hours (at least 24 of which are in mathematics) must be in courses numbered above 5000. Of the 45 hours, 15 in courses approved by the supervisory committee may be taken in fields other than mathematics. For this option it is also required that a written comprehensive examination be passed, and that credit be received for a 3-hour seminar or reading course (5990-5995) in which a term paper or project is required. A student offering mathematics as a minor for the Master's degree is required to obtain at least 9 hours of resident graduate credit in courses numbered above 4000 and approved by both the major department and the Department of Mathematics.

THE DOCTORAL PROGRAM

For the Ph.D. in Mathematics, the student must meet the following departmental requirements:

1. Pass written examinations covering four subjects, at least three of which must be from the following list:
   a. Algebra 5510-20-30
   b. Functions of a Complex Variable 5110-20-30
   c. Topology 5910-20-30
   d. Functions of a Real Variable 5210-20-30
   e. Linear Analysis 5250-60
   f. Partial Differential Equations 5450-60-70
   g. Ordinary Differential Equations 5870-80-90
   h. Numerical Mathematics 5655-65-75
   i. Mathematical Statistics 5750-60-70

2. Students may not take examinations in both d. and e. nor may they take examinations in both f. and g. as their preliminary examination subjects. Those students who choose four from this list must choose two from a. through e. and the students who choose only three from this list must choose one from a. to e.

3. A student selecting only three from the above list will also be required to pass a written examination in 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. For a given student and a given area, the Graduate Committee will appoint a section of faculty whose responsibility is to submit a list of topics and references to the Graduate Committee and the Applied Mathematics Committee for its approval.

4. A student may take as many of the written examinations as desired at any time these exams are given and subject to the following conditions:
   a. The exams to be taken must be approved in advance by the student's supervisory committee.
   b. At most 4-n exams may be taken at any one time, where n denotes the number of exams previously passed by the student.

At most two exams may be taken prior to passing one language exam.

A student may take a collection of written examinations a maximum of four times, but no failing five exams counting possible repetitions, will be permitted to take another round of exams.

Pass an intensive exam in the field of specialization. This exam will be given by a committee appointed by the department head at some time after the requirements in 1. have been met. A student may take this specialty exam only twice.

The conditions for the doctoral degree are to include a demonstrated proficiency in one foreign language, normally from among French, German, or Russian; this requirement is to be met prior to the examination in the area of specialization. The student's doctoral committee may require that the student pass a second language exam.

In addition, the department requires that each student take a one-year, 6000-level course in mathematics outside of his/her area of concentration. The use of the course selected to fulfill this requirement must be approved by the department head and either the student's supervisory committee or the student's Doctoral Committee. (Such approval may occur after completion of the course.)

The written exams mentioned in 3. are normally given twice a year, once in the fall and once in the spring. The fall exams are given before the fall quarter begins, and the spring exams are given during the spring quarter.

3.050 Elementary Probability and Statistical Analysis (3) Combinatorial problems; sample spaces, sets, and events; statistical independence; axiomatic probability theory; random variables and their distributions; binomial, Poisson, and normal and their properties; Markov chains, linear regression, and correlation; the use of the course in science and industry. Emphasis is given to pertinent theory related to the course, and the exam is given subject to the following condition:

3.060 Elementary Statistical Analysis (3) Combinatorial problems; sample spaces, sets, and events; statistical independence; axiomatic probability theory; random variables and their distributions; binomial, Poisson, and normal and their properties; Markov chains, linear regression, and correlation; the use of the course in science and industry. Emphasis is given to pertinent theory related to the course, and the exam is given subject to the following condition:

3.100 Logical and Set (3) Elements of mathematical logic; elementary algebra of sets. Primarily for students in the College of Education. Prereq: 1 yr of college mathematics. Su.

3.110 Real Number System (3) Laws of arithmetic; rational and irrational numbers; fields. Prereq: 1 yr of college mathematics. Primarily for students in the College of Education.


3.150 Introduction to Numerical Algorithms and Programming (3) Same as Computer Science 3150. E

3.155 Introduction to Numerical Algorithms (3) Same as Computer Science 3150. E

*These courses are offered in special summer institutes for an 8-week period with 4 hr credit. Such special courses are designed 3051, 3061, etc.
3220 History of Mathematics (3) Survey of development of various branches of mathematics, from ancient to modern times. Prereq: 1860 or 2550 or equivalent.

3310 Advanced Euclidean Geometry (3) Triangles and circles, constructions, modern concepts. Prereq: 1 yr of college mathematics. F.

3320 Non-Euclidean Geometry (3) Foundations of geometry: Elliptic plane geometry. Prereq: 1 yr of college mathematics. W.


3510 Intermediate Analysis (3) Primarily for students in secondary mathematics education. Course covers elementary calculus from advanced viewpoint with emphasis on proofs of basic theorems. Topics covered include limits of sequences and functions, continuous functions, derivatives, definite integral, and fundamental theorem of integral calculus. Prereq: 1550-60 or 1860. Su.

3715 Discrete Structures (3) (Same as Computer Science 3715.) E.

3720 Theory of Equations (3) Techniques for finding roots of polynomial equations. Topics covered include complex, integral, and rational roots, multiple roots, and methods such as Horner's method of approximating roots, and formulas for quadratic, cubic, and biquadratic equations. Prereq: 1 yr of college mathematics.

3725 Advanced Discrete Structures (3) (Same as Computer Science 3725.)

3780-90 Introduction to Combinatorial Theory (3, 3) Introduction to problems of arrangement and selection within discrete systems. Enumeration by recurrence relations and generating functions, graph theory, finite geometries, and finite fields, partitions, block designs. Prereq: 2860 or consent of instructor. F, W, or W; Sp.

3810 How To Prove It (3) Course is designed to improve understanding of nature and methods of mathematical proof by means of practice and participation in seminar setting. Variable content but will include certain standard topics such as elementary set theory, relations and functions, and mathematical induction. Coreq: 2850 or 2560. E.

3920-30 Topology of Euclidean Spaces (3, 3) Topics will include topology of line and plane, separation properties, compactness, connectedness, completeness, continuous functions, homeomorphisms, continua, and topological invariants. Must be taken in conjunction with 3220. Prereq: 3810, 2860, or consent of instructor. W, Sp.

3990 Studies in Mathematics (1-4) Credit determined at registration. Prereq: Consent of instructor. May be repeated with consent of department. Maximum 9 hrs.

4050 Matrix Algebra and Applications (3) Matrices, elementary operations, systems of linear equations, vector spaces, determinants, eigenvectors and eigenvalues. Prereq: 2850 or 2560 or consent of instructor. E.

4060-70 Matrix Algebra and Applications (3, 3) Eigenvalues and eigenvectors, singular values and singular vectors, unitary and similarity transformations, quadratic forms, vector and matrix norms, Jordan canonical form, and related topics. Prereq: 2860 or 4050. W, Sp.

4120 Linear Algebra (3) Abstract vector spaces, linear transformations, their matrices, systems of linear equations, determinants, inner products, and diagonalization of symmetric matrices. Prereq: 2860 or 4050. F.

4150-60 Abstract Algebra (3, 3) Equivalence relations, properties of integers, elementary theory of groups and rings, polynomial rings, integral domains, divisors, unique factorization domains, ideals, and related topics. Prereq: 2860 or 4050. W, Sp.


4250 Elementary Complex Variables (3) Complex numbers, Cauchy-Riemann equations, elementary functions, Cauchy's theorem and formula, Taylor and Laurent series, applications. Prereq: 2860; one 4000-level mathematics course recommended. F, Sp, Su.

4510-20-30 Introduction to Analysis (3, 3, 3) Real numbers; sequences; limits, continuity, uniform continuity, differentiability, integrability. Functions of several variables, implicit function theorem, Multiple infinitely long sequences and series of functions, uniform convergence, Taylor series. Should be taken in sequence. Prereq: 2860. F, Sp, Su.

4540 Infinite Series and Functions of Several Variables (3) General theory, power series and Taylor's formula, uniform convergence. Partial differentiation and maxima and minima for functions of several variables. LaGrange multipliers. Prereq: 2860.

4550 Partial Differential Equations (3) Fourier series; Fourier integrals; orthogonal functions; the vibrating string, solution by series, heat flow. Bessel functions. Prereq: 2860. Recommended: 4610 or 4710. E.


4640 Calculus of Finite Differences (3) Real differential equations, applications to problems in engineering and physics. Prereq or coreq: 4610.

4650-60-70 Introduction to Mathematical Statistics (3, 3, 3) Introduction to probability; discrete and continuous distributions; sampling; integration; regression; and statistical independence; foundations of sampling theory; significance tests. Must be taken in sequence. Prereq: 2860.

4710 Vector Analysis (3) Fundamental operations, basis vectors, dot and cross products, directional derivatives, divergence and curl of vector fields, line and surface integrals, the algebraic Cauchy and Stokes' theorem. Prereq: 2860. E.

4750-60-70 Introductory Probability Theory (3, 3, 3) 4750—Elementary combinatorial analysis; probability in discrete sample spaces; conditional probability and stochastic independence, binomial, Poisson, hypergeometric and normal distributions. 4760—Expectation, conditional expectation and the algebraic eigenvalue problem. Prereq: 4550 or 4710. E.

4810 Elementary Number Theory (3) Divisibility, congruences, theorems of Fermat and Wilson, primitive roots; introduction to cryptography. Prereq: 2860 or consent of instructor. Su.

4990 Readings in Mathematics (1-3) Open to superior students with consent of department head. Independent study; no faculty guidance. May be repeated. Maximum 9 hrs.

4990 Studies in Mathematics (1-4) Credit determined at registration. Prereq: Recommendation of Mathematics Department faculty member and consent of department. May be repeated. Maximum 9 hrs.

5000 Thesis (1-15) E.

5002 Non-Thesis Graduation Completion (3-15) Requires completion of departmental requirements registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. N/S only.

**5011 Elementary Functions from an Advanced Standpoint for Teachers (3-4) Order and completeness axioms of real numbers, limits of sequences, derivatives of functions, "limiting functions" of sequences of exponential, logarithmic and trigonometric functions. Taylor's series, infinite series, sequences and series of functions, uniform convergence, Maclaurin's series; constructions of logarithmic and trigonometric tables. Prereq: 3510 or 3110 or consent of instructor.

**5012 Elementary Functions for Teachers (3-4) Advanced techniques applied to graphing functions. Curves, surfaces, parametrizations, singular points, tangents and normal planes, osculating plane, arc length of curves in plane and curves on surface, curvature, torsion, asymptotes, local coordinates, Fresnel formulas. Prereq: 1 yr of calculus, or consent of instructor.

**5013 Geometry for Teachers (3-4) Primarily for high school teachers of geometry. Historical and modern presentations of topics encountered in a high school geometry class: axioms, synthetic and metric; models: betweenness; congruence of segments and triangles; parallel postulate; similarity, area; ruler and compass constructions; Klein's Erlangen Program. Prereq: Consent of instructor.

**5014 Analysis for Teachers (3-4) Functions of several variables, limits and continuity, partial derivatives, directional derivatives, gradients and gradient, implicit function theorem, maxima and minima, transformations. Prereq: 3510 or consent of instructor.

**5015 Probability and Statistical Inference for Teachers (3-4) Probability distributions including binomial, hypergeometric, and Poisson; moment generating functions; expectation of continuous random variables; moment generating functions of uniform and normal distributions. Sampling including Chi-square, and distributions, interval estimation of means and variances; simple hypothesis testing. Prereq: 1 yr of calculus and 3050 or consent of instructor.

5050-60-70 Mathematical Logic (3, 3, 3) Truth functions: syntax and semantics of some propositional theory, Gentzen's sequence-calculus and consistency of natural deduction, algebraic logic; syntax and semantics of first order theories; elementary model and recursion theory; consistency, completeness, decidability.

5051 Introductory Business Mathematics (3) Graphing of simple equations, straight lines, circle, parabola, functions, algebra of functions, limits, continuity, derivatives, maxima and minima, economic applications to maxima and minima, convexity and concavity, implicit differentiation, higher order derivatives, and applications. Credit applies only to

**This course is intended for students in the Master of Mathematics program and for students in graduate programs in education. It may not be applied as graduate credit toward the M.A. or M.S. degree in Mathematics.
5052 Mathematics for Business Decisions (3) Exponentional function, applications to growth and decay, different functions such as linear, exponential, and logarithmic as applied to growth and decay phenomena. Prerequisites: Math 1550 or equivalent.

5455 Finite Difference Methods for Partial Differential Equations (3) Finite difference techniques for solution of parabolic, elliptic, and hyperbolic equations. Computer implementation, stability, consistency, and convergence nonlinear; curved boundary problems. Prerequisites: 5450 or consent of instructor; req: 3150 or 3155, and one 4000-level mathematics course. (Same as Computer Science 5455.) F

5465 Finite Element Methods (3) Finite element techniques and applications to partial differential equations. Variational principles, local bases, rates of convergence, and computer implementation. Prerequisites: 3150 or 3155, and 4225 or consent of instructor. (Same as Computer Science 5456.)

5757 Advanced Topics in Numerical Partial Differential Equations (3) Finite element methods for eigenvalue problems, IV problems, BV problems with singularities. Other topics, such as special methods, further study of finite difference methods, etc. at discretion of instructor. Prerequisites: 5455-65. (Same as Computer Science 5475.) Sp

5860 Mathematical Programming (3, 3) Optimization of functions or variables subject to constraints. Prerequisites: 3150, 4060 and 4330. W, Sp.

5510-20-30 Introduction to Higher Algebra, (3, 3, 3) Algebraic systems; groups, rings, integral domains, fields. Must be taken in sequence. W, Sp, A

5540 Galois Theory (3) Fields and their extensions, separable and normal extensions, algebraic closure, groups of automorphisms, fundamental theorem, representations, Galois theory, by radicals. Prerequisites or corequisites: 5520.

5560-70-80 Theory of Matrices in Numerical Analysis (3, 3, 3) Matrix fundamentals and linear algebra; eigenvalues, generalized reciprocals, Hadamard inequalities, Lanczos reductions, 5570—Vector and matrix norms, condition numbers, domains of inclusion and exclusion of roots of matrices; the field of values; minimax and maximin theorems for Hermitian matrices; Kantorovic inequalities. 5580—Computation methods for inverting matrices, direct and by successive approximation; methods of reduction to normal form; successive approximation to roots of matrices; measures of error. Perquisites or Consent of instructor.

5590 Theory of Rings (3) Direct and subdirect sums of rings, prime and maximal ideals; modules and rings of endomorphisms; radicals; Wedderburn-Artin structure theory. Prerequisites: 5520.


5640 Numerical Methods in Physics (3) (Same as Physics 5640.)


5710-20-30 Tensor Analysis (3, 3, 3) Absolute differential calculus in three-dimensional Euclidean space; differential geometry of curves and surfaces; applications to physics; extension to ndimensional Euclidean space. Major in mathematics or physics. Must be taken in sequence.


5775 Combinatorial Algorithms (3) (Same as Computer Science 5775)

5810-20-30 Number Theory (3, 3, 3) Arithmetic functions, distribution of primes, Diophantine equations, approximation theory, Shnirelman density and Mann's theorem, quadratic forms, Dirichlet's theorem, prime number theory. Prerequisites or corequisites: 5510 for 5810; 5520 for 5820.

5840-50-60 Mathematical Ecology (3, 3, 3) Discrete and continuous models in ecology. Population, community, and ecosystem models from qualitative and quantitative perspectives. Physical environmental modeling effects in ecosystems. Specific ecosystem models; predator-prey, competition, parasite-host, foraging, and metapopulation models; random model effects. Comparison of stochastic with deterministic models. Prerequisites for 5840-50, 5842, 5850 or consent of instructor; prerequisites for 5860: 4570 or 4565 or consent of instructor.

5870-80-90 Introduction to Ordinary Differential Equations (3, 3, 3) Existence, uniqueness, extendability, continuity of solutions; linear equations, power series, Frobenius methods for regular singular equations; Fokker-Planck diffusion theory, stability of critical points; boundary value problems for linear systems; regular and singular perturbation theory for nonlinear systems. Prerequisites: 4610, 4580, 4510-20.

5910-20-30 Elementary Topology (3, 3, 3) Topological spaces; metrization, homeomorphic invariants of point sets; structure of Peano continua. Mapping; homotopy; introduction to combinatorial topology. F, W, Sp, A

5990 Graduate Reading in Mathematics (1-3) Open to graduate students with consent of department head. Independent study with faculty guidance. May be repeated with consent of department.

6000 Doctoral Research and Dissertation (3-15) E


6450-60-70 Partial Differential Equations (3, 3, 3) Advanced topics in classical and modern theoretical partial differential equations. Prerequisites or corequisites: 5110-20-30 and 5210-20-30 or consent of instructor.

6510-20-30 Modern Algebra (3, 3, 3) Intensive study of some major branches of algebraic subject. Major subject will vary according to interests and preparation of students. Prerequisites: 5510-20-30.

6540-50-60 Theory of Semigroups (3, 3, 3) Conjugations and endomorphisms; ideal theory; representations, decompositions of operators, polynomials; extension of functional analysis, regular, inverse, simple, and completely simple semigroups. Prerequisites: 5560.

6670 Theory of Groups (3) Structure of groups, free groups, homomorphisms and isomorphisms, free groups, quotients, and subgroup structure. Prerequisites: 5560.

6990 Seminar (3) May be taken for S/N or letter grade.

NOTE: Registration for seminars may be repeated with consent of department.

6999 Seminar (1-3)
literature. Subject matter varies according to inter-
ests and preparations of students. Prereq or coreq: 2610 or 4610, 4150-60, and 5110-20-30 or 5210-20-30 or consent of instructor.


6810-20-30 Topological Algebra (3, 3, 3) Topics chosen from topological semigroups, topological groups, Lie groups; transformation groups; topological lattices; relations in topological spaces; topological rings, fields, algebras. Prereq or coreq: 5810-20-30.

6910-20-30 Modern Topology (3, 3, 3) Technical background to current literature in topology. Topics vary from year to year.

6940-50-60 Introduction to Algebraic Topology (3, 3, 3) Homology, cohomology, and homotopy theories. Homology and cohomology groups, the Eilenberg-Steenrod axioms, cup and cap products, duality theorems, homotopy equivalence, higher homotopy groups, fiber spaces, spectral sequences. Prereq: 4160 and 5390.

6991 Seminar Analysis (1-3)
6992 Seminar Topology (1-3)
6993 Seminar Algebra (1-3)
6994 Seminar Foundations (1-3)
6995 Seminar Applied Mathematics (1-3)
6996 Seminar in Numerical Mathematics (1-3)

NOTE: Registration for 6000-level courses may be repeated with consent of department.

Microbiology

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

Professors:
A. Brown (Head), Ph.D. Chicago; W. Beck, Ph.D. Wisconsin; J. MacKenzie, Ph.D. Wisconsin; T. C. Montie, Ph.D. Maryland; J. O. Mundy, Ph.D. Michigan State; W. S. Rigby, Ph.D. Yale; R. V. Miller, Ph.D. Illinois.

Associate Professors:
B. T. Ross, Ph.D. McGill (Canada); J. M. Woodward, Ph.D. Kansas; C. J. Wust, Ph.D. Illinois; L. E. Stimson, Ph.D. Iowa.

Lecturers:
R. J. Courtney, Ph.D. Syracuse; R. V. Miller, Ph.D. Illinois.

Professors:
D. Boren, Ph.D. Cornell; D. A. Brian, Ph.D. D.V.M. Michigan State; G. S. Sayler, Ph.D. Idaho.

Lecturers:

Students planning to major in Microbiology are expected to present, as undergraduate prerequisites, a minimum of one year of biology, one year of mathematics including calculus, and two years of chemistry and one year of physics.

The student's dissertation committee determines whether a foreign language is required for the doctoral degree.


3819 Food Bacteriology Laboratory (2) Laboratory methods for examination, cultivation, and identification of bacteria associated with food fermentation and food spoilage. Prereq: 2919 or 3519. Coreq: 3810.

3820 Yeast and Molds (3) Morphology, taxonomy, and physiology of yeasts, actinomycetes, and fungi of industrial importance. Prereq: 2910 or 3700, or consent of instructor.

3829 Yeasts and Molds Laboratory (2) Laboratory methods for examination and cultivation of yeasts and molds. Prereq: 2919 or 3519. Coreq: 3820.

5110 Physiological Microbiology (3) Modern concepts of bacterial physiology and metabolism including cell structures and function. Prereq: 3700 and 12 hrs of organic chemistry. Prereq or coreq: 5410. W

5119 Bacterial Physiology Laboratory (2) Prereq: 3519. Coreq: 4110. W

5120 Taxonomy of Bacteria (3) Bacterial classification. Prereq: 3700 and 3519. F

5140 Molecular Genetics (3) Transmission and expression of genetic information at the molecular level. Emphasis is on bacterial and viral systems, but unique features of eukaryotic genetic systems are included. Prereq or coreq: 5110-20. W

5140 Techniques in Microbial Genetics (2) Practical experience in basic techniques in experimentation in microbial genetics. Coreq: 4140. Sp

5150 Microbial Ecology (3) Application of ecological principles to study of microbial communities. Emphasis on functional role of microorganisms in natural environments. Prereq: 3700, 1 yr of organic chemistry, Biochemistry 3130, or consent of instructor. Sp

5159 Experimental Microbial Ecology (3) Specific techniques for assessment of microbial forms, functions, activities, and interactions in a variety of habitats. Prereq: 4150 or consent of instructor. 1 hr and 2 labs. Sp

4270 Immunology (3) Principles of inflammation and immunity, immunoglobulin structure and theory of formation, complement, hypersensitivities, cell cooperation in immune mechanisms, abnormalities of the immune system. Prereq: Biology 3120. [Same as Zoology 4270.] F

4279 Advanced Immunology Laboratory (2) Laboratory exercises designed to accompany 4270. Prereq or coreq: 4270. F

4320 Pathogenic Bacteriology (3) Disease producing microorganisms including bacteria, rickettsia, and chlamydia. Prereq: 3200. Coreq: 4320. W

4329 Pathogenic Bacteriology Laboratory (2) Techniques for isolation, cultivation, and identification of pathogenic bacteria. Prereq: 3200. Coreq: 4329. W

4330 Medical Mycology (3) Disease-causing fungi: cytology, physiology, pathogenesis and immunity; emphasis on methodology of isolation and identification. Prereq: 3700. Sp

4350 Medical Mycology Laboratory (2) Laboratory procedures for isolation, handling and culturing of animal viruses. Prereq: 3519. Coreq: 4350. W

5000 Thesis (1-5) E

5002 Non-Thesis Graduation Completion (3-15) E

5011-12-13-14-15-16 Mini-course in Microbiology (1, 1, 1, 1, 1, 1) Selected, advanced topics in microbiology. Concentrated in time and subject matter. Consult departmental listing for topics offered. Prereq: as posted. May be repeated. Maximum 9 hrs. S/NC only.

5130 Topics in Taxonomy (3) Isolation, cultivation and taxonomic relationships of schizomycetes, emphasis upon less frequently encountered orders. Prereq: 4130. 3 labs.

5310 Selected Topics in Microbiological Research (3) Literature survey of laboratory methods for development and interpretation of microbiological research. May be repeated.

5350 Advanced Microbiology for Secondary Education Instructors (4) Major bacterial populations encountered in natural habitats; laboratory methods for isolation and characterization of naturally occurring microorganisms. Prereq. Consent of instructor and interest in microbiology. Not for degree credit in microbiology. Su

5360 Topics in Immunology and Immunoh chemistry (4) Molecular and cellular aspects of host-microorganism interaction. Theoretical and practical exercise in immunohemistry. Prereq: 4270. Biochemistry 4110-20 or consent.

5411-42-43-44-45-46 Clinical Microbiology (6, 6, 6, 6, 6) Six quarters, 6 hrs each consisting of lectures and clinical laboratory experience. Enrollment by consent of instructor.

5510-20-30 Research Problems (3, 3, 3)

5720 Microbial Physiology (3) Lectures and seminars dealing with current advances in bacterial physiology including growth and cell structure. Prereq: Biochemistry 4110-20. E

5730 Pathogenesis of Infectious Disease (3) Host response to infection. Derangement of host-bacterium synthesis stimulated by microbial invasion, exotoxins, endotoxins, and bacterial release factors related to virulence. Alteration of genetic and hormonal controls resulting from progressive infection. Prereq: 4250. W

5750 The Oncogenic Viruses (3) Lectures and special laboratory exercises dealing with known tumor-inducing viruses. Prereq: 4430 or consent of instructor. F

5760 The Bacterial Viruses (2) Lectures and discussions dealing with viral diseases with emphasis on the biological and chemical consequences of bacterial infection. Laboratory supplemented by readings from literature. Prereq: 4430. Biochemistry 4110-20.

5819 Molecular Genetics Laboratory (3) Principles and methods of research in molecular genetics. Fundamental genetics concepts (mutation, complementation, recombination) at molecular level. Studies of lactose operon of Escherichia coli. Prereq: 4140 and Biochemistry 4110-20 or consent of instructor.

5820 Microbiology of Foods (3) Lectures and seminars dealing with current advances and selected topics in food microbiology. Emphasis upon less frequently encountered orders. Prereq or coreq: 4110-20. W

5829 Food Microbiology Laboratory (2) Laboratory exercises designed to accompany 5820. Prereq or coreq: 5820. F

6000 Doctoral Research and Dissertation (3-15) E

6310 Seminar in Immunology (1) Readings and discussions based on current literature. Prereq: May be repeated. S/NC only.

6330 Seminar in Microbial Pathogenesis (1) Readings and discussions based on current literature. Prereq: May be repeated. S/NC only. E, F, W

6330 Seminar in Microbial Physiology (1) Readings and discussions based on current literature. Prereq: May be repeated. S/NC only. E, F, W

6340 Seminar in Microbial Genetics (3) Readings and discussions based on current literature. May be repeated. S/NC only. E, F, W

6350 Seminar in Virology (1) Readings and discussions based on current literature. May be repeated. S/NC only. E, F, W

6360 Seminar in Filamentous Fungi (1) Readings and discussions based on current literature. May be repeated. Maximum 9 hrs. S/NC only. E, F, W.
The Department of Music offers the degrees of Master of Music with concentrations in theory, choral conducting, Suzuki string technique, and piano literature, and the Master of Arts with a major in Music with concentrations in theory and musicology.

Applicants for these degree programs must have completed an undergraduate degree approximately equivalent in music requirements to those required in degrees concentrated in performance, composition, theory, choral conducting, Suzuki string techniques, and piano literature, and the Master of Arts with a major in Music with concentrations in theory and musicology.

Applicants who plan to pursue the degree in performance (applied music) are required to audition in their appropriate area committee. Applicants for admission to the program in composition must submit scores and tape recordings of representative works. All applicants are required to take the Diagnostic Examinations in music theory and music history and literature.

General requirements for the Master's degree begin on page 19 of this catalog.

THE MASTER OF MUSIC PROGRAM
Voice: 45 hours distributed as follows: (a) 12 hours in applied music, (b) 6 hours in vocal music, (c) 3 hours in music history/literature or music theory, (d) 6 hours in vocal pedagogy, and (e) 3 hours in recital or lecture-recital, (f) 3 hours in ensemble, and (g) 12 hours in elective (excluding pedagogy and ensemble).

Piano: 45 hours distributed as follows: (a) 12 hours in applied music, (b) 9 hours in piano literature and/or pedagogy, (c) 3 hours in music research, (d) 6 hours in music theory, (e) 3 hours in recital, (f) 6 hours in history/literature, and (g) 3 hours in recital.

Piano Literature: 45 hours distributed as follows: (a) 12 hours in applied music, (b) 6 hours in organ literature and/or pedagogy, (c) 3 hours in music research, (d) 9 hours in music theory, (e) 3 hours in recital, (f) 6 hours in music history/literature, and (g) 6 hours in music electives.

Strings: 45 hours distributed as follows: (a) 12 hours in applied music, (b) 6 hours in area literature, (c) 3 hours in advanced conducting, (d) 3 hours in research techniques, (e) 6 hours in ensemble, (f) 3 hours in theory, (g) 3 hours in recital, and (h) 12 hours in music electives.

Organ: 45 hours distributed as follows: (a) 12 hours in applied music, (b) 6 hours in organ literature and/or pedagogy, (c) 3 hours in music research, (d) 9 hours in music theory, (e) 3 hours in recital, (f) 3 hours in ensemble or accompanying, and (g) 6 hours in music electives.

Musical History/Literature, and (g) 6 hours in music electives.

The MASTER OF ARTS PROGRAM
Music Theory: 45 hours distributed as follows: (a) 18 hours in theory, (b) 3 hours in music research, (c) 6 hours in music history/literature, (d) 9 hours in thesis, and (e) 6 hours in electives.

Research Techniques, (d) 6 hours in ensemble, and (f) 3 hours in choral literature.

Suzuki String Techniques: 45 hours distributed as follows: (a) 12 hours in applied music, (b) 6 hours in Suzuki literature/techniques, (c) 3 hours in music research, (d) 9 hours in music history/literature, (e) 6 hours in ensemble, (f) 3 hours in choral conducting, and (g) 12 hours in electives.

Suzuki String Techniques: 45 hours distributed as follows: (a) 12 hours in applied music, (b) 6 hours in Suzuki literature/techniques, (c) 3 hours in music research, (d) 9 hours in music theory, (e) 3 hours in recital, (f) 6 hours in ensemble, and (g) 12 hours in electives.

THE MASTER OF ARTS PROGRAM
Music Theory: 45 hours distributed as follows: (a) 18 hours in theory, (b) 3 hours in music research, (c) 9 hours in music history, (d) 6 hours in thesis, and (e) 6 hours in electives.

Musicology: 45 hours distributed as follows: (a) 21 hours in music history/literature, (b) 3 hours in music

research, (c) 6 hours in theory, (d) 9 hours in thesis, and (e) 6 hours in electives.

A reading knowledge of French or German must be demonstrated by candidates for the Master of Arts degree.

Specific course requirements will be prescribed by the department for all degree programs and elective courses must have the approval of the student's advisor.

4085 Harpsichord Technique (1) Techniques, literature, performance practice, continuo playing, and basic tuning and maintenance. Requires a thorough keyboard background. Prereq: Consent of instructor. Maximum 3 hrs. May be repeated.

4111-25-31-41 Analysis of Music Literature (3, 3, 3, 3) Detailed examination of music compositions by historical period with emphasis on harmony, thematic development, form, and the music of contemporary analytical techniques. 4111—1600—1750, 4121—1750—1825, 4131—1825—1900, 4141—1900 to present. Prereq: 3123.

4112 Twentieth-Century Compositional Techniques (1) Techniques, literature, performance practice, and compositional devices from Debussy to present. Analysis of scores; idiomatic writing. Prereq: 2131 or equivalent.

4113 Pedagogy of Music Theory (3) Techniques, materials, and materials involved in college-level theory programs. Prereq: Consent of instructor.

4114 Stage Band Arranging (3) Analysis of scores and scoring for the stage band. Prereq: 3112 and consent of instructor.
Philosophy

MAJOR Philosophy MA, M.A., Ph.D.

Professors: J. W. Davis (Head), Ph.D. Emory; L. B. Cebik, Ph.D. Nebraska; N. Edwards, Ph.D. Emory; M. H. Moore (Emeritus), Ph.D. Chicago; D. Van de Vate, Jr., Ph.D. Yale.


Assistant Professors: J. E. Bennett, Ph.D. Tulane; S. H. Cohen, Ph.D. Northwestern; K. A. Emmett, Ph.D. Ohio State; W. J. Foxes, Ph.D. Northwestern; H. P. Hamlin, Ph.D. Georgia; R. Jones, Ph.D. Chicago; M. S. Osborne, Ph.D. Tennessee; S. Rassen, Ph.D. California (Berkeley).

THE MASTER'S PROGRAM

See general requirements on page 19. Courses below 4000 may not be taken for graduate credit by philosophy majors except with special permission.

THE DOCTORAL PROGRAM

Specific requirements for doctoral students in Philosophy include a minimum of three academic years of graduate study involving at least 72 quarter hours credit in course work (normally 24 quarter courses or their equivalent, exclusive of credit for the thesis and dissertation) of which not less than 45 shall be in courses numbered over 5000, and of which at least 9 shall be in a subject other than philosophy. The specific number and distribution of courses will be determined by the student's faculty committee.

Two foreign languages, normally French and German, are required. As an alternative to the two-language requirement, candidates for the Ph.D. may elect to demonstrate a substantially more advanced proficiency in reading knowledge of one language. Requirements for this option may be obtained in the department office.

Registration in any course in the 5000 or 6000 series (except 5050 and 5910-20-30) may be repeated for credit with the consent of the department. That is, courses having the same number, but with different subject matter, may be taken with each separate subject description.

MEDICAL ETHICS

The department has an M.A. and Ph.D. program of graduate study with a concentration in medical ethics. Details concerning the program can be obtained from the department.

RELIGIOUS STUDIES

The department has an M.A. program of graduate study with a concentration in philosophy of religion and other religious studies. Details concerning the program can be obtained either from the Departments of Philosophy or Religious Studies.

3111 Ancient Western Philosophy (4) F, W
3121 Medieval Philosophy (4) F, Sp
3131 Seventeenth- and Eighteenth-century Phi-
losophy (4) E
3141 Nineteenth- and Early Twentieth-century Phi-
losophy (4) F, Sp
3151 Contemporary Philosophy (4) Survey of recent movements in philosophy. F
3270 Russian Philosophical and Theological Thought (4) (Same as Religious Studies 3270 and Russian 3270).

3311-12 American Philosophy (4, 4) 3311-Colonial to late nineteenth century. 3312-Late nineteenth century to present. W: Sp
3320 Philosophy of Law (4) Nature, sources, function of law. F
3330 Philosophy of History (4) Speculative and critical aspects of the philosophy of history. A
3410 Philosophical Ideas in Literature (4) Philosophical assumptions and implications in major literary works. F, W
3420 Philosophy of Literature (4) Study of the nature, functions, value and epistemic principles of literary arts. A
3430 Concepts of Woman (4) Examination of some of the theoretical foundations of feminism and anti-
 feminism. F, W: Sp
3440 Social Ethics (4) Ethical theory as related to politics, economics, law, religion and the family. F
3510 Existentialism (4) E
3550 Marxism as Philosophy (4) W
3650 Philosophy and Religion in India (4) (Same as Religious Studies 3660.) F
3660 Buddhist Philosophy and Religion (4) (Same as Religious Studies 3660.) W
3671 Religion and Philosophy in China (4) (Same as Religious Studies 3671.) F
3690 Philosophy of Religion (4) Analysis of basic issues of religion. (Same as Religious Studies 3690.) F, Sp, Su
3740-50 Conceptual History of Science (4, 4) 3740-The Scientific Revolution: historical evolution of thought in astronomy, mechanics and philosophy of nature up to Newton. 3750-The development and decline of Newtonian science: historical evolution of thought on the nature of matter and of light, and on that of life. Prereq: 8 hrs of physical science or consent of instructor. F: W
3770 Introduction to Philosophy of Science (4) Standard topics in philosophy of science: scientific method, nature of laws and theories, problems of induction, explanation, measurement. No background in logic presupposed. F
3810 Introductory Symbolic Logic (4) Techniques for formal analysis of deductive reasoning (propositional logic and quantification theory.) Sp
3910 Contemporary Aesthetics (4) Philosophical discussion of contemporary art. F, W, Sp
4000 Special Topics (4) A student- or instructor-initiated course may be offered at convenience of department. Subject matter to be determined by mutual consent of students and instructor with approval of department. Prerequisites to be determined by department. May be repeated.
4111-21 Modern Religious Philosophies (4, 4) (Same as Religious Studies 4111-21.)
4310 Intermediate Ethics (4) Topics in metaethics or ethics. Sp
4370 Theoretical Issues in Medical Ethics (4) Prereq: 3130 or 3611 or consent of instructor. (Same as Religious Studies 4370.) Sp
4410 Plato (4) Prereq: 8 hrs philosophy or consent of instructor.
4420 Aristotle (4) Prereq: 8 hrs philosophy or consent of instructor. A
4450 Continental Rationalism (4) Prereq: 8 hrs philo-
osophy or consent of instructor. A
4460 British Empiricism (4) Prereq: 8 hrs philosophy or consent of instructor. A
4470 Kant (4) Prereq: 8 hrs philosophy or consent of instructor. A
4480 Advanced Topics in Existentialism and Phenomenology (4) Prereq: 8 hrs philosophy or consent of instructor.
4510 Intermediate Symbolic Logic (4) Axiomatic development of propositional calculus and first-order functional calculus. Prereq: 3610 or equiva-

4511 Advanced Topics in Logic (4) Prereq: Consent of instructor.
4610 Philosophic Analysis (4) Prereq: 8 hrs philo-
osophy or consent of instructor.
4620 Philosophy of Mind (4) Problems of mind and body in relation to consciousness and personal identity. Prereq: 8 hrs philosophy or consent of instructor.
4630 Philosophy of Language (4) Prereq: 8 hrs phi-
losophy or consent of instructor.
4710 Philosophy of Natural Science (4) Considera-
tion of standard topics pertinent to natural science including reduction of theories and teleological ex-
planation. Familiarity with symbolic logic is recom-

4720 Philosophy of Social Science (4) Examination of methods of inquiry and modes of explanation in social sciences. Prereq: 3770 or 2 yrs social science.
4810 Metaphysics (4) Prereq: 8 hrs philosophy or consent of instructor.
5000 Thesis (1-15) E
5050 Symbolic Logic (4)
5080 Philosophy of Logic (4) Nature of logic; episte-

5101 Foreign Study (1-12) See page 95. E
5102 Off-campus Study (1-12) See page 95. E
5103 Independent Study (1-12) See page 95. E
5110-20-30-40-50-60 Studies in the History of Euro-

5355 Orientation to Medical Ethics (4) Survey of ethical theories in application to issues in medical ethics. (Same as Religious Studies in 5355.) F
5398 Applied Ethical Theory (4) Single author, tradi-

tion, or logic in ethical theory with special attention to application to issues in health, business, technol-
ogy, ecology, and other practical fields. (Same as Religious Studies 5365.) W
5370 Topics in Medical Ethics (4) Prereq: 4370-71 or consent of Medical Ethics Committee.
5375 Clinical Practicum Orientation (4) Medical terminology, history of medical ethics; preparation for UT Center for the Health Sciences Clinical Prac-
ticum. Sp
5410 Philosophy of History (4) Theories of history and historical processes.
5430 Philosophy and Literature (4) Mutual influ-

5510-20 Studies in Epistemology (4, 4) 5510-
Modern rationalism: Descartes, Spinoza, Leibniz, 5520—Modern empiricism: Locke, Berkeley, Hume.
5550-60 Philosophy of Science (4, 4) Nature of sub-

5610 Recent Developments in Philosophy of Reli-


6550 Seminar in Philosophy of Science (4)
6950 Advanced Residence in Medical Ethics (4-12)
Prereq: Consent of Medical Ethics Committee. Open only to students concentrating in medical ethics. S/NC only.

Physics and Astronomy

The Physics Department has two Master's degree programs—thesis and non-thesis.

**THE MASTER'S PROGRAM**

The Physics Department has two Master's degree programs—thesis and non-thesis.

**THE NON-THESIS PROGRAM** is primarily designed for students intending to teach in colleges or universities on the elementary or intermediate level, or for students specifically intending to seek the MS degree in physics.

The requirements for the M.S. degree in physics include the satisfactory completion of 45 hours of coursework composed of 27 hours from courses numbered above 5000 (e.g., 5110-20-30, 5210-20-30, 5310-20-30, 5610-20-30 and appropriate courses in related fields. Each candidate must present an acceptable thesis, equivalent to 9 hours of credit, and pass an oral examination on course material and thesis.

The non-thesis program includes a thesis program that is primarily intended for students intending to teach in colleges or universities on the elementary or intermediate level, or for students specifically intending to seek the M.S. degree in physics. The requirements for the M.S. degree in physics include the satisfactory completion of 45 hours of coursework composed of 27 hours from courses numbered above 5000 (e.g., 5110-20-30, 5210-20-30, 5310-20-30, 5610-20-30 and appropriate courses in related fields. Each candidate must present an acceptable thesis, equivalent to 9 hours of credit, and pass an oral examination on course material and thesis.

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The Physics Department has two Master's degree programs—thesis and non-thesis.

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20-30 or 2210-20-30 and calculus. 3 labs. F, W.

3630 Nuclear Electronics Laboratory (3) Elementary circuits of interest in nuclear instrumentation are designed and built, and their characteristics are tested by a function of various parameters. Prereq: 3610-20.

3710-20-30 Introduction to Atomic and Nuclear Physics (3, 3, 3) 3710-Special relativity and early quantum mechanics; 3720-Elementary atomic and molecular physics; 3730-Nuclear physics. Prereq: Mathematics 2860 and Physics 2320 for 3710; 2338 or 3710 for 3720-30. E

4040 Foundations of Physics (3) Selected topics from history and philosophy of classical and modern physics. Prereq: 1 yr general physics and consent of instructor. Required of MACT candidates. Sp

4110-20-30 Introduction to Quantum Mechanics (3, 3, 3) Introduction to fundamental principles of quantum mechanics and methods of calculation. Application to atomic, molecular, and nuclear physics. Prereq: 2330 or equivalent, Mathematics 4500. F, W, Sp, or W.

4140 Elementary Nuclear Physics (3) General properties of nuclei, two-nucleon systems, nuclear forces, nuclear models, nuclear reactions, nuclear disintegrations and beta-decay, nuclear spin and magnetism. Prereq: 3730 or 4120. Sp

4180 Physical Acoustics (4) Considerations fundamental to acoustics; propagation of acoustic waves in the in-frasonic, the auditive, and the ultrasonic ranges of frequencies. Prereq: 3210-20, 3220, 3 hrs and 1 lab. F

4210-20-50 Electricity and Magnetism (3, 3, 3) Intermediate level electrostatics; steady and alternating currents; laws of electromagnetism; Maxwell’s equations; radiation of electromagnetic waves; reflection and refraction; electromagnetic fields of moving charges. Must be taken in sequence. Prereq: 2320 or 2220 and Mathematics 2830. F, Sp. Prf, or Sp.

4230-40 Modern Optics (4, 4) Geometrical Optics: Reflection and transmission of light at a dielectric interface, paraxial theory of interfaces, lenses, and mirrors; thick lenses, lens systems, ray tracing; polarization; imagery; laser light. 4240-Physical Optics: Mathematics of wave motion, superposition of waves, interference; Fraunhofer and Fresnel diffraction; Fourier optics; holography. Prereq: 4210 or consent of instructor. 3 hrs and 3 hrs lab. F, W.


4540 Experimental Methods of Infrared and Raman Spectroscopy (3) Experimental equipment; instrumental optics; detection systems; analytical methods. Analysis vibrating-rotating diatomic molecule. Prereq: 4130 or equivalent. F


5450 Principles of Nondestructive Testing (3) Detection and characterization of discontinuities in materials by nondestructive physical measurements. Ultrasonic, electromagnetic, holographic and penetrant radiating techniques are discussed. Prereq or consent of instructor. (Same as Engineering Science 4580.) W


5640 Numerical Methods in Physics (3) Numerical methods for solving mathematical problems, pointed toward use of automatic computing machinery; analysis of errors. Prereq: 5610-20, or consent of instructor. (Same as Mathematics 5610-20.) F, W

5720 Physics of Polyatomic Molecules (3) Introduction to electronic structure of molecules and physical processes of fluorescence of these molecules; theoretical and experimental aspects of intermolecular and intramolecular electronic excitation energy transfer and charge transfer; application of excitation energy transfer and charge transfer in such field as organic molecular reactivity and organic scintillation. Prereq: 5210-20 or consent of instructor. F, W

5910-20-30 Special Problems (3, 3, 3) Specially assigned problems of a theoretical or experimental nature having wide coverage. Topics may be assigned in special fields or on special projects. Prereq: 2300-20-30 and either 5400-20 or 5410-20. Electrical Engineering 5310-20. 5310-20. 5310-20. F

6000 Doctoral Research and Dissertation (1-5) E


6210-30-30 Nuclear Structure (3, 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: 5210-20. W

6310 Electromagnetic Theory of Light (3) Classical electron theory including theories of the breadth, dispersion and absorption; scattering of light and x-rays, relativistic and magnetic properties of waves and solids. Optical properties of electromagnetic waves in sporic media including reflection, refraction, polarization and also theory of diffraction. Prereq: 5410-20-30. Su

6320 Special Relativity (3) Lorentz transformation; Einstein postulates; relativistic tensors; relativistic mechanics; relativistic electrodynamics. Prereq: 5310-20-30, 5410-20-30, 6310. F

6330 General Relativity (3) Tensor calculus; general theory of relativity; gravitational field equations. Prereq: 6330. W

6420 Advanced Topics in Classical Theory (3) To meet special needs of students. Possible topics: advanced dynamics and hydrodynamics, electrodynamics, statistical mechanics, including theory of nonequilibrium processes. Prereq: 5310-20-30, 5410-20-30, 5510-20-30. May be repeated with consent of department.

6430 Advanced Topics in Quantum Theory (3) To meet special needs of students. Possible topics: angular-momentum theory, beta-ray theory, theory of x-rays, electromagnetic radiation, electron theory, theory of radiation, electric and magnetic susceptibilities, high energy processes, scattering and collision processes, theory of fields. Prereq: 6110-20-30. May be repeated with consent of department.

6500-10 Electrical Conduction in Gases and Plasma Physics (3, 3) Electrical conduction in gases at high and low pressures. Characteristics of spark, arc and glow discharge. Collective phenomena in a plasma, plasma oscillation magnetohydrodynamics, instabilities. Topics of current interest in astrophysics, geophysics and thermonuclear research. Prereq: 5310-20-30 and either 5410-20-30 or Electrical Engineering 5310-20. (Same as Electrical Engineering 6500-10.) F

6610 Interaction of Radiation with Gases (3) Interaction with and artificial experimental with atoms and molecules; oscillator strength, interaction of charged particles with atoms and molecules; ionization; photoionization and charged particle interaction, transport and capture; electron swarm and electron beam experiments. Prereq or coreq: 6100-20. F, W

6620 Interaction of Electrons with Solids (3) Collisions with free electrons; stopping power; electron slowing down spectra; energy straggling; nuclear scattering; electron diffusion; plasmon effects in ir
radiation, solid-state techniques in electron spectroscopy, applications to dosimetry. Prereq or coreq: 6110-20-30. W


6810 Vibrational Problems in Molecular Spectra (3) Normal coordinates and potential functions; group theoretical methods and selection rules in gases and condensed phases. Laser ammonia spectroscopy and nonlinear electrooptical phenomena. Prereq: 5420 or equivalent. (Same as Chemistry 6810.)

6820 Molecular Vibration-Rotation Theory (3) Molecular vibration and rotational systems possessing specific symmetry properties; quantum mechanical theory of symmetric and asymmetric molecules; vibrations and rotation interactions; molecular transition intensities and energies of molecular transitions; methods of analysis used in high resolution molecular spectroscopy. (Same as Chemistry 6820.)

Political Science

MAJORS

DEGREES

Political Science

M.A., Ph.D.

Public Administration

M.P.A.

Professors:

T. U. Ungs (Head), Ph.D. Iowa; R. S. Avery (Emeritus), Ph.D. Northwestern; R. S. Avery, Ph.D. New York; S. M. Robinson, Ph.D. Syracuse; M. Robinson, Ph.D. Syracuse; R. S. Avery, Ph.D. New York; S. M. Robinson, Ph.D. Syracuse; M. Robinson, Ph.D. Syracuse; T. A. Smith, Ph.D. Columbia; G. J. Rathjen, Ph.D. Wisconsin; V. R. Iredell, Ph.D. Chicago; D. D. Nimmo, Ph.D. Vanderbilt; H. Piass, Ph.D. Utah; N. M. Robinson, Ph.D. Syracuse; O. H. Stephens, Ph.D. Johns Hopkins; D. M. Welborn, Ph.D. Texas.

Associate Professors:

R. B. Cunningham, Ph.D. Indiana; J. Dodd, Ph.D. Tulane; A. Elliott, Ph.D. Columbia; O. Evans, Ph.D. Johns Hopkins, Ph.D. Syracuse; W. Lyons, Ph.D. Oklahoma; W. Lyons, Ph.D. Oklahoma; R. L. Peterson, Ph.D. Yale; G. J. Rashin, Ph.D. Michigan State; T. McN. Simpson, Ph.D. Johns Hopkins; T. A. Smith, Ph.D. Ohio State.

Assistant Professors:


Registration in any courses in the 5000-6000 series may be repeated for credit with consent of the department.

THE BUREAU OF PUBLIC ADMINISTRATION

The University maintains in the College of Liberal Arts a Bureau of Public Administration for the purpose of promoting sound governmental administration through research, publication, and consultation. The staff is as follows: Professor Ungs (director); Professors Cunningham, Lyons, and Fitzgerald; Freeman (assistant professors); Research Associates Durant, Koehler.

THE MASTER'S PROGRAM

See general requirements on page 19.

MASTER'S IN PUBLIC ADMINISTRATION

Specific requirements for graduation include:

1. The completion of 54 quarter hours of approved graduate courses.
2. At least fifty percent of the credit hours must be approved courses numbered 5000 and above.
3. Demonstration of command of the material covered in course work through a written comprehensive examination which may be followed by oral examination.
4. The 54 quarter hours of graduate courses comprise 30 quarter hours of core courses which focus upon general perspectives, analytical skills, and management skills, a recommended internship arranged with a cooperating public agency (9 quarter hours), and 15 quarter hours in an elective specialized track developed by the student with the approval of the coordinator of the M.P.A. program. The specialized track will often contain a mix of courses from political science and one or more outside fields; examples include general government, public health administration, fiscal administration, crime administration, administration of criminal justice, urban administration, environmental and natural resources administration. Inquiries concerning all programs should be directed to the Department of Political Science, Knoxville, Tennessee 37916.

THE DOCTORAL PROGRAM

Specific requirements for the degree of Doctor of Philosophy in Political Science include:

1. A minimum of 117 quarter hours, following the Bachelor's degree, is required. At least 93 hours shall be in political science. At least 72 hours in political science must be graduate level hours (i.e. earned in 5000-6000 level courses). At least 45 of these graduate level hours shall be at the 6000 level. This figure includes 36 hours of credit for the dissertation.

2. Each Ph.D. candidate must pass an examination in one foreign language. Students specializing in areas which may be required to demonstrate knowledge of a second language or appropriate research tools or both.

3. Admission to candidacy shall be based on written and oral preliminary examinations which must be passed not later than three quarters before the date on which the degree is granted.

4. The candidate must pass a final oral examination on the dissertation.

5. Successful completion of the degree also depends on course performance and other evidence of professional interest and conduct.

3545 United States Constitutional Law: Sources of Power and Restraint (4) Analysis of judicial review. Constitutional sources of power and restraint. Constitutional powers of President and Congress, the Supreme Court, and in the states. Federalism, sources of regulatory authority, and constitutional protection of political rights. Recommended prerequisite: 2510-20. F.


3550 Minority Group Politics in the United States (4) Content varies; 15 quarter hours may be repeated with consent of department. Maximum 8 hrs. W

3555 Introduction to Public Administrative Organization and Management (4) Organization and decision-making theory, line and staff services, political and management problems associated with policy formulation, administrative responsibility. Recommended prerequisite: 2510-20. (Same as Water Resources Development.)

3560 Public Administration and the Policymaking Process (4) Public bureaucracies and the policymaking process, their political environments, administrative and political problems associated with policy making. Recommended prerequisite: 2510-20. F, W, Sp

3605 Political Change in Developing Areas (4) Characteristics and problems of political changes with primary focus on developing areas. F, Sp

3615-16 Dynamics of Black African Politics (4, 4) W, F

3621 Contemporary China and Japan (4)

3622 Contemporary South and Southeast Asian States (4) Analysis of selected states, with emphasis on problems of development. 4

3625-26 Latin American Government and Politics (4, 4) Sp

3631-32 Government and Politics of the Soviet Union (4, 4) F, W

3635-36 Politics in Western Democracies (4, 4) Political culture, patterns, and institutions of Western democratic systems. F, Sp, A, W

3641 Government and Politics of Middle East and North Africa (4)

3710 State Politics (4) Focus on formal and informal setting of state government; governors, courts, legislatures, and state administrators. Attention will be paid to state government's role in formulating, enacting, and implementing state policy. F

3720 State Government and Policy Making (4) Nature and functions of the institutions of state government; governors, courts, legislatures, and state administrators. Attention will be paid to state government's role in formulating, enacting, and implementing state policy. W

3750 The Urban Policy (4) Analysis of political institutions and processes in metropolitan areas. W

3760 Urban Policy Process (4) Analysis of urban problems and policies in metropolitan areas. Sp

3796 Contemporary Problems of Soviet Foreign Policy (4) Sp

3801 Studies in Ancient Political Thought (4) Classical Greek and Roman political thought. F

3802 Studies in Medieval Political Thought (4) From Augustine to Luther: emphasis on problems and theories of religion and politics. W or Sp

3803 Studies in Early Modern Political Thought (4) Machiavelli through Locke. W

3804 Studies in Nineteenth- and Twentieth-century Political Thought (4) Political theories of industrial and technological societies; nineteenth and twentieth centuries. Sp

3880 American Political Thought (4) Examination of role of selected political ideas, doctrines, and themes in America; emphasizing their development and relationships to diverse political interests. Sp

4000 Revolution (4) Characteristics, theories, and consequences of revolution, with particular focus on left-wing revolutions and movements. W

4410 Law and the Administrative Process (4) Powers of, procedures of, controls over administrators. W

4535-36 Political Attitudes, Opinions and Communication (4, 4) Nature, development, and distribution of political attitudes and opinions; role of leadership, persuasion, and communication in opinion-policy process. F, W

4540-50 Presidency, Congress and Public Policy (4, 4) The President's role in the political process within framework of policy-making process. W, Sp

4544-46 The Judicial Process (4, 4) The study of courts as components of political systems, and public policy formulation through judicial decision-making
4575 Special Topics in United States Government and Politics (4) May be repeated with consent of department. Maximum 8 hrs.

4610 Budgetary Process (4) Fiscal planning, budget and expenditure processes in government, their policy and administrative implications. F or Sp.

4620 Public Personnel Administration (3) Development of the merit system in government, career systems, public personnel management functions, organization for personnel management. F or W.

4665-66 Policy Making in Democracies (4, 4) Comparative approaches to theory and process of making public policies. For Sp; W.

4727 Politics of Inter-American Relations (4) Sp

4701-02 International Organization (4, 4) The department. Maximum 8 hrs.

4701-02 International Organization (4, 4) The League of Nations and the United Nations. 4702-4703

4711 International Law (4)

4727 Politics of Inter-American Relations (4) Sp

4730 Policy Making in Democracies (4, 4) Com.


4711 International Law (4)

4727 Politics of Inter-American Relations (4) Sp

4730 Policy Making in Democracies (4, 4) Com.


4711 International Law (4)

4727 Politics of Inter-American Relations (4) Sp

4730 Policy Making in Democracies (4, 4) Com.


4711 International Law (4)

4727 Politics of Inter-American Relations (4) Sp

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4727 Politics of Inter-American Relations (4) Sp

4730 Policy Making in Democracies (4, 4) Com.


4711 International Law (4)

4727 Politics of Inter-American Relations (4) Sp

4730 Policy Making in Democracies (4, 4) Com.


4711 International Law (4)

4727 Politics of Inter-American Relations (4) Sp

4730 Policy Making in Democracies (4, 4) Com.


4711 International Law (4)

4727 Politics of Inter-American Relations (4) Sp

4730 Policy Making in Democracies (4, 4) Com.


4711 International Law (4)

4727 Politics of Inter-American Relations (4) Sp

4730 Policy Making in Democracies (4, 4) Com.


4711 International Law (4)

4727 Politics of Inter-American Relations (4) Sp

4730 Policy Making in Democracies (4, 4) Com.


4711 International Law (4)
The Psychology Department emphasizes doctoral degree programs with specializations in clinical, school, community, developmental, experimental, cognitive, physiological, and comparative psychology, psycholinguistics, psychometrics, and learning. Some students complete a Master's degree as part of their doctoral program.

For detailed information on graduate programs and admissions requirements write: Graduate Secretary, Department of Psychology, University of Tennessee, Knoxville, Tennessee 37916.

THE PSYCHOLOGICAL CLINIC

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, on referral by a physician.

4107 Experience in Individualized Instruction (1-6) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. E

4120 Topics in Social Psychology (4) Intensive and directed study of selected research topics: Prereq: 3120 or Sociology 3130. (Same as Sociology 4120.)

4230 Sensory Processes and Perception (4) Survey of sensory and perceptual processes with emphasis on audition and vision. Prereq: 3150. Recommended: 2520. F

4239 Laboratory in Sensory Processes and Perception (2) Prereq or coreq: 4220. F, W, Sp

4460 Organizational-Industrial Psychology (3) Concepts and principles for the design and evaluation of human resource programs. May be taken for credit by students who have credit for Management 3460. E

4510 Personality Theories (4) Prereq: 3650. F, Su

4520 Personality and Social Systems (4) Prereq: 2540.

4610 Group Processes (3) Study and experience of theory and techniques of group process and facilitation. Those participating in 4610 are expected to continue into 4620 and 4630. Prereq: 3816-26 and consent of instructor. F

4620-30 Seminar in Group Processes (3, 3) Didactic and laboratory experience for those qualified for further training as group facilitators. Prereq: 4610 and consent of instructor. W, Sp

4640 Psychological Tests and Measures (4) Theory and construction of individual and group measures; survey of various methods of assessment of intelligence, personality, special abilities, and educational acquisition of behavior. Prereq: 3150. F, Su

4650 Symbolic Processes (4) Logic of signs and symbols; directed and associative thinking; memory, problem solving, and concept formation; nature, use, and development of language. Prereq: 3210 or consent of instructor.

4660 The Psychology of Language (4) Theories and descriptions of phonology, syntax, and semantics as applied to psychology and related disciplines. Recommended: 4650 or linguistics background.

4710 Physiological Psychology (4) Nervous system and physiological correlates of behavior. Prereq: 1 yr of biology or Zoology 2520. W

4719 Physiological Psychology Laboratory (4) Laboratory studies of nervous system and physiological correlates of behavior. Coreq: 4710. W

4720 Comparative Animal Behavior (4) Methods and principles. (Same as Zoology 4720.) F

4729 Comparative Animal Behavior Laboratory (4) Laboratory and field studies. Coreq: 4720. (Same as Zoology 4729.) F

4750 Evolution and Ontogeny of Social Behavior (4) Genetic, evolutionary, ecological, and developmental processes as they apply to social organization and dynamics of vertebrates. Prereq: Consent of instructor.

4830 History and Systems of Psychology (4) Prereq: 9 hrs of upper division psychology.

4850 Learning Theories (4) Historical and theoretical development of learning models. Prereq: 3210.

4860 Programmed Learning (3) (Same as Curriculum and Instruction 4860.)

4870 Contemporary Research in Behavior of Women (4) Study of interaction of cultural and biological factors in determining the behavior of women, with emphasis on physiological mechanisms involved. Sp

4880 Afro-American Psychology (4) Review and analysis of psychological literature on Afro-Americans. Prereq: Consent of instructor. (Same as Black Studies 4880.)

4900 Aspects of Urban Environment (4) Interdisciplinary course in urban problems. Prereq: Consent of instructor. (Same as Architecture 4900, Real Estate 4900.) S/NC only.

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. S/NC only.

5017 Colloquium in Experimental Psychology (1) Coreq: 5016. S/NC only. F


5050 Methods of Research in Applied Psychology (3) Techniques and principles for designing and conducting psychological research in natural settings.

5070 Seminar in College Teaching (2) Concepts, methods, and materials in introduction of psychology at college level. Emphasis on research. Required of all Ph.D. candidates. S/NC only.

5079 Practicum in College Teaching (2) Supervised participation in college teaching. S/NC only.

5100 Developmental Psychology (3) Prereq: 3550 or Educational Psychology 2430. (Same as Educational Psychology 5100.) F, Sp

5105 Developmental Assessment (3) Techniques for assessing development in infants and children. Does not include practicum. Prereq: 5100 or equivalent and consent of instructor.

5110 Clinical Aspects of Human Sexuality (3) Nature of sexuality; societal perspectives, personal identity, socialization, intimacy and isolation including psychosocial and psychosexual identity and models for decisions. Intended for graduate students in clinical psychology, social work, and community and mental health professions. Prereq: Consent of instructor.

5112-13 Seminar in Current Issues in School Psychology I, II, 1, 1 Historical, legal, ethical and technological issues in practice of school psychology. Multiple instructors. (Same as Educational Psychology 5111-12-13.) S/NC only. F, W, Sp

5140-50-60 Psychoeducational Assessment (3, 3, 3) Naturalistic, psychometric, and sociometric assessment methods in school learning environments. Must be taken in sequence. Prereq: Admission to School Psychology program or consent of instructor. (Same as Educational Psychology 5140-50-60.) F, W, Sp

5149-50-60 Practicum in School Psychology I, II, 2, 2 First-year School Psychology Program practicum core sequence. Coreq: 5140-50-60. (Same as Educational Psychology 5149-50-60.) S/NC only. F, W; Sp

5170-80-90 Seminar in Individual and Organizational Psychology (3, 3, 3) (Same as Management 5170-80-90.) F, W, Sp

5200 Topics in Developmental Psychology (3) Prereq: 5105 and consent of instructor. May be repeated. Maximum 6 hrs.

*5210 Readings in Psychology (1) S/NC only. E

*5220 Readings in Psychology (2) S/NC only. E

*5320 Readings in Psychology (3) S/NC only. E

*5240 Readings in Psychology (4) S/NC only. E

*5250 Readings in Psychology (5) S/NC only. E

*5260 Special Problems in Psychology (1) S/NC only. E

*5270 Special Problems in Psychology (2) S/NC only. E

*5280 Special Problems in Psychology (3) S/NC only. E

*5290 Special Problems in Psychology (4) S/NC only. E

*5300 Special Problems in Psychology (5) S/NC only. E

5319 Field Work in School Psychology: Level 1 (2) Supervised on-the-job training in school psychology. Limited to students fully admitted to doctoral program in school psychology who are assigned to program approved field settings. Prereq: 5140-50-60 or equivalent. May be repeated. S/NC only. F; W; Sp

5319 Field Work in School Psychology: Level 2 (2) Supervised on-the-job training in school psychology. Limited to students fully admitted to doctoral program in school psychology who are assigned to program approved field settings. Prereq: 5140-50-60 or equivalent. May be repeated. Maximum 6 hrs. (Same as Educational Psychology 5319.) S/NC only. F; W, Sp

5320 Behavioral Interventions (3) Principles and techniques for planning, implementing, and evaluating interventions derived from social learning theory. Focuses on helping individuals in community (teachers, supervisors), and students, in decision making and strategies for self-control.

5340 Group Dynamics (3) (Same as Educational Psychology 5340.)

*5350-60-70 Seminar in Psychology (3, 3, 3)

5400 Psychophysics and Scaling Methods (3) Prereq: One course in statistics.

5420-30-40 Advanced Psychological Statistics (3, 3, 3) Must be taken in sequence. W, Sp; Su; F

5450 Human Problems in Administration (3) (Same as Management 5230.)

5490 Continuing Education in Mental Health (1-4) Topics of interest to persons in mental health and allied fields. Workshop, seminar, or lecture; topic and format to be announced. Prereq: Graduate standing or consent of instructor. May be repeated. Maximum 9 hrs.

5500 Fundamentals of Psychometrics (4) Basic ideas and orientation in psychometrics. All graduate students who plan to take one or more courses in psychometrics required to take course. Prereq or coreq: 4640.

5510 Instrumentation for Psychological Research (3)

5520 Theory of Measurement (3) Reliability, validity, basic principles of measurement and designing tests into batteries. Prereq: 1 qtr of graduate-level statistics and 5500 or consent of instructor.

5530 Issues in Applied Psychological Measurement (3) Applications of measurement in community and organizational research. Prereq: Statistics 5550-70 or equivalent and consent of instructor.

5540 Probability Models in Psychology (4) Introduction to use of probability models in theory of binary test items, differential psychology, comparison of different populations in specific psychological parameters, individual choice behavior, and testing of psychological hypotheses in human and animal behavior; reliability theory and regression theory. Prereq: Calculus I, II, and basic statistics.

5550 Advanced Social Psychology (3) Interaction between individual and group, theories of group behavior. Prereq: 3120. May be used for credit in psychology.

5560-70 Seminar in Social Psychology (3, 3) Prereq: 5140. May be used for credit in sociology. May be repeated. Maximum 9 hrs.

5580 Theories of Personality (3)

5581-82-83 Clinical Psychology I: Human Development and Personality (3, 3, 3) Major core of doctoral program in clinical psychology. Students take 3 2-hr courses concurrently, each
covering content area from one to three major contemporary points of view. F

5589 Psychological Techniques Laboratory (2) Basic techniques of psychological appraisal. Prereq: Consent of instructor. Individual psychological testing.

5590 Psychodynamics (3) Research and theory focusing on origins of behavior.

5591-92-93 Clinical Psychology I: Patterns of Adaptation (2, 2, 2) Second quarter core of doctoral program in clinical psychology. Clinical students take 2-3 hr courses concurrently, each covering content area from one of three major contemporary points of view. Sp

5601-02-03 Clinical Psychology I: Behavioral De
viance and Psychopathology (2, 2, 2) Third quarter core of the doctoral program in clinical psychology. Clinical students take 2-3 hr courses concurrently, each covering content area from one of three major contemporary points of view. Sp

5610-20 Psychology of Learning (3, 3) Prereq: 3210 or Educational Psychology 3730. F, W

5650 Ethics in Professional Psychology (2) Review of ethical concerns in professional psychology. Multiple instructors. Meets 3 hrs per week. Sp

5670 Forensic Psychology (2) Psychologist’s role in relation to legal system. Issues concerning licensure requirements, legal restrictions, and testimony as expert witness. Offered in alternate years. Prereq: Consent of instructor.

5680 Neural Basis of Behavior (3) Neuroanatomy; basis and symptomatology of neurological syndromes encountered in clinical psychology. Prereq: M.A. in psychology or equivalent.

5690 Psychopharmacology (3) Review and evaluation of pharmaceuticals as it relates to psychology. Prereq: Consent of instructor. Offered in alternate years. Sp, A

5702 Community Psychology (3) Psychological aspects of research, evaluation, intervention, and planning in communities. Community ecology, systems for primary and secondary prevention, planning, social systems, and relevance of federal policies. Prereq: Consent of instructor.

5713 Learning Modules for Techniques in Professional Psychology (1-4) Set of learning packages; each package develops skills in assessment, counseling, child therapy, or pathology. Prereq: Consent of instructor. May be repeated. S/N only.

5750 Ethological Psychology (3) Evolutionary and physiological basis of comparative psychology and implications for human behavior. Prereq: Introductory biology and graduate standing.

5760 General Vertebrate Neuroanatomy (3) Lecture and lab on vascular, nervous and skeletal systems, with an emphasis on central and peripheral nervous system. Prereq: 4710, 4719, or consent of instructor. (Same as Zoology 7620)

5769 Advanced Techniques in Physiological Psychology (3) Animal and human laboratory procedures central to research in physiological psychology. Prereq: 4710, 4719, and consent of instructor. May be repeated with consent of instructor.

5790 Seminar in Psycholinguistic Concepts in Speech Pathology (3) (Same as Speech Pathology 5790).

5810 Techniques of Psychological Examination (3) Development and administration of basic examination techniques. Intended primarily for students in fields related to psychology using assessment procedures. Prereq or coreq: 4640 or equivalent and consent of instructor.

5819 Practicum in Techniques of Psychological Examination (3) Prereq: 5819.

5840 Student Appraisal (3) (Same as Educational Psychology 5840).

5850-60-70 Psychological Appraisal (3, 3, 3) Objective and projective tests, clinical interviews, case study evaluation, organizational and vocational disorders. Prereq: 5819, Prereq or coreq: 5590-90.

5859-69-79 Practicum in Psychological Appraisals (2, 2, 2) Ordinarily to be taken concurrently with 5850-60-70.

5890 Counseling Theories and Techniques (3) (Same as Educational Psychology 5890).

5950-60 Theory and Practice of Consultation (3, 3) Issues in consultation, models of consulting process, and evaluation of consulting techniques. Must be taken in sequence. Coreq: 5959-90 and consent of instructor. (Same as Educational Psychology 5950-60.) W, Sp

5959-69 Practicum in Consultation (2, 2) Coreq: 5950-90. Must be taken in sequence. (Same as Educational Psychology 5959-69.) S/N only. W, Sp

6000 Doctoral Research and Dissertation (3-15) E

6050 Seminar on Methods of Social Research (3) (Same as Sociology 5050.) F, W

6100 Seminar in Community Psychology (3) Evaluation, research, intervention, and systems for delivery of services in communities. Prereq: 5762 and consent of instructor.

6150 Seminar in Program Evaluation (3) Techniques for designing and conducting research to evaluate effectiveness of programs. Prereq: Statistics 5050-60-70 or equivalent and consent of instructor.

6210-20-30 History, Systems, and Theories in Psychology (3, 3, 3) Prereq: M.A. in psychology or equivalent. (Same as Management Psychology 6250-60-70, 6720.)

6290-90 Factor Analysis (3, 3) Factor analysis: component analysis; introduction to latent structure analysis. Prereq: 4640 and 5500.

6310 Seminar in Motivation and Emotion (3) 5919 Field Work in School Psychology: Level II (2) Supervised on-the-job traineeship in school psychology. Limited to students fully admitted to doctoral program in School Psychology assigned to approved field settings. Prereq: 5950-90. May be repeated. Maximum 6 hrs. (Same as Educational Psychology 6130-90.)

6320 Seminar in Research Methods (3) 5930 Seminar in Learning (3)

6340 Seminar in Developmental Psychology (3)

6350 Seminar in Thinking (3)

6360 Seminar in Sensation and Perception (3)

6370 Seminar in Theoretical Psychology (3)

6380 Seminar in Industrial and Organizational Psychology (3) (Same as Management Psychology 6380.)

6390 Seminar in Psychotherapy (2) Treatment of current case, focusing upon psychodynamics, psychopathology, and therapeutic techniques employed. Prereq: Consent of instructor or equivalent.

6395 Seminar in Assessment (3) Seminar for advanced graduate students in clinical psychology, to deal with current research on methods of evaluating the status of individuals seeking clinical aid.

6400 Seminar on Changing Concepts in Clinical Psychology (3) New developments in field in relation to their impact on experimentation and systems of thought. Prereq: M.A. in psychology or equivalent.

6405 Seminar in Psychopathology (3) Prereq: Consent of instructor.

6410-20-30 Psychotherapy (3, 3, 3) Theories and principles of psychotherapy. Prereq or coreq: 5550-60. W, Sp, F

6411-12-13-14 Psychotherapy; Elective Concentration Learning Laboratory (2, 2, 2, 2) Typically four psychotherapy concentration areas offered each quarter. Clinical students in core psychotherapy sequence must elect at least one of these in each quarter of sequence. Prereq: 5959-90. Prereq or coreq: 5590-90.


6450-60 Advanced Psychometrics (3, 3) Construction and standardization of psychological tests, questionnaires, and rating scales; theory of errors or measurements; item analysis, scaling, equating, and norms development. Prereq: 4650, 5440, and 5500. May be repeated. Maximum 9 hrs.

6490 Continuing Education in Professional Mental Health (1-4) Topics of interest to persons in mental health and allied fields. Workshop, seminar, or lecture; topic and format to be announced. Prereq: Professional degree in field related to mental health or consent of instructor. May be repeated. Maximum 9 hrs.

6491-23-34 Field Placement in Clinical Psychology Levels 1, 2, 3, 4, 1-4, 1-4, 1-4, 1-4 Supervised clinical experience. Required of all and limited to students fully admitted to Ph.D. program in Clinical Psychology. May be repeated. Maximum 8 hrs per course. S/N only. W, Sp, F

6500 Seminar in Psychometrics (3) Seminar for advanced graduate students in psychometrics or quantitative psychology, to deal with advanced theories, methodologies, and their applications. Prereq: 4640. S/N only or equivalent, and consent of instructor. May be repeated. Maximum 9 hrs.

6550 Seminar in Advanced Social Psychology (3) Prereq: Consent of instructor. (Same as Management Psychology 6550-60-70.)

6575 Seminar in Mental Health Administration (3) Theory and problems in organization and management of mental health administration.

6580-60-70 Systems Approaches in Psychological Services (3, 3, 3) Focuses on development and growth models in health-related organizations with an emphasis on case control, systems development approaches in schools and other human service settings. Prereq: Consent of instructor. (Same as Educational Psychology 6580-60-70.)

6598-69-79 Practicum in School Psychology III (2, 2, 2) Third year School Psychology Program practicum core sequence. (Same as Educational Psychology 6598-69.) S/N only. F

6710 Seminar in Physiological Psychology (3)

6720 Seminar in Comparative and Ethological Psychology (3)

6730 Methods of Ethological and Naturalistic Research (3) Current laboratory and field techniques. Prereq: 4720, 5750, 6720, or consent of instructor.

6780 Advanced Psycholinguistics (3) Language from psycholinguistic and associated points of view; methodological and theoretical problems. Prereq: Consent of instructor.

6800 Field Work in Industrial and Organizational Psychology (1-15) Prereq: Consent of instructor. (Same as Management Psychology 5950-60.)

Note: Psychology 5210-5300, 5350-60-70, 5819, 6310-400, 6419-29-39, 6719-20-30, and/or 6900 may be repeated for credit with the approval of the department.

Radiation Biology

(Radioisotopes and Low Energy Radiation)

MAJOR

DEGREES

Radiation Biology M.S., Ph.D.

Daniel Billen, Director

A graduate major in the field of Radiation Biology is offered through the Institute of Radiation Biology. This is a program covering both departmental and institutional lines. Included on the Institute staff are certain scientists from the Departments of Biochemistry, Botany, Chemistry, Microbiology, Physics, Zoology, the Microbiological Research Center, and the Comparative Animal Research Laboratory of the University of Tennessee; the Biology and Environmental Sciences Divisions of the Oak Ridge National Laboratory; and the Medical Division of Oak Ridge Associated Universities.

Formal courses in this program are offered mainly on the Knoxville campus. The research may be carried out either at the University or at one of the Oak Ridge
Dissertation and such other fields as the oral examination covering the candidate's degree.

The University of Tennessee Graduate School offers courses in biochemistry, botany, chemistry, electrical physics, and zoology. Courses are available in biochemistry, botany, chemistry, electrical physics, and zoology. The Admissions Committee determines whether a student has completed a course in religious studies as a graduate concentration.

Areas of radiation specialization currently include photobiology, environmental, microbial, botanical, and biochemical and biophysical radiobiology.

**ADMISSION REQUIREMENTS**

The minimum academic requirements for admission to the Institute are: (1) a Bachelor's degree from an accredited college or university; (2) biological science, chemistry, physics: 30 quarter hours in one and 12 in each of the others; (3) college mathematics: potential candidates for the Master's degree, 9 quarter hours; potential candidates for the doctoral degree, differential and integral calculus, (4) for the Ph.D. program, Graduate Record Examination scores.

**THE MASTER'S PROGRAM**

Course requirements include: (1) Zoology 5610, (2) Zoology 5620 or 5780; (3) Zoology 5350 or Plant and Soil Science 3610; (4) Chemistry 3810, (5) Biochemistry 4110-20 or 5510-20. (At least one-half of the student's program must be at the 5000 level.) The thesis is required of all students.

**THE DOCTORAL PROGRAM**

(1) Courses: In addition to those required for the Master's degree. Chemistry 4910-20-30; Physics 3710-20-30 (Chemistry 3810 may be substituted for Physics 3730); Radiation Biology 5620, 5780. Additional course requirements are determined by the student's faculty committee. The student's special field of interest and plans for a career determine these requirements. The more important courses from which selection may be made are advanced courses in biochemistry, botany, chemistry, electrical engineering, mathematics, microbiology, physics, and zoology. Courses are available in The University of Tennessee Graduate School of Biomedical Sciences at Oak Ridge. (2) The preliminary examination will consist of oral and written portions in radiation biology and in allied fields in which the candidate has received training. (3) The student's dissertation committee determines whether a foreign language is required for the doctoral degree. (4) The final examination will be an oral examination determining the candidate's dissertation and such other fields as the candidate's faculty committee may specify. Regular attendance at the weekly Radiation Biology Seminar or an appropriate Departmental Seminar is expected of all students.

**Religious Studies**

**Producers:**

F. S. Lustby (Head); B. D. Colgate Rochester; D. L. Duncan, T.H.D. Harvard; R. V. Norman, Jr.; Ph.D. Yale; C. H. Reynolds, Ph.D. Harvard.

**Associate Producers:**

W. L. Humphreys, Ph.D. Union; D. E. Linge, Ph.D. Vanderbilt.

**Assistant Producers:**

R. R. Earl, Ph.D. Vanderbilt; J. Kim, Ph.D. Chicago.

**Instructor:**

J. L. Fitzgerald, M. A. Chicago.

An M.A. in Philosophy with a concentration in religious studies is available for graduate work in these related fields. (Details of this program are available in the office of either department.) Graduate courses in religious studies further provide opportunity for students in a variety of disciplines to pursue work in religious studies as a graduate concentration.

3060-70-80 History of Western Religious Thought and Institutions (3, 3) 3060-First Century to Fifth Century. 3070-Sixth Century to Fifteenth Century. 3080-Sixteenth Century to 1900. (Same as History 3060-70.)

3210 Early Greek Mythology (3) (Same as Classics 3210) F

3220 Early Greek Mythology in the Classical Period (3) (Same as Classics 3220) W

3230 Roman Mythology (3) (Same as Classics 3230) Sp

3270 Russian Philosophical and Theological Thought (4) (Same as Philosophy 3270 and Russian 3270).

3411-12 Renaissance and Reformation (3, 3) (Same as History 3411-12) 13th Century and the nineteenth century. Pre-req: 9 hrs of philosophy other than logic. (Same as Philosophy 3411-21).

4210 Topics in Ancient Israelite and Ancient Near Eastern Religions (4) Prereq: 3110-20 or consent of instructor. May be repeated. Maximum 8 hrs.

4310 Jesus and Paul Compared (4) Jesus' teaching and activity in the context of first-century Palestinian Judaism; analysis of what the Apostle Paul made of the tradition of and about Jesus. Recommended prerequisite: 2610 or 2611.

4370 Theoretical Issues in Medical Ethics (4) (Same as Philosophy 4370).

4410 American Religious Thought (4) Selected figures, movements and problems in American religious thought from colonial period to present.

4500 Topics in American Religion (4) Prereq: One of the following: 3510, 3520, 4410, or consent of instructor. May be repeated. Maximum 8 hrs.

4540 Social and Religious Change (4) (Same as Sociology 4540.)

4610 Topics in Western Religious Thought and Institutions (4) Selected figures, issues, and institutions. Seniors and graduate students only, except by consent of department. Prerequisite: 3060-70-80. May be repeated. Maximum 12 hrs.

**College of Liberal Arts**

5000 Thesis (1-15) E

5300 Graduate Research Participation (3-9) May be repeated. Maximum 12 hrs. E

5610-20 Foundations of Radiation Biology (4, 4) (Same as Zoology 5610-20). E

5780 Radiation Physiology (4) (Same as Zoology 5780). E

6000 Doctoral Research and Dissertation (3-15) E

6910 Seminar in Radiation Biology (2) (Same as Zoology 6910). E

**5400 Topics in Early Christianity and Hellenistic Religions (4) Selected figures, issues, and institutions. Seniors and graduate students only, except by consent of department. Prerequisite: Consent of instructor. May be repeated. Maximum 12 hrs.**

**5470 Topics in Eastern Religions (4) Selected figures, issues, and institutions. Seniors and graduate students only, except by consent of department. Prerequisite: 3560-60,71-72. May be repeated. Maximum 12 hrs.**

**4810-20-30 Readings and Research in Religious Studies (3-4, 3-4, 3-4)**

**4840 Readings in Selected Languages Related to Religious Studies (3-4) Prerequisite: Consent of instructor. May be repeated. Maximum 12 hrs.**

**4940 Sociology of Religion (4) (Same as Sociology 4940).**

**4950 Theory of Religion (4) Elements for construction of a theory of religion drawing on resources from fields of psychohistory, social psychology, sociology of religion, cultural anthropology, theology and comparative religion.**

**4960 Tradition, Change and Modernity in Asia (4) Comparative study of processes of religious and social change seen in historical context in Asian societies. Comparative focus of course will vary each year (e.g., China and Japan, India and South Asia). May be repeated. Maximum 8 hrs. (Same as Sociology 4960).**

**5101 Foreign Study (1-12) See page 95.**

**5102 Off-campus Study (1-12) See page 95.**

**5103 Independent Study (1-12) See page 95.**

**5310-20 Topics in Religion and Society (4, 4)**

**5335 Orientation to Medical Ethics (4) (Same as Philosophy 5335).**

**5365 Applied Ethical Theory (4) (Same as philosophy 5365).**

**5510-20 Topics in the History of Religion (4, 4)**

**5710-20 Topics in Religious Thought (4, 4)**

**Roman Languages**

**MAJORS**

**DEGREES**

MACT French M.A. Spanish

**Professors:**


**Associate Professors:**


**Assistant Professors:**

T. R. Arrington, Ph.D. Kentucky; E. J. Campion, Ph.D. Yale; M. Handlesman, Ph.D. Florida.

The Department of Roman Languages offers three advanced degrees: the Master of Arts in College Teaching (MAC) in the Romance Languages only; the Master of Arts (M.A.) in French and Spanish; and the Doctor of Philosophy (Ph.D.) in Spanish.

**The Master of Arts in College Teaching Program**

This program requires a minimum of 60 hours of graduate work. Students must participate in the graduate seminar in college teaching during their first year of residence (3 hours credit). They must also complete 6
hours in supervised instructional experience. French or Spanish must be selected as the major subject, and at least 36 hours of graduate work, including 9 hours of thesis and 9 hours of linguistics and philology, and 3 hours of problems in language teaching, must be completed. In addition, civilization courses are strongly recommended. Spanish or French must be selected as the minor subject, in which at least 18 hours of graduate work must be completed.

THE MASTER OF ARTS PROGRAM

The student may select either Plan A or B:

Plan A

1. Completion of a minimum of 36 quarter hours of which 24 must be taken in courses numbered above 5000, including 5011 (French or Spanish, as appropriate).
3. A written examination covering the course work and selected items from a master reading list.
4. A final oral examination covering the thesis.

Plan B

1. Completion of 45 quarter credits of which 33 must be in courses beyond 5000, including 5011 (French or Spanish, as appropriate).
2. Three term papers that have been accepted as satisfactory by the Advisory Committee.
3. A written examination covering the course work and selected items from a master reading list.

THE DOCTORAL PROGRAM

Residence and Course Work:

Completion of at least three consecutive quarters of full-time residence, a minimum of 81 credit hours in course work beyond the Bachelor's degree or its equivalent, and a dissertation (36 credit hours).

No less than 54 quarter hours should be taken in courses pertaining to the student's major field; of these a minimum of 18 hours are to be taken in courses above 6000, a maximum of 12 hours may be taken in courses of the 4000 level and the rest in courses above 5000. All students must complete the series in methods of research (5151-61-71) for a total of 3 credits. The minor subject course work, including 9 hours of which at least 12 hours must be numbered above 5000 and the rest above 4000, and should represent a meaningful complement to the student's area of concentration. In addition 9 hours of courses above 4000 in a related discipline are required. In special cases the latter requirement may be waived in favor of additional course work in the major field.

Language Requirements:

Students are expected to demonstrate written and oral fluency in Spanish as well as knowledge of two other foreign languages. One of these must be French; the second one should be chosen from such languages as German, Italian, Portuguese, Arabic or Hebrew in accordance with the student's field of concentration. Proficiency in Latin shall be required of all students specializing in an area related to philology or the medieval period.

Examinations:

A preliminary comprehensive examination, both written and oral, covering the major and minor fields must be passed before a student can become an official candidate for the degree. This preliminary examination is to be held at the time deemed most appropriate by the student's major advisor and committee. The candidate is expected to defend the dissertation in a final oral examination.

For additional information on the program, consult pages 8-9.

Arabic

3510-20 Intermediate Modern Standard (4, 4) A
3610 Islamic Literature in English Translation (4) Survey from origins to modern period of major Islamic literatures, especially Arabic, Persian, and Turkish. Readings include The Arabian Nights, The Rubaiyat of Omar Khayyam and Gibran's The Prophet. A
5070-80-90 Hispano-Arabic Literature and Culture (3, 3, 3) (Same as Spanish 5070-80-90.) A
5101 Foreign Study (1-12) See page 95. E
5102 Off-campus Study (1-12) See page 95. E
5103 Independent Study (1-12) See page 95. E

French

3510-20-30 Elements of French for Upper Division and Graduate Students (3, 3, 3) Elements of language, elementary and advanced readings. Open to graduate students preparing for language examinations, and upper division students desiring reading knowledge of the language. Undergraduate credit only. No credit for those having had Elementary French. No auditors. F; W; Sp; Su
4010 Masterpieces of French Literature in English Translation (3) No foreign language credit. A
4020 Masterpieces of French Drama in English Translation (3) No foreign language credit. A
4110-20-30 French Literature of the Seventeenth Century (3, 3, 3) Prereq: Intermediate French or equivalent. A
4150 Theatrical French (1-3) Performance in one or more French plays. Prereq: Intermediate French or equivalent and consent of instructor. May be repeated with consent of department. A
4160-70-80 Advanced Conversation (2, 2, 2) Intensive training in prepared and spontaneous conversations. Subjects range from travel and current events to literature and aspects of national culture. Prereq: Completion of 9 hrs of courses on 3000 level. F; W; Sp
4210 Phonetics (3) Prereq: 2190, 2520, or equivalent. F
4220-30 Advanced Grammar (3, 3) Prereq: 2190, 2520, or equivalent. W, Sp
4250 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: 9 hrs of upper division English or 9 hrs of upper division courses in a modern or ancient language (exclusive of German and French 3010-20-30, 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, Spanish and Russian 4250.) F
4260 Introduction to Historical and Comparative Linguistics (3) (Same as German, Russian, and Spanish 4260.) W
4270 Romance Linguistics (3) Development of Classical Latin thought through Vulgar Latin into major Romance languages. (Same as Spanish 4270.) Sp
4310-20-30 French Literature of the Eighteenth Century (3, 3, 3) Prereq: Intermediate French or equivalent. A
4350-60-70 Medieval French Literature (3, 3, 3) Medieval works in modern French texts. Prereq: Intermediate French or equivalent. A
4410-20-30 French Civilization (3, 3, 3) Prereq: Intermediate French or equivalent. A
4510-20-30 French Literature of the Nineteenth Century (3, 3, 3) Prereq: Intermediate French or equivalent. A
4640-50-60 French Literature of the Sixteenth Century (3, 3, 3) Prereq: Intermediate French or equivalent. A
4710-20-30 French Literature of the Twentieth Century (3, 3, 3) Prereq: Intermediate French or equivalent. A
5000 Thesis (1-15) E
5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a 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
5011 Techniques in Literary Analysis (3) Required for either Plan A or Plan B of M.A. program. Intensive course in explication de texte. F
5101 Foreign Study (1-12) See page 95. E
5102 Off-campus Study (1-12) See page 95. E
5103 Independent Study (1-12) See page 95. E
5110-20-30 Old French (3, 3, 3) Medieval French literature and language. A
5121 College Teaching of Romance Languages (3) Demonstrations, and practical applications of techniques and procedures for teaching and evaluating basic language skills, cultural aspects, and beginning literature. 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. F
5151-61-71 Bibliography and Methods of Research (1, 1, 1) (Same as Italian and Spanish 5151-61-71.) S/N only. E
5210-20-30 French Literature of the Sixteenth Century (3, 3, 3) A
5310-20-30 French Directed Readings (3, 3, 3) E
5350-60-70 The Philosophes (3, 3, 3) Textual analysis of the works of Voltaire, Diderot, Rousseau, and other eighteenth-century writers. A
5410-20-30 The French Novel (3, 3, 3) A
5450-60 Lyric Poetry of the Nineteenth Century (3, 3) (Same as German and English influences on French Romanticism and generation of the poets of "le mal du siecle." 5450—Victor Hugo, the Parnassians. A
5470 Baudelaire and the Symbolists (3) Les Fleurs du mal and petits poemes en prose with emphasis on theories of color and "correspondances" and their influence on Symbolist school. A
5510-20-30 The French Drama (3, 3, 3) From Seventeenth Century to present. Emphasis on Seventeenth Century. A
5610-20-30 Trends in Contemporary French Literature (3, 3, 3) A
5650-60 Advanced Syntax and Stylistics (3, 3) Readings and written imitations of modern literary styles in form of compositions, sketches, and original stories. A
5707 Problems in Romance Linguistics (3) Topics vary. May be repeated with consent of department. Prereq: 4520 or equivalent. (Same as Spanish 5707.) A
5710-20-30 Seminar in French Literature (3, 3, 3) Topics vary. May be repeated with consent of department. Su
5910 Literary Criticism: The Foundations of Romanticism (3) (Same as Spanish 5910.) A

Italian

3210-20-30 Civilization and Culture (3, 3, 3) Prereq: Intermediate Italian or equivalent. A
3310-20-30 Italian Literature in English Translation (3-4, 3-4, 3-4) 3310—Sicilian School, the Florentine School, Dante, Petrarch (Boccaccio, Machiavelli, Ariosto, Tasso. 3320—From the Baroque through nineteenth century, commedia dell'arte, Vico,
Leopoldi. 3330—Twentieth century, Carducci, Piran, or Quevedo, D'Annunzio, Croce, Moravia. No change in credit hours after add deadline. Option of 4 hrs credit must present appropriate amount of extra work above that required for 3 hrs. A

3510-20 Aspects of Italian Literature (4, 4) Prereq: Intermediate Italian or equivalent. Recommended for literature majors. F; W

4010-20 Italian Drama in English Translation (3-4, 3-4) 4070—La commedia dell'arte and major works of Mercurei, Mignanasso, Affari, Goldini. 4200—Twentieth-century theatre: operatic drama, the Grottesco, Pirandello, De Filippo, Friti. No change in credit hours after add deadline. Option of 4 hrs credit must present appropriate amount of extra work above that required for 3 hrs. A

4050-50-50 Dante and Medieval Culture (3, 3, 3) Readings and lectures in English for students majoring or minoring in Italian. (Same as Comparative Literature 4050-50-50.) A

4220 Petrarch (3) Prereq: 3130, 3520 or equivalent. A

4230 Boccaccio (3) Prereq: 3130, 3520 or equivalent. A

4330 History of Italian Language (3) Prereq: 3130, 3350 or equivalent. A

4410-20-30 Literature of the Rinascimento (3, 3, 3) From Pulci to Tasso, the Quattrocento and the Cinquecento. Prereq: 3130, 3520 or equivalent. A

4530 The Modern Novel (3) Prereq: Intermediate Italian or equivalent. A

4540 The Modern Theatre (3) Prereq: Intermediate Italian or equivalent. A

4610 Contemporary Theatre (3) Prereq: Intermediate Italian or equivalent. A

4620 Contemporary Poetry (3) Prereq: Intermediate Italian or equivalent. A

4630 Contemporary Prose (3) Prereq: Intermediate Italian or equivalent. A

5011 Techniques in Literary Analysis (2) Intensive course in explication de texte. A

5011 Foreign Study (1-12) See page 95. E

5012 Off-campus Study (1-12) See page 95. E

5103 Independent Study (1-12) See page 95. E

5151-61-71 Bibliography and Methods of Research (1, 1, 1) (Same as French and Spanish 5151-61-71.) S/N only. A

5610-20-30 Readings in Italian Literature (3, 3, 3) Topics vary and may be repeated with consent of department. A

5710-20-30 Seminar in Italian Literature (3, 3, 3) Topics vary and may be repeated with consent of department. A

Portuguese

3510-20 Aspects of Portuguese Literature (4, 4) Prereq: Intermediate Portuguese or equivalent. Recommended for literature majors. F; W

4110-20-30 Directed Readings in Brazilian and Portuguese Literature (3, 3, 3) May be repeated with consent of instructor. F; W; Sp

4210 Phonetics (3) Prereq: 2130, 2520, or equivalent. F

4220-30 Advanced Grammar (3, 3) Prereq: 2130, 2520, or equivalent. F; W; Sp

4250 Introduction to Descriptive Linguistics (3) (Same as French, German, and Russian 4250.) F

4260 Introduction to Historical and Comparative Linguistics (3) (Same as German, Russian, and French 4260.) W

4370 Romance Linguistics (3) (Same as French 4270.) Sp

4410 Spanish Civilization (3) Prereq: Intermediate Spanish or equivalent. F

4420-30 Latin American Civilization (3, 3) Prereq: Intermediate Spanish or equivalent. W; Sp

4540-70 Studies in Modern Spanish Style (3, 3) Prereq: 3140-20-30 or consent of instructor. A

4510-20-30 Spanish Literature of Nineteenth Century (3, 3, 3) Prereq: Intermediate Spanish or equivalent. A

4720-30 Spanish Literature of the Twentieth Century (3, 3, 3) 4710—Non-dramatic prose fiction. 4720—Drama. 4730—Lyric poetry. Prereq: Intermediate Spanish or equivalent. A

4820-30 Topical Survey of Spanish American Literature (3, 3, 3) Prerequisite: major exam of 18 hrs. A

5000 Thesis (1-15) E

5062 Non-Thesis Graduation Completion (3-15) Required for the non-thesis study student only. Students are not registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May be repeated. S/N only. E

5011 Techniques in Literary Analysis (3) Required for either Plan A or Plan B of M.A. program. An intensive course in explication de texte. F

5070-80-90 Hispano-Arabic Literature and Culture (3, 3, 3) 5070—Development of classical muwashshah, the colloquial zajal, and the later villancico. Readings in poetry and popular and native Spanish choral lyric; modern novel of character after invention of printing. 5090—Mutual influence of traditional Arabic poetry and popular and native Spanish choral lyric; development of classical muwashshah, the coloquial zajal, and the later villancico. Readings in Arabic and Spanish. (Same as Arabic 5070-60-90.) A

5101 Foreign Study (1-12) See page 95. E

5102 Off-campus Study (1-12) See page 95. E

5103 Independent Study (1-12) See page 95. E

5151-61-71 Bibliography and Methods of Research (1, 1, 1) (Same as French and Spanish 5151-61-71.) S/N only. A

5151-61-71 Bibliography and Methods of Research (1, 1, 1) (Same as French and Italian 5131-61-71.) S/N only. A

5211-21 Don Quixote (3, 3) Must be taken in sequence. A

5222-23 Goldage Prose (3, 3) 5222—La Celestina: critical study of Fernando de Rojas' life and work. Celestinesque genre. 5223—Spanish philosophical thought; mystical prose; satirical works. 5224—Guadalupe de Alarcon and Spanish picaresque genre. A

5233 The Exemplary Novels, Peralles y Sigismunda (3) A

5250-60 The Generation of '98 (3, 3) Angel Gavier, Galdos de los Rios, Barjo, Unamuno, Valle Inclan, Benavente, Azorin, Perez de Ayala. A

5270 The Contemporary Novel (3) Civil War and post-Civil War period. A

5310-20 Directed Readings (3, 3) E

5311-21 Special Topics in Spanish or Spanish American Literature (3, 3) May be repeated. A

5340 Problems in Hispanic Culture (3) Prevailing social, political, artistic, literary and ideological conditions and patterns of any area or period within Spanish or Latin American culture. May be repeated with consent of department. Maximum 6 hrs. A

5510-20-30 The Spanish Theatre after the Golden Age (3, 3, 3) 5510—From eighteenth century through Romanticism. 5520—From realism through Generation of 1898. 5530—Contemporary Theatre. A

5550-60-70 The Golden Age Theatre (3, 3, 3) 5550—Introduction to Spanish theatre, Lope and Tirso. 5560—Castro, Mira de Amescua and Alarcon. 5570—Rojas Zorrilla, Moro, and Calderon. A

5610 Spanish American Prose to 1900 (3) Novel, chronicle, essay, A

5611-21 Spanish American Lyric Poetry (3, 3) A

5620-30 The Modern Novel in Spanish America (3, 3) A

5631 Spanish American Essay (3) A

5632 The Spanish American Short Story (3) Short story as major literary genre in Spanish America. Reading and criticism of works of authors such as Darío, Quiroga, Borges, Arreola, and Rulfo. A

5633 Twentieth-century Latin American Theatre and Film (3) Readings from works of Carlos, Solorzano, Rodolfo Usigli, Conrado Naile Roxio, Roberto Cossa, Rene Marques and Sebastian Salazar Bondy. Presentation of films as adaptations of classics such as Doha Barbara, Los de abajo and Don Segundo Sombra as well as exponents of experimental cinema of today. A

5640 Latin American Women Writers (3) Feminine point of view, modern image of woman, male-female relationships and society as context for woman's destiny. Readings from poetry and fiction, including such authors as Alfonsina Storni, Delmira Agustini, Gabriell Misaial, Silvina Bullrich, Silvina Ocampo and Rosario Castellanos. A

5650-60 Advanced Syntax and Stylistics (3, 3) Readings and written imitations of modern literary styles in compositions, sketches, and original stories. A

5670 Problems in Romance Linguistics (3) (Same as French 5670.) A

5810-20-30 Spanish Lyric Poetry (3, 3, 3) A

5910 Literary Criticism: The Foundations of Romance Criticism (3) (Same as French 5910.) A

6000 Doctoral Research and Dissertation (3-15) E

6210-30 Seminar in Spanish Literature (3, 3, 3) Topics vary in field of Peninsular Literature. May be repeated with consent of department. A

6310-20-30 Seminar in Latin American Literature (3, 3, 3) Topics vary. May be repeated with consent of department. A

Russian

See German

Sociology

MAJOR

degrees
sociology
M.A., MACT, Ph.D.

Professors:
D. R. Riech (Head), Ph.D. North Carolina
J. A. Baker, Ph.D. Iowa; D. J. Champion, Ph.D. Purdue; L. Eerskole, Ph.D. Pennsylvania; S. Wallace, Ph.D. Minnesota.
4410 Educational Sociology (3) (Same as Curriculum and instruction 4410.)
4530 Community Organization (4) Structure, function, linkages, change and development and important community studies are reviewed and discussed. Emphasis on sociological analysis, not on the implementation of solutions.
4540 Social and Religious Change (4) Critical review of historical and contemporary theories and methods employed in study of social change. Attention given to both macro and micro group change. (Same as Religious Studies 4540.) A
4560 Formal Organization (4) Analysis of bureaucratization process, division of labor, delegation of authority, and channelled communication under a system of rationality.
4820 American Minority Groups (4) Minority groups and social structure in American society; analysis of intergroup relations with attention given to both past and present relationships of selected groups to broader society.
4930 Social Movements (4) Development, organization, and function of social movements; attention is given to the ideology, leadership and organization of political, religious and other types of social movements.
4960 Sociology of Religion (4) Interrelationship of society, culture and religion. (Same as Religious Studies 4960.) A
4960 Tradition, Change and Modernity in Asia (4) (Same as Religious Studies 4960.)
5000 Thesis (1-15) E
5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a 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
5010 Professional Seminar (1) Limited to sociology graduate teaching assistants or graduate assistants. May be repeated. Maximum 4 hrs. S/NC only. W, Sp
5040 Methodological issues in Social Research (3)
5050 Seminar in Political Sociology (3) Political system from societal, organizational, and group perspectives.
5060-70 Special Social Investigation (3, 3) Directed readings and/or research projects. E
5200 Seminar in Collective Behavior and Social Movements (3)
5210 Social Theory (3) F
5220 Social Control (3)
5230 Seminar in Sociology of Medicine (3)
5251 Historical Demography (3) Family reconstitution, age and sex composition of the population, and fertility rates. May be repeated. W, Sp
5252 Seminar in Social Attitudes (3)
5260 Seminar in Occupations (3) Occupations and settings in which they are performed.
5262 Social Structure and Personality (3) Social interaction and personality; genesis and functioning of self; cultural basis of personality. May be used for credit in psychology.
5270 Seminar in Community Power (3) Analysis of power and leadership in community context. (Same as Religious Studies 5270.)
5290 Seminar in Social Attitudes (3)
5340 Seminar on Community Power (3) Analysis of theories and methods used in studying social power in communities.
5550 Seminar in Community Power (3) (Same as Religious Studies 5550.)
5560-100 Survey Design and Analysis (3, 3) Application of general methodological principles to particular operating context of survey. Systematic exploration of survey problems through student participation in design and analysis of survey (2 qtrs.).
5610 Seminar in Occupations (3) Occupations and their relation to individual and societal, technology, and organization; utilization of rewards and occupations; social organization and occupations.
5620 Seminar in Occupations (3) Continuation of material in Sociology 5610; interface between occupations and skills which they are performed.
5630 Seminar in Occupations (3) Research participation; directed projects on subjects developed in 5620. Prereg: 5610 or 5620.
5640 Social Structure and Personality (3) Social interaction and personality; genesis and functioning of self; cultural basis of personality. May be used for credit in psychology.
5670 Social Organization (3) Structure and function of human groups, with special attention to voluntary associations and administrative organizations.
5720 Small Group Theory and Research (3) Critical assessment, through reading and actual research, of contemporary theoretical orientations to study of small groups. Research designed to test selected theoretical problems. May be repeated.
5730 Seminar in Research Problems in Inter-group Relations (3) Research techniques and problems as encountered in race and intergroup relations are explored; actual field research projects are performed.
5810 Seminar in Race and Culture (3) Critical examination of theoretical and conceptual approaches in study of intergroup relations. A
5910 Urban and Regional Sociology (3)
5920 Seminar in Social Attitudes (3)
5940 Delinquency and the Social Structure (3) Critical assessment of contemporary theories of delinquency; research findings related to them, and their implications for formal strategies of control and rehabilitation.
5960 Demographic Techniques (3) Life, table, standard rates, and survey techniques of population analysis.
5970 The Sociology of Development and Modernization (3) Comparative approach to institutional and organizational correlates of modernization and disorganization; implications for urbanization, industrialization, and modernization.
6000 Doctoral Research and Dissertation (3-15) E
6040 Experimental Research (3)
6050 Seminar on Methods of Social Research (3) Experimental research projects. (Same as Psychology 6050.)
6070 Field Research (3)
6090-100 Survey Design and Analysis (3, 3) Application of general methodological principles to particular operating context of survey. Systematic exploration of survey problems through student participation in design and analysis of survey (2 qtrs.).
6130 Seminar in Mass Behavior and Related Topics (3)
6140 Advanced Readings in Sociological Theory (4) S/NC only. E
6150 Advanced Readings in Sociological Methods (4) S/NC only. E
6160 Advanced Social Investigation (4) E
6170 Cross-cultural Aspects of Human Fertility (3) Historical, topical, regional, and methodological approaches to human fertility and demographic problems. Consideration of relations obtained between socioeconomic and demographic change in various parts of world; fertility rates and national
power; controversies on control of vital rates of growth.

5180 Theory and Method of Human Ecology (3) Theoretical perspective and research techniques of human ecology applied to selected research sites.

6190 Advanced Special Social Investigation (4) E

6240 Theory and Research in Human Migration (3)

6510 Advanced Issues in Criminology Theory (3) Emphasis on problems related to theory construction and measurement.

6520 Sociology of Deviance (3) Advanced studies in deviant behavior. Theories and findings regarding cause and procedures and programs for social control. Prereq: 4310 and 5520.

6530 Sociology of Law (3) Analysis of social and cultural factors influencing emergence and maintenance of law as social institution and affecting relations between law and deviant behavior; appraisal of theoretical and methodological issues encountered in studying law.

6540 Readings in Criminology and Deviance (3) Directed readings and selected topics on criminology and deviance.

6550 Advanced Studies in Community (3) Analysis of concepts of community, theories of community change, and techniques used in community research.

6610 Seminar in Formal Organization (3) Major formal organizational theories: bureaucracy, functions of theoretical models of organizations; major organizational variables; organizational authority patterns; communication in formal organizations. Prereq: 3810-20.

6620 Seminar in Formal Organization (3) Organizations, organizational change and effect of technology; social consequences of automation; unionization and organization; organizations and community interrelatedness. Prereq: Consent of instructor.

6630 Seminar in Formal Organization (3) Comparative organizational analysis; case studies, selected readings; Personality and organization. Prereq: Consent of instructor.

6710 Seminar in Class and Status (3) Classic and recent studies of class and status. Methods used in research and current position of theory.

6810 Advanced Studies in Social Psychology (3) Social interaction and personality, genesis and functioning of self; interplay of social structures and individual actions; theories of social psychology related to these problems and recent research are discussed. May be repeated. Prereq: 3130 or 5640 or Psychology 5550.

6840-50 Social Change (3, 3) Major theories, methods and research.

6940 Advanced Studies in Urban Sociology (3) Field work projects and community studies examined and/or applied in specified areas. Prereq: 3410-20.

6950 Seminar in Population Theory (3) Malthus, Marx, optimum population, and selected variables.

Spanish

See Romance Languages

Speech and Hearing Sciences

See Audiology and Speech Pathology

Speech and Theatre

MAJOR

Speech and Theatre DEGREE M.A.

Professors:


Associate Professors:


Assistant Professors:

R. S. Amboth, Ph.D. Ohio State; M. L. Ambrester, Ph.D. Ohio (Athens); J. F. Buckley, Ph.D. Northwestern; M. Custer, M.F.A. Wilson; B. V. Daniels, Ph.D. Cornell; L. J. DeCuir, M.F.A. Tulane.

M.S.T. ARTS DEGREE CURRICULUM

The departmental requirement for the M.A. degree in Speech and Theatre is 45 quarter hours (inclusive of hours taken toward a minor), at least 22 hours of which must be earned in courses numbered 5000 or above. Only 9 hours of thesis credit (Speech and Theatre 5000) may be included in the 45-hour minimum for the degree. Speech and Theatre 5110 is required of all M.A. students. Area concentration requirements are as follows:

Speech Communication

(1) Enrollment in Speech 4999 during each quarter of full-time graduate study.

(2) 12 hours in rhetorical and communication theory.

(3) 9 hours in public and interpersonal communication.

(4) 3 hours (not inclusive of Speech and Theatre 5110 and Speech 4999) in methods and materials in theatre.

Theatre

(1) 15 hours in theatrical history and criticism.

(2) At least 9 hours (and no more than 12 hours) in performance and production courses may be included in the 45-hour minimum for the degree.

(3) No more than 6 hours in projects courses.

For detailed information, contact the Director of Graduate Studies, Department of Speech and Theatre.

Speech

3541 Rhetorical Theory and Criticism (4) Survey of Western rhetorical theory; contemporary approaches to criticism of public address. Recommended: 1211.

4222 Advanced Argumentation and Debate (4) Prereq: 2331 or consent of instructor. Sp

4461 Quantitative Research Methods In Speech Communication (4) Designing experiments; planning field studies; using statistical analysis.

4551 Sociology of Law (3) May be repeated. Maximum 9 hrs. Sp

5000 Thesis (1-15) E

5140 Communications Theory (3) May be repeated. Maximum 9 hrs. F

5160 Theatre and Technique in Oral Interpretation (4) Literary, psychological, communicative, and aesthetic approaches to collection, adaptation, and oral presentation of literature. May be repeated. Maximum 6 hrs. W, Sp

5700-70 Social Change (3, 3) W

6530 Sociology of Law (3) May be repeated. Maximum 9 hrs.

6540 Readings in Criminology and Deviance (3) May be repeated. Maximum 9 hrs.

6550 Social Change (3, 3) W

6620 Seminar in Formal Organization (3) Organizations, organizational change and effect of technology; social consequences of automation; unionization and organization; organizations and community interrelatedness. Prereq: Consent of instructor.

6630 Seminar in Formal Organization (3) Comparative organizational analysis; case studies, selected readings; Personality and organization. Prereq: Consent of instructor.

6710 Seminar in Class and Status (3) Classic and recent studies of class and status. Methods used in research and current position of theory.

6910 History of American Public Address (4) May be repeated. Maximum 15 hrs.

7000-60 Thesis (1-15) E

7500-70 Social Change (3, 3) W

7610 Theatre and Technique in Oral Interpretation (4) Literary, psychological, communicative, and aesthetic approaches to collection, adaptation, and oral presentation of literature. May be repeated. Maximum 6 hrs. W, Sp

7810-20 History of American Public Address (4, 4) May be repeated. Maximum 15 hrs.

7850 Communication Theory (3) May be repeated. Maximum 9 hrs.

7860 Theatre and Technique in Oral Interpretation (4) Literary, psychological, communicative, and aesthetic approaches to collection, adaptation, and oral presentation of literature. May be repeated. Maximum 6 hrs. W, Sp

8000-60 Thesis (1-15) E

8510 Theatre Practicum: Performance (1-4) Supervised work on departmental productions. Available for credit only to theatre majors or with consent of department. Prereq: Consent of instructor. May be repeated. Maximum 4 hrs. E

8520 Theatre Practicum: Production (1-4) Supervised work on departmental productions. Available for credit only to theatre majors or with consent of department. Prereq: Consent of instructor. May be repeated. Maximum 4 hrs. E

8530 Summer Repertory Productions (4) Supervised work on summer repertory productions. Available only to members of summer company by consent of instructor. Su

8540-15 Technical Theatre (4, 4) Special techniques in scenery and property construction; stage management; problems and basic technical theatre practice. Prereq: 2211-21, or consent of instructor. Must be taken in sequence.

8550-22 Introduction to Scene Design (4, 4) Problems in stage design with reference to space and form, movement, scale, and style; rudiments of rendering and ground plan preparation. 3222-Play
Theatre.

3252-53-54 History of the Theatre (4, 4, 4) Drama in the Western theatre with particular emphasis on theatre architecture, scene design, and acting styles. 3252: Prehistory to Renaissance. 3253—The European Theatre, 1650-1650. 3254—Modern Theatre.

3263 History of American Theatre (3, 3, 4) Development of theatre as social institution in America, 1865-1900. 3262—From its beginnings to 1900. 3263—The development of theatre as social institution in America from 1900 to present.

3321-22 Introduction to Lighting Design (4, 4) Course as an expression of character on stage; the application of color, contrast and environment for dramatic action; rudiments of surface color; construction of spatial illusion through color with reference to rendering, scene painting, and preparation of painter's elevations. Must be taken in sequence. F, W

3321-22 Indexing (4, 4) Exercises in voice and movement; preparation of costume history to specific design projects. Prereq: 2211. F, W

3451-52 Play Directing (4, 4) Must be taken in sequence as an expression of character on stage: the application of costume history to specific design projects. Prereq: 2211. F, W

3512. W; Sp

4541-42 Advanced Theatre Costume Design (4, 4) Advanced technical theatre; advanced scenic design, interpretation, and execution. E

5680 Projects in Technical Theatre (3) Problems of set design, interpretation, and execution. E

5701-72-73-74 Master Class in Acting (5, 5, 5, 6)

5800-81-82 Design and Technical Theatre Seminar (6, 6, 6)

5900 Studies in Dramatic Theory and Criticism (3, 3, 3) F, W; Sp

Speech Pathology

See Audiology and Speech Pathology

University Studies

(Non-Departmental)

University Studies deal with important contemporary topics which are sufficiently comprehensive to require the study and attention of students and faculty from more than one college. They are open to all qualified members of the university community.

4100 Energy Needs and Our Environment (3) Problems of present and projected energy resources and demands; economic, behavioral, legal, technical and environmental opportunities and constraints; regional impacts of energy production and high school dramatic programs. (Same as Curriculum and Instruction 5912.) Su

5912 Play Production in Secondary Schools (4) Principles and methods for directing high school dramatic programs. Prereq: Consent of instructor. F, W; Sp

5950-60-70 Studies in Dramatic Theory and Criticism (3, 3, 3) F; W; Sp

The Department of Zoology offers the Master of Science and Doctor of Philosophy degrees with concentrations in aquatic biology and ecology, cell biology and radiation biology, physiology, genetics, organismal and field biology, and reproduction 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) general zoology or general biology, 12 quarter or 8 semester hours; (2) upper division zoology, 18 quarter or 12 semester hours; (3) chemistry, two years including 12 quarter or 8 semester hours of general inorganic; (4) mathematics, 9 quarter or 6 semester hours including differential and integral calculus; (5) physics, 12 quarter or 8 semester hours; (6) Graduate Record Examination scores acceptable for Graduate and Advanced Biology; and (7) a grade point average of 3.0 out of a possible 4.0. Otherwise superior students, deficient in one or more of the above requirements, may be admitted at the discretion of the Graduate Committee.

A course in biostatistics is required of all candidates for an advanced degree in Zoology.

All aspirants for advanced degrees in Zoology must exhibit competency in four (M.S.) or five (Ph.D.) of six areas of zoology as determined by a comprehensive examination. Students must take this examination during the fall quarter of the first year and may repeat the examination the following fall quarter if unsatisfactory scores are received. Competency must be exhibited within this two-year period for a student to continue in the program.

Preparation for thesis or dissertation: During the first year a written examination and a special research problem in each of two faculty members' laboratories will determine the student's preparation for thesis or dissertation study.

THE DOCTORAL PROGRAM

Special requirements in Zoology are as follows: (1) course requirements shall be determined by the candidate's faculty committee; (2) the preliminary examination will be an oral and written examination in zoology and in allied fields in which the candidate has had training; (3) the candidate for the Ph.D. degree must possess a reading knowledge of at least one foreign language in which there exists a sizeable amount of literature relevant to the major field of study. The student has the option of demonstrating a reading knowledge of this foreign language by (a) passing the official reading examination given by the language department or (b) earning at least a B in 3030 language courses. This requirement for the first language must be fulfilled before the student can take the preliminary examination. The student's faculty committee may require the student's completion of training or proficiency in a second foreign language but may not require that the student take the official language examination in the second language.

1Alumni Distinguished Service Professor.
4269 Comparative Animal Physiology Laboratory II (1) Coreq: 3080 and consent of instructor. Coreq: 4260. W
4270 Immunology (3) (Same as Microbiology 4270) W
4280 Comparative Endocrinology (5) Comparative analysis of the physiology and morphology of endocrine glands in vertebrates and invertebrates. Their role in the regulation of the life cycle of the organism and species. Prereq: 3060 or 3920. W
4290 Herpetology (4) Classification, distribution, life histories, collection and identification of amphibians and reptiles, primarily of local species. 2 hrs and 2 labs or field periods. Sp
4300 Ornithology (4) Morphology, physiology, behavior, reproduction, populations, evolution, field identification of birds and 2 hrs or field periods. Sp
4310 Nuclear Physics (4) Chromosome structure and behavior in mitosis and meiosis. Prereq: Biology 3110. 1 hr and 3 labs.
4320 Microtechnique (4) Prereq: 3320 recommended. 2 hrs and 2 labs.
4330 General Cytology (4) Study of cellular organelles at the light and electron microscope levels and the functioning of these organelles. Prereq: Biology 3120. Sp
4349 General Genetic Laboratory (2) Primarily designed to illustrate basic principles of inheritance. Prereq: Biology 3110. W
4380 Organic Evolution (3) Modern concepts of animal evolution. Prereq: Biology 3110. F
4390 Human Genetics (3) Principles and problems of human genetics. Prereq: Biology 3110. W
4410 General Parasitology (4) Morphology, taxonomy, and system, and organism changes. Recommended prereq: Agricultural Biology 3210 or Biology 3130. W
4450 Protozoology (4) Morphology, taxonomy, and field of parasites in relation to fundamental biological concepts. 2 hrs and 2 labs. Recommended prereq: Biology 3120. Sp
4610-20 Comparative Animal Pathology (2, 2) Abnormal morphological changes and their causes. 4610—Cell and tissue changes. 4620—Organ, organ system, and organism changes. Recommended: 3060, 3080, 3320.
4619-20 Comparative Animal Pathology Laboratory (2, 2) Tissue changes and experimental techniques. Coreq: 4610-20. 4 hrs and 1 lab. Prereq: 4610-20.
4660-70 Limnology (4, 4, 4) 4660—Effects of origin, age, and location of lakes on their physical and chemical nature. 4670—Lake communities, productivity and pollution. Prereq: Chemistry 1110-20 and Biology 3130. Recommended: Botany 1110-20 and Physics 1210-20. 2 hrs and 2 labs (4660); 3 hrs and 1 lab (4670). Must be taken in sequence, except with consent of instructor. F, Sp
4700 Arachnology (4) Biology of spiders, mites, scorpions, and relatives. Prereq: 3110, or 3150. 2 hrs and 2 labs.
4720 Comparative Animal Behavior (4) Methods and principles. (Same as Psychology 4720.) F
4729 Comparative Animal Behavior Laboratory (4) Laboratory and field studies. Coreq: 4720. (Same as Psychology 4729.) F
4810-20 Insect Morphology and Taxonomy (4, 4, 4) 4810—Insect morphology and taxonomy of insects and their relationships to man. Coreq: 4820-30; 3110 or consent of instructor. 2 hrs and 2 labs. F; Sp; A
4940 Physiology of Exercise (4) Functions of body in muscular work; physiological aspects of fatigue, training and physical fitness. Prereq: 2920-30 or 3060. 3 hrs and 1 lab. F, Sp
5000 Thesis (1-15) E
5080 Graduate Research Participation (3) Advanced research techniques studied under supervision of staff research director. Techniques may be repeated with consent of department. SNC only. E
5110-20 Special Problems (2, 2, E)
5150 Zoological Bibliography (1) Methods of locating and using zoological literature, bibliographies, and abstracts, and of preparing bibliographies and scientific papers.
5180 Fresh Water Invertebrate Zoology (4) Ecology and taxonomy of fresh water invertebrates exclusive of insects. Laboratory and field study. Prereq: 3150.
5210 Plant Parasitic Hematology (4) (Same as Agricultural Biology 5210.)
5270 Advanced Neurornuscular Physiology (5) Cellular and molecular aspects of phenomena associated with conduction of excitation and muscular contraction. Prereq: 4200. 3 hrs and 2 labs.
5280 Insect Physiology (4) Functions and interrelationships of systems relative to metabolism, growth, coordination, movement, and reproduction. Prereq: 4670-L. Consent of instructor. 2 hrs and 2 labs. W, A
5390 Quaternary Problems (4) (Same as Geology 5590 and Botany 5590)
5310-20 Seminar in the Teaching of College Zoology (2, 2) Current concepts and principles in teaching of zoology; modern techniques and instrumentation; supervised application of teaching principles and methods. Must be taken in sequence. Prereq: Consent of instructor. SNC only.
5350 Biometry (3) Statistical methods used in analysis of quantitative biological data. Prereq: 1 yr statistics or consent of instructor.
5410 Advanced Parasitology (4) Life cycles, techniques of collection, preservation, and identification of parasitic worms and protozoa. Prereq: Consent of instructor.
5480 Advanced Medical Entomology (3) Prereq: 4430.
5510-20 Advanced Animal Physiology (5, 5) Primarily mammalian physiology: 5515—membrane neuron, central nervous system, muscle, cardiovascular system, and respiratory, renal, gastrointestinal, and reproductive physiology; acid-base mechanisms, and metabolism. Should be taken in sequence if both courses are taken. Prereq: General undergraduate anatomy and physiology and Biochemistry 4110 or equivalent course and consent of instructor. Biochemistry 4120 also recommended. (Same as Animal Science 5510-20.) 4 hrs and 1 lab. W, Sp
5550 Advanced Ornithology (4) Classification, distribution, and anatomy of birds. Prereq. 4340.
5570 Animal Populations (3) Characteristics and methods of study of animal populations.
5610-20 Foundations of Radiation Biology (4, 4) Physical, chemical, and biological mechanisms involved in actions of ionizing radiations on living cell and its components. Recommended prereq: 1 yr biological science, general physics; biochemistry; calculus. (Same as Radiation Biology 5610-20.) 3 hrs and 1 lab.
5630 Methods of Experimentation with Laboratory Mammals (3) Designed to give competence in handling research mammals. Techniques of anesthesia, drug administration, radiography and surgery. Prereq: 4050, or 4410, or consent of instructor.
5680 Physiology of Development (3) Chemical aspects of growth, differentiation, aging, and cell and tissue development. Recommended prereq: Biochemistry 4110-20. F
5670 Cellular Immunology (4) Laboratory course with emphasis on immunological phenomena at cel-
lular level. Preparation and use of immunofluorescent reagents, macrophage migration inhibition, skin allograft reactions, diffusion chamber cultures, and antibody formation at cellular level. 4 hrs and 2 labs.

5760 General Vertebrate Neuroanatomy (3) (Same as Psychology 5760.)

5780 Radiation Physiology (4) Effects of different kinds of radiations on functions of cells, tissues, and organ systems of animals. Recommended prereq: 5610. (Same as Radiation Biology 5780.)

5790 Transport of Ions Across Epithelia (4) Operational principles and methods needed to study electrical and kinetic properties of epithelia and electrically excitable tissues. Quantitative methods of measuring ion fluxes and flux ratios. Prereq: Two upper-division physiology courses, graduate standing, or consent of instructor. Recommended prereq: Chemistry 3810.

5820 Methods of Taxonomy (4) Classification of animals; rules of nomenclature; problems in priority, preparation of keys, descriptions, and figures. Prereq: Consent of instructor. W

5840 Aquatic Insects (4) Taxonomy and biology of aquatic insects, emphasis on immature forms. 2 hrs and 2 labs. Sp

5860 Geographic Distribution of Animals (4) Distribution patterns of vertebrate and invertebrate animals in all major habitats. Prereq: Consent of instructor.

5870 Insect Synecology (4) Ecology of insect communities.

6000 Doctoral Research and Dissertation (3-15) E

6110 Seminar in Cellular Biology (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. Sp

6140 Seminar in Immunobiology (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

6210 Seminar in Physiology (2) Prereq: Two physiology courses or consent of instructor. May be repeated. Maximum 6 hrs.

6310 Seminar in Cytology (2) Prereq: 4310. May be repeated. Maximum 6 hrs. W

6350 Seminar in Developmental Biology (2) Internal regulation in differentiating cell. Prereq: 3050, 4050; Biochemistry 4110-20. W

6410 Seminar in Parasitology (2) Prereq: 5410. May be repeated. Maximum 6 hrs.

6610 Seminar in Genetics (2) Prereq: General genetics. May be repeated. Maximum 6 hrs. F

6610 Seminar in Ornithology (2) Prereq: 4300. May be repeated. Maximum 6 hrs.

6650 Seminar in Aquatic Biology (2) Prereq: Any 2 of 4200, 4660-70, Botany 3061, or consent of instructor. May be repeated. Maximum 6 hrs. F, W, Sp

6710 Seminar in Ecology (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. W

6810 Seminar in Entomology (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. Sp

6910 Seminar in Radiation Biology (2) Prereq: 5610. Coreq: 5620. May be repeated. Maximum 6 hrs. (Same as Radiation Biology 6910.)
The College of Nursing offers a five-quarter program of study leading to the Master of Science in Nursing degree. The general purpose of the program is to prepare at the graduate level nurses who are qualified to function as practitioners, clinicians, educators, and administrators in all segments of the health care delivery system. Upon successful completion of the program, graduates will be able to:

1. Provide advanced high quality, comprehensive nursing care to individuals and groups in a variety of settings;
2. Collaborate with other health professionals in systematic implementation and evaluation of health care delivery to large groups in institutional and community settings;
3. Utilize appropriate advanced teaching, administrative and clinical practice skills in the discharge of one's professional responsibilities;
4. Utilize appropriate research findings in the implementation and evaluation of nursing care;
5. Participate in clinical research activities by means of data collection, tabulation, and analysis, and by generating research topics for referral to nurse researchers.

GENERAL REQUIREMENTS FOR ADMISSION

1. Meet requirements for admission to the Graduate School.
2. Hold a Bachelor's degree in Nursing. If the Bachelor's degree is not in Nursing, the applicant must demonstrate successful completion of the equivalent of an upper division major in Nursing.
3. If the number of qualified applicants exceeds the number that can be accommodated, preference will be given to applicants:
   a. whose undergraduate GPA is 3.0 or higher;
   b. who have had at least two years of full-time clinical practice experience following completion of a baccalaureate nursing program;
   c. who are Tennessee residents;
   d. who are currently employed in underserved health service areas and who can demonstrate their commitment to return to those areas following completion of the program;
   e. who are currently employed as nurse educators in programs preparing registered nurses; or
   f. who are currently employed as directors of nursing service.
4. Ordinarily one year of full-time clinical practice experience should be completed prior to applying for admission to the program.

DEGREE REQUIREMENTS

1. Students must complete 60 quarter hours of graduate level course work with a cumulative GPA of 3.0 or better.
2. The 60 credit hours must include the following components:
   - Core requirement:
     - Clinical concentration option: 17 hrs
     - Functional concentration option: 26-30 hrs
     - Electives:
       - 5-9 hrs
   - Total: 60 hrs
3. A Master's thesis is not required, but those students who wish to complete a thesis may substitute the thesis for the 9 elective hours.
4. Those students who do not choose the thesis option must successfully complete a comprehensive final examination.
5. Students may choose either primary care nursing, secondary care nursing or community mental health nursing as a clinical concentration option. Students selecting the primary care nursing option must complete the following courses: 4770, 5050, 5240, 5260, 5550, 5650. Students selecting the secondary care nursing clinical option must complete the following courses: 5120-30 (or 5140-50), 5310, 5330, 5340, 5510, 5530. Students selecting the community health nursing option must complete the following courses: 5410-20-30-40, 5470, 5510, 5530.
6. The core requirement which must be completed by all students regardless of clinical option includes 5010, 5020, 5030, 5210 and a graduate level statistics course which must be approved in advance by the student's faculty advisor.
7. Students may select a functional concentration option in teaching, management or advanced clinical practice. Students selecting the teaching option must complete 6 hours of graduate level courses in education and 5630. Students selecting the management option must complete 6 hours of graduate level courses in administration and 5730. Students selecting the advanced clinical practice functional option must complete 5560 and 5630 if their clinical option is primary care, 5320 and 5340 if their clinical option is secondary care or 5520 and 5540 if their clinical option is community mental health. All courses taken in other colleges must be approved in advance by the student's faculty advisor.

Faculty
Professor:
S. E. Hart (Dean), Ph.D., New York.
Associate Professors:
M. E. Groer, Ph.D., Illinois; J. Mayall, Ph.D., Purdue; B. M. Reid, M.S.N. Columbia.
Assistant Professors:
K. P. Conlon, M.S.N. New York, (Buffalo); M. M. Feltske, M.N. Florida; M. F. Kollar, M.N. Vanderbilt.

Courses
4240 Nursing in Acute Care Settings (5) Theory and clinical practice related to care of hospitalized children and adults experiencing acute illness episodes. Open only to MSN candidates lacking undergraduate major in nursing; others with consent of instructor. Prereq: All required 2000 and 3000 level nursing courses. 3 hrs and 2 labs. Su
4260 Community Mental Health Nursing (5) Theory and clinical practice related to care of clients whose...
primary actual or potential health problem is psychosocial or developmental; strong family and community orientation with emphasis on mental health of the family. Open to MSN candidates lacking undergraduate major in nursing; others with consent of instructor. Prereq: All required 2000 and 3000 level nursing courses. 4200 Coreq: 4210. 3 hrs and 2 labs. Sp

4280 Nursing the Child Bearing Family (5) Theory and clinical practice related to care of clients and their families. Prereq: 4200 and 4201. Open to MSN candidates lacking undergraduate major in nursing; others with consent of instructor. Prereq: All required 2000 and 3000 level nursing courses. 3 hrs and 2 labs. Sp

4330 Nursing in the Specialties (2-4) Application of principles from behavioral, physical, social and nursing sciences to solution of nursing problems. Exploration of nursing intervention needed to maintain or restore homeostasis in clients experiencing selected physiological or behavioral deviations. Specific topics to be determined by faculty and students. Prereq: Consent of instructor. May be repeated with consent of instructor. Maximum 12 hrs. Sp

4350 Oncology Nursing (3) In-depth exploration of the cancer problem, medical and nursing intervention. Interactions and therapeutic intervention; assessment of physiological and pathological manifestations of acute illness in children with special emphasis on developmental implications. Medical and nursing therapeutic modalities. Prereq or coreq: 5010. 3 hrs and 3 labs. W

5010 Applied and Pathophysiology (5) Advanced physiological theories and principles related to normal and abnormal body function with particular emphasis on those processes which, when altered, are most commonly encountered in acute and chronic disease states. Prereq: 3210-20 or 4010 or consent of instructor. 5 hrs. F, Sp

5420 Principles of Community Mental Health I (3) Continuation of 5410 with emphasis on recognized and developing approaches to mental health problems encountered in acute and chronic care settings. Prereq: Consent of instructor. May be repeated. W

5110 Geriatrics and Gerontology (4) Physiological, psychological, developmental, economic, and sociocultural aspects of aging; health needs of aging people; emphasis on family issues and management with aging process; management of health care for elderly. Prereq: 5010. 2 hrs and 2 labs. Sp

5120 The Acutely Ill Adult I (6) In-depth exploration of physiological and pathological manifestations encountered in acute illness usually associated with adulthood. Medical and nursing therapeutic modalities will be explored. Prereq or coreq: 5010. 3 hrs and 3 labs. W

5130 The Acutely Ill Adult II (6) Continuation of 5120 with further exploration and analysis of impact of acute illnesses on adult clients and their families. Prereq: 5010. 3 hrs and 3 labs. Sp

5140 The Acutely Ill Child I (6) In-depth exploration of physiological and pathological manifestations of acute illness in children with special emphasis on developmental implications. Medical and nursing therapeutic modalities. Prereq or coreq: 5010. 3 hrs and 3 labs. W

5150 The Acutely Ill Child II (6) Continuation of 5140 with further exploration and analysis of impact of acute illness on children and their families. Prereq: 5010. 3 hrs and 3 labs. W

5170 Readings in Applied Physiology (3) Carefully planned library study of selected topics in physiology and pathophysiology related to various body systems. Prereq: 5010. E

5210 Nursing Research Methods (4) Utilization of research process to identify and solve common nursing problems; data collection and analysis; use of the literature; presentation and publication of findings. Prereq: Graduate level course in behavioral or biomedical statistics. W, Sp

5240 Management of Common Health Problems (5) Indications for treatment and referral; use of protocols and treatment plans; pharmacological agents in common use; intervention in emergencies. Prereq: 5010, 4770. 3 hrs and 2 labs. W

5250 Chronic Health Problems (4) Indentification and in-depth exploration of health problems of long-term or lifelong nature common to people in various age groups over life cycle; nursing and health care management of individuals and groups who must deal with one or more chronic health problems throughout most or all of their lives. Prereq: 5010, 5240. 3 hrs. W

5260 Advanced Family Health Care (4) Nursing and health care management of families in child-bearing and child-rearing stages of development; advanced developmental nursing dynamics; management of women during pregnancy, labor and delivery, and post partum period, assessment of newborn infants. Prereq: 5010, 4770. 2 hrs and 2 labs. Sp

5310 Secondary Care Nursing Field Work I (9) Advanced clinical practice in acute care hospital settings with opportunities to apply newly acquired nursing knowledge to more complex clinical nursing situations. Prereq: 5120-30 or 5140-50. Su

5320 Secondary Care Nursing Field Work II (9) Continuation of 5110 with emphasis on further acquisition and refinement of nursing skills needed to provide high quality nursing care to acutely ill patients. Prereq: 5310. Sp

5330 Secondary Care Nursing Seminar I (2) Weekly, on-campus seminar taken concurrently with 5310; topics focus on discussion of nursing problems commonly encountered in acute care settings. Su

5340 Secondary Care Nursing Seminar II (2) Continuation of 5330 to be taken concurrently with 5320. F

5410 Principles of Community Mental Health I (3) Epidemiology; influence of biological, cultural, religious, and economic variables affecting mental health status of individuals, families, and communities; functions and status of community mental health centers. F

5420 Principles of Community Mental Health II (3) Continuation of 5410 with emphasis on recognized and developing approaches to mental health problems encountered in acute and chronic care settings. W

5430 The Adult and Mental Health (3) Coping and adjustment problems commonly experienced from post adolescent through middle adulthood; nursing approaches to alleviation of mental health problems of both institutionalized and noninstitutionalized adults. 2 hrs and 1 lab. W

5440 The Child and Mental Health (3) Normal and abnormal behavioral and psychosocial development from infancy through adolescence; emphasis on primary preventive activities. Treatment systems and modalities in clinical settings. Prereq: 5430. 2 hrs and 1 lab. Sp

5470 Advanced Psychiatric Nursing Skills (3) Group and family process and therapy in primary and secondary levels of mental health. Continued exploration, analysis and application of other therapeutic interventions. Prereq: 5430. 2 hrs and 1 lab. Sp

5510 Community Mental Health Nursing Field Work I (9) Clinical practicum in a community setting providing opportunities to apply mental health nursing knowledge in planned interactions with individuals and groups at primary, secondary and/or tertiary care levels. Community and mental health systems assessment. Prereq: Consent of instructor. W

5520 Community Mental Health Nursing Field Work II (9) Clinical practicum for graduate student choosing functional concentration of advanced clinical practice. Objectives identified by student to meet specific learning and practice needs. Prereq: 5510 and 5530. F

5530 Community Mental Health Nursing Seminar I (3) On-campus seminar taken concurrently with 5510; common nursing and community problems encountered by community mental health nursing field students. Su

5540 Community Mental Health Nursing Seminar II (2) Taken concurrently with 5520; a continuation of 5530. F

5550 Nurse Practitioner Fieldwork I (6) Placement in selected off-campus primary health care delivery site for purposes of applying newly acquired knowledge and developing clinical skills necessary to function as a nurse practitioner. Prereq: 5580, 5240, 5260. Su

5560 Nurse Practitioner Fieldwork II (6) Continuation of 5550 with further emphasis on acquisition of nurse practitioner skills coupled with ability to function autonomously in selected practice settings. Prereq: 5550, 5560. Su

5570 Special Topics (3) In-depth study of selected nursing topics, problems, or issues not covered in other courses. Prereq: Consent of instructor. Maybe repeated. Maximum 6 hrs.
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 Doctor of Philosophy degrees. The National Laboratory, one of three installations operated at Oak Ridge by Union Carbide Corporation for the Department of Energy, is a well-known center of basic research. The school utilizes the staff and facilities of this laboratory, and thus brings directly into the mainstream of full-time graduate study in the life sciences the talent and experience of that staff, as well as the most advanced research methods and technology.

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

The School is not departmentalized, and, apart from certain basic requirements, 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 research areas available for Master's thesis and Ph.D. dissertation work are biochemistry, biophysics, carcinogenesis, genetics, and cellular, developmental and mammalian biology. Included are such subjects as immunology, protein and enzyme chemistry, nucleic acid chemistry, cytology, radiation and environmental biology, virology, developmental biology, experimental pathology, microbial and mammalian genetics, mutagenesis, 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 previous training in biology, calculus, physics, and organic and physical chemistry. However, a course in physical chemistry is offered by the School in order to meet this requirement. It is recommended that deficiencies in meeting entrance requirements should 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 Y, Oak Ridge, Tennessee 37830.

THE DOCTORAL PROGRAM

Requirements for the Ph.D. degree are:
1. Satisfactory (B grade or better) completion of the following core courses or their equivalent: Biochemistry (5110-20); Biophysics (5140); Genetics (5160); Molecular Genetics (5170); Cell Biology (5180-90): Mammalian Physiology (5200); and Statistics for Biologists (5740).
2. Three quarters of Biomedical Sciences Laboratory (5310-20-30-40).
3. Participation in Biomedical Sciences Seminar (5350-60-70) for one year.
4. Participation in at least one of the seminars during each quarter of residence after the first year is strongly recommended.
5. An examination as determined by the student's committee. The number and nature of the required advanced courses will vary depending upon the student's background and area of specialization.
6. Pass both written and oral examinations.
7. A dissertation reporting the results of original and significant scientific research. A minimum of 36 quarter hours of course 6000 is required.
8. A final oral examination on the dissertation.
9. A formal seminar presentation of the dissertation research.

SPECIAL MASTER OF SCIENCE DEGREE PROGRAM

The graduate faculty has designed a Master of Science program in Biomedical Sciences primarily to fill the need for such a degree within the Oak Ridge National Laboratories; however a limited number of students from other institutions may be accepted if qualified and as space is available. Requirements for the M.S. degree are:
1. Graduate credit or a proficiency in the following core courses: Biochemistry (5110-20); Cell Biology I (5180); Cell Biology II (5190); plus any three of the following four courses: Biophysics (5140); Genetics (5160); Molecular Genetics (5170); and Mammalian Physiology (5200). Additional credits may be obtained (6 to 15 credit hours) with electives. The student will need previous training in biology, calculus, physics, organic and physical chemistry.
2. Forty-five credit hours of approved graduate courses including a minimum of 9 quarter hours for thesis (maximum 18 quarter hours of credit for course 5000).
3. For admission to candidacy: Completion of any required prerequisite courses and one quarter of graduate course work with a B average. Admission to candidacy forms must be filed at least one full quarter prior to receipt of degree.
4. A Master's Committee of three approved faculty members upon admission to candidacy.
5. A thesis reporting results of original and significant scientific research.
6. Pass a final oral (or oral and written) examination as determined by the student's committee.

Full-Time Faculty

Professors: D. Billen, Ph.D. Tennessee; D. E. Olins, Ph.D. Rockefeller.
Associate Professor: F. H. Gaertner, Ph.D. Purdue.
Assistant Professor: N. W. Revis, Ph.D. (Glasgow, Scotland).

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

W. E. Barnett (Director), Ph.D., Florida State; R. J. Preston (Associate Director), Ph.D.
Washington; A. L. Olins, Ph.D.; J. S. Cook, Ph.D.; D. M. Skinner, Ph.D.
State.

M. A. Brown, Ph.D., Texas; J. N. Dumont, Ph.D., Massachusetts; G. A. Heeman, Ph.D.
Florida State; F. J. Finamore, Ph.D., Florida State.

D. G. Gosslee, Ph.D., North Carolina State; E. H. Greff, Ph.D., Kansas State; Technology; R. F. Graff, Ph.D., Tennessee.
W. D. Gude, M.S. Tennessee; F. C. Hartman, Ph.D.; J. W. Longworth, Ph.D.
State; J. K. Selkirk, Ph.D. (Armenia)

R. A. Wallace, Ph.D., Georgia; L. C. Waters, Ph.D.; M. Uziel, Ph.D.
Iowa; P. A. Swenson, Ph.D. (Stanford); D. G. Gosslee, Ph.D.
North Carolina State; D. M. Skinner, Ph.D.

J. B. Storer, M.D. Chicago; M. P. Stulberg, Ph.D.
State; A. W. Hsie, Ph.D. (Indiana); L. H. Smith, Ph.D.
Syracuse; D. G. Gosslee, Ph.D.

M. A. Brown, Ph.D., Tennessee; J. C. NRL (Ph.D.); G. Andrews, Ph.D.; R. F. Kimball, Ph.D.
Ph.D. Massachusetts; A. Hollaender, Ph.D.

S. P. Leibo, Ph.D. (Princeton); F. W. Larimer, Ph.D.
Florida; G. D. Novelli, Ph.D. (Harvard); E. F. Oakberg, Ph.D.

Ph.D. Tulane; S. P. Leibo, Ph.D.; W. L. Carrier, M.S.
Medical Center; L. H. Smith, Ph.D. (Syracuse); D. G. Gosslee, Ph.D.
North Carolina State; A. W. Hsie, Ph.D.

and in-depth surveys of active areas of contemporary modern biological science.

5920 Mammalian Genetics (3) Orderly presentation of known genetic variants affecting each organism system of experimental mammals, especially laboratory mouse and Drosophila.

5940 Bioorganic Reaction Mechanisms (3) Nature of chemical bond, nucleophilic and electrophilic reactions, molecular rearrangements, oxidation-reduction, solvolysis, protein and nucleic acid modification reagents, reactions involving proteins and nucleic acids on polymer supports.

5850 Cryobiology (3) Physical and chemical responses of cells and bacteriohphere to low temperatures and ice formation. Relation of these responses to permeability, structure and function of semipermeable membranes, conformation of macromolecules, and nature and water of water in cells, and how they bear on other fields of biology and medicine—including electron microscopy, photobiology, cell physiology, exobiology, ecology, and cryosurgery.

5900 Classic Experiments in Genetics (3) Original papers presenting new and lasting concepts in genetics. Prereq: 5170.

6000 Doctoral Research and Dissertaton (3-15)
6110 Seminar in Plant Physiology (1) May be repeated. Maximum 12 hrs. S/NC only.
6120 Seminar in Cellular and Developmental Biology (1) May be repeated. Maximum 12 hrs. S/NC only.
6130 Seminar in Genetics (1) May be repeated. Maximum 12 hrs. S/NC only.
6140 Seminar in Mammalian Research (1) May be repeated. Maximum 12 hrs. S/NC only.
6150 Seminar in Immunology (1) May be repeated. Maximum 12 hrs. S/NC only.
6160 Seminar in Biophysics (1) May be repeated. Maximum 12 hrs. S/NC only.
6170 Seminar in Biochemistry (2) May be repeated. Maximum 24 hrs. S/NC only.
6180 Advanced Seminar in Biomedical Sciences (1-3) Presentation, evaluation and discussion of current research in various areas of biomedical sciences, including cell biology, genetics, biochemistry, and microbiology. Prereq: Consent of instructor. May be repeated. S/NC only.
6190 Seminar in Animal Virology (1) Discussion of experimental data and in-depth surveys of active research problems in virology through use of literature. Prereq: Microbiology 4521 or equivalent and consent of instructor. May be repeated. Maximum 12 hrs. S/NC only.
6210 Protein Chemistry and Enzyme Mechanisms (3) Theoretical and practical aspects of protein chemistry including structure and function, transformation of proteins, chemical modification of proteins, and structure-function relationships. Latter topics covers enzymes, includes approximations of
substrates, covalent catalysis, general acid-base catalysis, and strain and distortion of substrates.
Prereq: 5110-20.


6240 Chemistry and Metabolism of Lipids (3) Nomenclature, chromatographic isolation, chemistry, physical properties, and enzymology of lipids. Hormonal action of prostaglandins and role of lipids in membranes, enzymic expression, and nervous tissue. Lipid biochemistry of mammals; comparative aspects, particularly lipid pathways in bacteria and yeast. Prereq: 5110-20.

6270 Viral Carcinogenesis (3) History of viral oncology and descriptive catalog of tumor viruses. Biology of normal and transformed cells. DNA tumor viruses; replication cycle; transformation; genetics; natural history. RNA tumor viruses; endogenous and exogenous states; genetics; induction; transformation; natural history.


6290 Cancer Biology and Biochemistry (3) Pathology and nomenclature of cancer. Tumor immunology and immunotherapy. Biochemistry of tumor cells; enzymology, metabolism; membranes; DNA repair; regulation; strategies in chemotherapy.

6300 Mutagenesis (3) Basic mechanisms in chemical and radiation mutagenesis and dosimetry in variety of systems including bacteria, fungi, Drosophila, and mice.

6510-20-30-40 Advanced Topics in Biomedical Sciences (3, 3, 3, 3) Current and future research developments. Topics listed under Special Topics Courses, can be taken either as tutorials or as literature survey courses requiring substantial student participation. May be repeated.
The Graduate School of Library and Information Science provides a library education program leading to the preparation of librarians for work in all types of libraries. The programs of study of this School include the graduate curriculum leading to the degree of Master of Science in Library Science.

MASTER OF SCIENCE IN LIBRARY SCIENCE

The goal of the program is to prepare graduates to function effectively in libraries and information centers. The program is designed to:
1. Enable students to examine critically the role and function of libraries and information centers in our society, and to define and redefine that role as the needs of society demand;
2. Enable students to understand and use the concepts and procedures related to the selection, acquisition, organization, and dissemination of knowledge;
3. Enable students to understand and apply the principles of management to the library and information center;
4. Enable students to assume individual and collective responsibility for the well-being and development of their profession and of professional service;
5. Enable students to make informed assessments and decisions regarding various career opportunities in libraries and information centers.

PROGRAMS OF INSTRUCTION

The program leading to the degree of Master of Science in Library Science involves a total of 51 quarter hours of graduate courses, 21 hours of which form a core curriculum required of all students. Either a thesis or a non-thesis program is available, with 9 hours allowed for thesis credit. At least 36 hours must be taken in the Graduate School of Library and Information Science, allowing up to 15 hours outside the School. Upon completion of the program, all students are subject to an 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. Programs are designed for persons interested in school libraries, public libraries, academic libraries, special libraries and information centers as well as a variety of library and information related activities.

ADMISSION REQUIREMENTS

The minimum grade point average for admission to the Graduate School is 2.5. 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 aptitude test of the Graduate Record Examination. The test should be taken at least one quarter in advance of application for admission to the Graduate School.

Foreign applicants are required to take the Test of English as a Foreign Language.

APPLICATION PROCEDURE

Admission to the programs in the Graduate School of Library and Information Science should be made in advance of the quarter for which admission is requested. Applicants should submit the "Application for Admission" form (printed as the first page of the Graduate School Catalog) and should request the registrars of all colleges and universities attended to send two official transcripts to the Graduate School. In addition, each applicant should make arrangements to take the GRE and TOEFL exams, if applicable. 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.

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 extend the period required for the degree up to two years.

Similar opportunities exist with some other libraries in the Knoxville area. A limited number of graduate assistantships are available through the School for the degree. 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.

Information on financial assistance is available from the Director of the Graduate School of Library and Information Science.

Faculty


Assistant Professors: J. M. Pemberton, Ph.D. Tennessee; G. M. Sinkankas, Ph.D. Pittsburgh.

Courses

4140 Libraries and Librarianship (3) Librarianship as an occupation: its organization, responsibilities, problems and prospects.

4150 School Library Administration (3) Objectives, functions, and place of school library: relationship to local and state services; cooperative planning for quarters and materials: evaluation. (Same as Curriculum and Instruction 4150.)

4270 Organization of Library Collections I (6) Acquisitions, cataloging and maintenance of library collections.

4330 Introduction to Reference Materials (3) Basic information sources and services for all libraries.

4750 Utilization of Instructional Media (3) (Same as Curriculum and instruction 4750 and Vocational-Technical Education 4750.)

5000 Thesis (1-15)

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a 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.

144
5110-20-30 Problems in Library Science (3, 3, 3)
May be repeated with consent of school.

5140 Research Methods in Library Science (3) Re- 
sertation methods applicable to library research; 
process and conduct of research; analysis of published re- 
search.

5200 Subject Reference and Bibliography (3) Gen- 
eral patterns of bibliographical organization and 
and basic information sources in subject fields including 
non-English materials; experiences in bibliographic 
methods and search techniques. Prereq: 4330.

5210 Sources and Services for the Social Sciences 
(3) English and non-English literature and biblio- 
graphical sources in education, economics, politi- 
cal science, history, anthropology, psychology, 
and sociology; organization of collections for 
 optimum use. Prereq: 5200.

5220 Sources and Services for the Natural Sci- 
ces (3) English and non-English literature and biblio- 
graphical sources in mathematics, physics, 
anatomy, chemistry, geology, biology and medicine; 
organization of collections for optimum use. Prereq: 5200.

5230 Sources and Services for the Humanities (3) 
English and non-English literature and biblio- 
graphical sources in literature and language, fine 
arts, music, philosophy and religion; organization of 
collections for optimum use. Prereq: 5200.

5240 Organization of Library Collections II (3) Con- 
struction and maintenance of library catalog as a retreiva 
instrument; indexing and subject analysis and 
theory, comparative classification with emphasis on 
Library of Congress system, and problems in reclas- 
sification. Prereq: 4270.

5250 Government Publications I (3) Acquisition, or- 
anization, and utilization of federal, state, and local 
government publications, publications of Congress; exec- 
tive branch agencies and the Federal courts as 
well as government research and development 
report literature.

5260 Government Publications II (3) Acquisition, 
organization and utilization of publications of 
foreign governments and international organiza- 	ions such as United Nations, UNESCO, and others.

5270 Legal Bibliography (3) Introduction to litera- 
ture of Anglo-American jurisprudence. Use of 
reports, statutes, administrative regulations and de- 
cisions, treatises, periodicals, and indexes as 
bibliographic tools.

5300 Library Management (3) Management and or- 
ganization concepts applicable to libraries and 
librarians.

5310 Multitype Systems and Networks (3) Organi- 
tization, structure, finance, planning, evaluation 
and services in state, regional, national, and interna- 
tional networking of information.

5330 Academic Libraries (3) Persistent and current 
problems. Topics vary depending upon needs and 
interests of group.

5350 School Libraries (3) Persistent and current 
problems. Topics vary depending upon needs and interests of group. Prereq: 4150 or consent of in- 
spector.

5360 Special Libraries and Information Centers (3) 
Development and present status, scope and objec- 
tives, administration and organizational problems; 
aquisition, organization, and use of information.

5370 The Library in the Community (3) Publiclibrar 
y as social agency; role in education and communica- 
tion systems of community.

5390 Seminar in Library and Information Science 
(3) Advanced study of varying topics. Prereq: Con- 
sent of instructor. May be repeated. Maximum 8 hrs.

5400 Library Facilities (3) Problems inherent in 
planning and construction of library quarters, inter- 
relationship of staff, materials, and user space re- 
quirements.

5500 Principles of Materials Selection (3) Philo- 
osophy and practice of building library collections in 
light of library objectives.

5510 Multimedia Resources of Libraries (3) Selec- 
tion, acquisition, processing, storing, and servicing 
onbook materials, with special attention to films, 
recordings, microforms, photo-copying.

5520 History of Books and Printing (3) Development 
of alphabet and writing; early writing materials 
book in manuscript; history and technique of print- 
ing; book illustration and binding; standards of modern fine printing.

5530 Contemporary Publishing (3) Creation, pro- 
duction, marketing, and distribution of materials 
acquired by libraries, with special attention to vari- 
ous types of publishers.

5540 Special Collections—Archives and Rare 
Books (3) Problems involved in acquisition, organi- 
ization, housing, preservation and utilization of rare 
books and archival materials.

5600 Reading Guidance for Children and Young 
People (3) Organization to meet needs, interest, 
abilities of different age and socioeconomic groups. 
Prereq: 5640 or consent of instructor.

5610 Mass Communications and the Library (3) 
Mass media of communication in terms of their rela-
tion to modern library service, considered as forces 
that influence what people read, see, and hear.

5620 Traditional Literature and Oral Narration (3) 
Fundamental principles of art storytelling; tech- 
niques of adaptation and presentation for various 
age groups, instruction and practice in oral tech- 
niques.

5630 Critical History of Children's Literature I (3) 
Development of literature for children noting influ-
ence of changing social and cultural factors; atten-
tion to emerging genres through primary sources. 
Fifteenth century to 1920.

5640 Critical History of Children's Literature II (3) 
Development of literature for children noting influ-
ence of changing social and cultural factors; atten-
tion to emerging genres through primary sources. 
1920 to present.

5691 Advanced Production of Audiovisual 
Software (3) (Same as Curriculum and Instruction 
5691.)

5700 Automation of Library Processes (3) Analysis 
of application of data processing methods to basic 
library operations such as bibliographic control, 
technical processes, circulation control, and man- 
agement functions.

5710 Introduction to Information Science (3) Con-
tent and method of information science; application 
of research findings to general library practice.

5720 Information Systems Analysis and Design (3) 
Elements in design and operation of information 
retrieval systems, including acquisition, indexing 
vocabularies, information representation, file or- 
ganization, search procedures, and system evalua- 
tion.

5730 Information Retrieval Systems Laboratory (3) 
Comparative capabilities of various types of infor-
mation retrieval systems; analyzing performance of 
systems to arrive at generalizations with respect to 
theory, design and operation of information retrieval 
systems.

5999 Practicum (6 or 9 or 12) Opportunity to trans-
late library theory into practice under guidance of 
qualified librarians. Prereq: Completion of 21-hr 
core curriculum plus approval of director.
The Graduate School of Planning offers a two-year graduate course leading to a degree of Master of Science in Planning with concentrations in land use, transportation, environmental, regional, administrative, health, and historic preservation planning.

The purpose of study is the education of professional planners, competent to handle positions of increasing technical and administrative responsibility. Graduates are candidates for professional service in regional, city, county, and metropolitan area planning agencies; in local, state, and federal agencies concerned with physical, economic and administrative planning; in private businesses and organizations dealing with urban problems; and in private consulting practices.

The curriculum is organized on a basis of six quarters, or 72 credit hours, and provides the student with core courses in planning theory, methods and techniques, and also takes advantage of offerings at The University of Tennessee in related fields such as government, economics, geography, civil engineering, and sociology.

The course of study ordinarily requires two years with an optional work internship during the summer between the two years. Planning courses as well as related courses will be offered during the summer period. This is to serve the needs of those planners now in the field who wish to acquire their professional degree but who can spare only the minimum amount of time from their jobs because of financial or family considerations.

Entering students follow a program of courses which provides education in the basic elements of planning. These include studies in theory, history, analytical methods, and legislation, as well as related courses in government, geography, sociology, and economics. Students are permitted to pursue particular interests through the choice of electives approved by the Graduate School of Planning. Practice in research and analysis on a particular planning problem or topic is obtained through the preparation of a thesis or major study option.

Core planning courses are taught by the faculty of the Graduate School of Planning. Related courses are taught by other specialists drawn from the University faculty. In addition, the services of experienced professional planners in TVA and other public and private organizations are called upon to broaden the scope of the students' understanding. A variety of outside speakers and seminar leaders provide insight into particular problems of significance to planners.

ADMISSION PROCEDURES

All applicants should submit two letters of recommendation with their applications. Both letters should be from teachers familiar with the applicant's undergraduate or, where applicable, graduate academic record. In the event the applicant has had planning experience, a third letter is required from a supervisor or other person familiar with the planning work of the applicant. All applicants who wish to be considered for financial assistance from the University or the Graduate School of Planning should also submit recent Graduate Record Examination scores for the Aptitude (verbal, quantitative and analytical) portion of that test. All applicants are also requested to submit a statement of career goals. All inquiries concerning admission should be addressed to: Director, Graduate School of Planning, The University of Tennessee, Knoxville, Tennessee 37916.

DEGREE REQUIREMENTS

Each student will be required to complete a minimum of 72 hours credit.

The following courses are the required core curriculum for the M.S.P. degree: 5040, 5045, 5100, 5110, 5130, 5190, 5230, 5270, 5290, 5340, 5435, 5440, 5465, 5500, Sociology 5320 or Statistics 5211. Waivers can be made by the faculty where competence is demonstrated.

Each student will be required to demonstrate competence in individual research. This may take either of two forms:

Plan I—Complete a thesis for 9 hours credit.

Plan II—Complete a major study with acceptable documentation. In order to be eligible for the major study the student must have earned a grade of B+ or higher in Research Methods II, have a 3.5 cumulative grade point at the time of approval of the major study proposal, and have completed at least 24 hours of graduate study. The student meeting these criteria may present a proposal for a major study which will include at least 9 hours of elective course work in an area of concentration. The proposal shall justify the area of study, the approach to the study, and the method of final documentation. Approval of the documentation, which must include written documentation, is a prerequisite for graduation.

Students in the Graduate School of Planning are given a comprehensive written examination after approximately four quarters of course work. In addition to testing the knowledge of the student, the information thus obtained is taken into account in advising students concerning the study program they should undertake during the balance of their academic program to remove any indicated deficiencies.

Each student will be encouraged, but not required, to complete a work internship equivalent to at least two and one-half months of full-time work in a planning agency at approximately the mid-point in course work.

Faculty

Professors:


Associate Professors:

G. E. Bowen, M.A. George Washington; J. A. Spencer, M.C.P. Ohio State.

Assistant Professors:

E. Cole, M.S.P. Tennessee; P. Fisher, M.S. Florida State; M. Kersey, B.L.A. Georgia; J. G. Stilloff, M.U.P. Hunter.

Courses

4100 Survey of Planning (3) History of city development and of planning with special attention to the U.S. experience in urban and other levels of planning. State of the art, the process, the comprehen-
5000 Thesis (1-15) E
5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. SYNC only. E
5005 The Planning Process (3) Identification and examination of generic aspects of planning process and planning techniques applied in variety of settings. Not for credit for M.S.P. degree. F, Su
5040 Communications for Planners I (1) Introduction to basic communications, interpersonal and oral communications, graphic presentations, audiovisual equipment. F, Su
5045 Communications for Planners II (1) Graphic communications in planning. Maps and mapping, computer graphics, models and presentation graphics. Prereq: 5040. W
5050 Communication for Planners III (1) Audiovisual equipment, programmed communications, and photography used in planning. Prereq: 5045. Sp
5100 Theory of Planning (3) Analysis of nature and objectives of planning process; role of planner in planning function in public decision-making. Prereq: 5110. W
5110 Introduction to Planning (3) History of planning, familiarization with operations of contemporary planning, concept of systems, current trends and issues. Relationship between planning and society in which it occurs. Designed for GEP students. F, Su
5130 Planning Research Methods I (2) Research techniques in subject areas associated with city and regional planning. Research tools, data collection and analysis as basis for planning and decision-making. (Same as Water Resources Development 5130). F, Su
5135 Planning Research Methods II (3) Application of rigorous investigation techniques in solving planning problems, including statistical analysis and mathematical models. Urban and regional information systems as resource and tool in problem identification and solution. Prereq: 5130. W, Sp
5145 Library Research for Planning (1) Survey of publications of interest to planners, including resources and research techniques. Use of facilities and collections of UTK library. F, W
5160 Planning and Utilities (3) (Same as Environmental Engineering 5160 and Water Resources Development 5160.)
5170 Planning for Historic Preservation (3) Planning for preservation, conservation and protection of historic buildings, sites and areas as related to urban and regional planning. Designation of sites, legislative needs, financing and administrative requirements. Prereq: 5130. W
5180 Planning Analysis and Forecasting (3) Methods of quantitative analysis and modeling for urban and regional studies. Population, employment, and economic base studies with emphasis on forecasting techniques. Prereq: 5130. W
5230 Urban and Site Design (3) Principles of design of residential subdivisions and some components of public and private facilities. Assignment of use and importance of land uses and public facilities in comprehensive development plans, including visual aspects. Prereq: 5180. Sp
5235 Urban and Site Design II (3-6) Prereq: 5230.
5270 Planning and Transportation (3) (Same as Civil Engineering 5270.) W
5280 Planning Methods (5) Tooling up studies; methods for coordination of land use and public facilities; components of comprehensive development plans, including visual aspects. Prereq: 5180. Sp
5300 Regional Planning (3) Making planning process more effective in intergovernmental context. Theories of regions and analysis of metro planning, area planning, regional planning by states, single-purpose agency planning, and TVA. Prereq: 5100.
5310 State Planning (3) Evolution of planning function in state government, with emphasis on institutional environment in which planning occurs. Context and scope of state planning, and relationships with other branches and levels of government. Prereq: 5100.
5340 Implementation (3) Policy formulation, information systems, taxation, capital improvement programming, and other aspects of plan implementation. Programming public actions to affect development. Prereq: 5440. Su, F
5360 New Towns (2) Historical development of planned new towns and implications for national urbanization policy in United States; process by which new towns are created, from establishment of objectives to administration of development process and provision of public services; organizational alternatives for new town planning, development and management in context of past experience and future objectives. Prereq: 5110 and consent of instructor.
5380 Housing (3) Nature and demand for housing in U.S. and abroad with emphasis on U.S. experience. Private market processes and public influences. Problems of change in housing supply, impact of new technology, and governmental programs to improve quality and quantity of housing. Coreq: 5110 or consent of instructor.
5410-20-30 Special Topics in Planning (1-3, 1-3, 1-3) Lecture, group discussion, and individual research and study on specialized topics in planning not covered in depth in other courses. May be repeated. Prereq: Consent of instructor. E
5435 Planning and Government (3) Governmental context within which planning occurs. Policy making as public process. Planning structures, powers, and policies. F
5440 Planning and Land Use Controls (4) Legal basis for planning and guiding community development. Exercise of police power and police domain. Development and administration of zoning, subdivision controls, and related devices. Prereq: 5435. Sp
5445 Urban Revitalization (3) Goals, principles and strategies for restoring and revitalizing cities. Review and analysis of historic, current, and proposed public and private programs aimed at urban revitalization. Physical building and restoration activities as related to financial and administrative requirements. Relationship between construction oriented activities and economic and social development programs is emphasized. Prereq: 5110 or consent of instructor.
5450 Planning Administration (2) Planning agency management, program development, and agency finance. Prereq: 5435.
5455 Planning and Property Development (3) Process of urban physical growth and change with emphasis on functioning of private sector real estate development and its relationship to planning. Partnership roles of public and private sectors in urban development and redevelopment. Prereq: 5440.
5500 Synthesis (9) Problem-oriented experience to integrate knowledge from previous courses. Interrelationships stressed; student required to use judgment in evaluation and creation of plans and policies addressed to real world situations. Extensive laboratory experience. Prereq: Required planning courses or consent of faculty. F, W
5670 Social Planning (3) Theory, philosophy, interpretation and implications of programs for planned social change. Consideration of major social planning issues in diverse fields of service; aging, corrections, education, health, social services. Prereq: Consent of instructor. (Same as Social Work 5670.)

Graduate School of Planning
Social Work Education

take creative roles in the social work profession's efforts toward the elimination of racism and such other social ills as poverty, crime, neglect, and social injustice.

A special bulletin describing the facilities, admission, fees, and degree requirements is obtainable from The School of Social Work, 204 Lake Avenue, Knoxville, Tennessee 37916.

AREAS OF PROFESSIONAL PRACTICE

Specializations within the School's curriculum prepare students for social work careers in such practice fields as criminal and juvenile justice systems; family and child welfare services in public and voluntary agencies; group services in neighborhood and community centers; health services; mental retardation; public welfare services; mental health services; manpower training programs; governmental and voluntary human services planning agencies; rehabilitation services; school social work; and social gerontology.

THE PROFESSIONAL CURRICULUM

The School of Social Work's curriculum is designed to provide the student with the basic components of professional competence through a progression of course work and supervised practice experience. Students may elect a thesis or non-thesis option. The two-year, six-quarter program includes a core curriculum, a specialization in one of two areas—social work treatment or social welfare administration and planning—and concurrent field practice.

The Core Curriculum

The core curriculum is offered during the first two quarters of the first year and is required of all students. It is a 30-quarter-hour sequence of five basic courses. As the initial phase of the School's educational program, the core curriculum contributes to the process of socialization and professional identification, and presents students with a comprehensive and broad knowledge base from which to operate in the future as practitioners and administrators.

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Courses</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>Fall Quarter, First Year</td>
<td>5070 Social Work Research I</td>
<td>3</td>
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<td></td>
<td>5110 Social Welfare Policy and Services I</td>
<td>3</td>
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<tr>
<td></td>
<td>5210 Human Behavior and Social Services I</td>
<td>3</td>
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<td></td>
<td>5410 Social Work Practice I</td>
<td>3</td>
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<td></td>
<td>5910 Field Practice</td>
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<td><strong>TOTAL QUARTER HOURS</strong></td>
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<tr>
<td>Winter Quarter, First Year</td>
<td>5080 Social Work Research II</td>
<td>2</td>
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<tr>
<td></td>
<td>5120 Social Welfare Policy and Services II</td>
<td>3</td>
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<td></td>
<td>5220 Human Behavior and Social Services II</td>
<td>3</td>
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<td></td>
<td>5420 Social Work Practice II</td>
<td>3</td>
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<td></td>
<td>5920 Field Practice</td>
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<td><strong>TOTAL QUARTER HOURS</strong></td>
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<tr>
<td>Spring Quarter, First Year</td>
<td>5930 Field Practice</td>
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<td>Specialization Courses and Electives</td>
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<td><strong>TOTAL QUARTER HOURS</strong></td>
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<tr>
<td>Fall Quarter, Second Year</td>
<td>Specialization Courses and Electives</td>
<td>12</td>
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<td>Winter Quarter, Second Year</td>
<td>5940 Field Practice</td>
<td>8</td>
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<td>Specialization Courses or Electives</td>
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<td><strong>TOTAL QUARTER HOURS</strong></td>
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<td>Spring Quarter, Second Year</td>
<td>5950 Field Practice</td>
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<td>5961 Integrative Seminar</td>
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<td></td>
<td>One Elective</td>
<td>.2 or .3</td>
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<td></td>
<td><strong>TOTAL QUARTER HOURS</strong></td>
<td><strong>12 or 13</strong></td>
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</tbody>
</table>

AREAS OF SPECIALIZATION

Social Work Treatment

Social work treatment deals with those individual, family, and group methods utilized...
to enhance the social functioning of individuals and effectively ameliorate problems of social dysfunction. The specializations attempt to develop a thorough knowledge of the theory and methodology based on individual, family, and group methods applicable in the treatment of diverse client problems.

Social Welfare Administration and Planning

Social welfare administration and planning deals with the design, implementation, and continued operation of effective programs for client service. Specifically, the method deals with assessment of client characteristics, development of environmental resources, design of effective organizational structures, management, staff development, program evaluation, social planning, neighborhood and community development, financing, and coordination of services.

Field Practice

Field practice is a critical component of the student's first- and second-year program. Because the School of Social Work cooperates with a wide range of social agencies and human service programs in the principal cities in Tennessee and areas immediately adjacent to the State, the School is able to provide field placements in a variety of social work practice areas. The faculty works closely with the placement agency and the field instructor to insure that the student has a quality field practice experience which meets the objectives of the core curriculum and the specialization.

The first-year curriculum is on a concurrent class and field plan, with students engaged in classroom study two or three days per week and in field practice the remainder of the week. First-year agency placements are selected to provide the student with practice experiences related to the core curriculum content and beginning specialization. Within the placement, each student's experiences are planned and designed according to the educational needs.

In the second year, students are engaged full time in classroom courses during the fall quarter. The winter and spring quarter plans consist of a block field placement of four days per week and at least one concurrent classroom course each quarter. Second-year placements are selected according to the student's area of specialization, individual career development needs, and the student's experiences in the first-year field practice. The student actively participates with the field practice coordinator and the specialization committee in selection of the second-year placement. The second-year field practice experience focuses on the integration of social work knowledge and values, and emphasizes the acquisition and development of full practice skills.

Students are responsible for meeting the requirements of their placement agencies in terms of office hours and workload coverage. This responsibility takes precedence over scheduled University breaks and may result in variations in holidays and office hours for the student.

DEGREE REQUIREMENTS

1. Satisfactory completion of the curriculum.

2. All courses taken as part of the degree programs, whether taken within the School of Social Work or outside, must be acceptable for graduate credit, relevant to social work and to the student's career objectives, and have the approval of the student's faculty advisor.

3. Achievement of a B average on all work presented for the Master's degree.

4. Completion of each required course at a satisfactory level (a grade of C or above). Graduate courses may not be repeated to raise a grade. Degree credit can be awarded after two years of absence from the School of Social Work.

5. Students who elect a thesis must pass an oral examination conducted by a faculty committee.

6. Students who elect a non-thesis option must pass a written comprehensive examination.

7. Credits to be counted toward the degree must be earned within six years from the beginning date of the earliest course applied toward the degree, except in cases where permission to update courses has been granted.

8. The minimum number of credit hours required for a degree shall be 79 hours including a maximum of 36 S/N/C hours.

9. Performance at a satisfactory level in field practicum, which is designed to teach professional practice skills.

ADMISSION REQUIREMENTS

Admission to the professional curriculum is based on the following requirements:

1. A bachelor's degree from an accredited college or university with some 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 may request consultation regarding ways in which they might be admitted.

2. A grade point average of 2.5 on a 4.0 scale, with those falling below the average to be admitted on 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. Application should be filed no later than December 31 for the year in which admission is desired.

THE ADMISSIONS PROCESS

Individuals who wish to be considered for admission must submit the required application materials from the Office of Admissions, UT School of Social Work, 2014 Lake Avenue, Knoxville, TN 37916, telephone (615) 974-3175. Beginning students are admitted only in the fall quarter. The Admissions Office begins processing applications after October 1 for the following fall quarter. Applications for first-year admission should be filed by March 1 of the year in which admission is desired.

Transfer Credits

Students who wish to be considered for admission should obtain the required application materials from the Office of Admissions, UT School of Social Work, 2014 Lake Avenue, Knoxville, TN 37916, telephone (615) 974-3175. Beginning students are admitted only in the fall quarter. The Admissions Office begins processing applications after October 1 for the following fall quarter. Applications for first-year admission must be filed by March 1 of the year in which admission is desired. A minimum of six weeks should be allowed for consideration of the application.

Students intending to apply for financial aid are encouraged to apply for admission to the School as early as possible. By doing so, students should be able to meet financial aid application deadlines, which are April 1 for September funding.

To apply for admission, applicants should forward the completed Graduate School Application and Payment of a nonrefundable $10 application fee to the Graduate School Office, The University of Tennessee, Knoxville, TN 37996. Two official transcripts of all work (except work taken at The University of Tennessee, Knoxville) should be sent to the Graduate School Office immediately after filing the Graduate School Application.

The completed University of Tennessee School of Social Work Application for Admission should be sent to the Office of the School of Social Work.

If a personal interview is required by the School, the applicant will be contacted by a representative of the School and any arrangement will be made concerning a time and place. Applicants who wish to also request a personal interview with a faculty member.

ACCELERATED PROGRAM

The University of Tennessee has a special accelerated program which enables eligible candidates to complete the M.S.S.W. degree in four quarters. This Accelerated Program is approved by the Council on Social Work Education.

Students who qualify for the Accelerated Program must:

1. Have maintained a 3.0 or above grade point average (on a 4.0 scale) in undergraduate work.

2. Have an undergraduate major in social work or which included a supervised field practice component, or have two years full-time practice in the field of social work.

3. Pass a qualifying examination administered by the School of Social Work faculty in early spring.

The accelerated programs begin either in the Memphis Branch in March or in the Nashville Branch in June with an intensive ten-week term from which students proceed in the fall into the regular second-year curriculum.

Application for admission should be made through the regular admission process. Applications should be filed not later than December 31 for the Memphis program and not later than January 31 for the Nashville program.

PART-TIME STUDENTS

Courses in the regular curriculum of the School are open to persons who meet the admission requirements for full-time study and who are planning to complete the work for the degree within the next two or three years. Application should be made to the School in the regular way, but the applicant should inform the Director of Admissions of the wish to begin part-time study on a planned basis.

TRANSFER CREDITS

Courses completed in another accredited school of social work are usually accepted for credit toward the Master's degree at The University of Tennessee School of Social Work. However, the student must submit evidence of the course work and a copy of the catalog of the school at the time of application for admission. The student need not adjust the catalog to show the work taken in the School.
must have been taken for graduate resident credit and passed with a B or better. In addition, it must be part of an otherwise satisfactory graduate program (B average) and be approved by the branch director and the Dean. The work must be completed within the six-year period prior to the receipt of the degree. In addition, S/NC credit earned for the field practicum is also accepted.

Social work students majoring in fields other than social work are admitted to certain social work courses with the approval of the School of Social Work and the student's major professor.

Faculty


Courses

5000 Thesis (1-15) E Required for the nonthesis student not otherwise registered during any quarter when such a 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

5603 Directed Readings in Research (2-4) May be repeated with approval of instructor. Maximum 4 hrs. F, W, Sp

5900 Special Problems in Social Work (2-9) Individual study on research problems of special significance to student's program, under supervision of major professor. May be repeated. F, W, Sp

5110 Social Welfare Policy and Services I (3) Interests of social work personnel toward development of contemporary social policy at local, state, national, and international levels of organization. Contributions of social work personnel toward policy-making process through which macroworld change is effected, and through which aggregate social welfare services are designed, authorized, financed, and programmed. Policy lab may be used to focus on beginning skill development. F

5120 Social Welfare Policy and Services II (3) Examination of innovative applications of social work policy to social welfare service delivery settings. Transformation of collective social welfare reality to benefit population through organized instrumental action of professional nature. W

5130 Social Policy Analysis (2-3) "Policy science" techniques are considered for appropriateness in assessing social, political, and economic impacts of social policy proposals. Prereq: Completion of core or consent of instructor. Sp

5161 Social Welfare Seminar 1 (2-3) Problem area or field of practice seminar focusing on substantive knowledge about social problem or condition and individual problems, including policy definition, social policy, social welfare program, and social work practice. Fields such as health, mental health, child and family, mental illness, aging, corrections, housing, labor force development, income maintenance, and aging. Prereq: Completion of core or consent of instructor. May be repeated. Maximum 9 hrs. F, W

5210-20 Human Behavior and Social Environment I and II (3, 3) Examination of theories pertaining to individual, family, and small group within context of functions, structures, roles and processes. Behavior of these systems conceptualized along functional, dysfunctional and normative dimensions. Organizing themes, development and maturation, adaptive and defensive mechanisms. Open system approach used to understand interpersonal relationships, psychological and social variables with emphasis on implications of culture and ethnicity. F, W

5290 Special Accelerated Program in Social Work (1-16) Ten-week program for students with intensive academic and field practice experience that qualifies them to enter second year of graduate study toward successful completion of this term. S/NC only.

5301 Comparative Theories of Personality (2-3) Those personality theories with most relevance for social work practice with individuals, groups, or families. Prereq: Completion of core or consent of instructor. Taught at branches only. Available at UTK as Psychology 4510.

5315 Human Social Problems (2-3) Desensitization and resolution of personal and social attitudes toward social behavior, clinical problems and approaches to work in social services. Prereq: Completion of core or consent of instructor. F

5316 Mental Health and Employment (2-3) Working as major life task and value, attitudes toward work, battles of professional commitment. Prereq: Completion of core or consent of instructor. F

5411 Social Work Practice I (3) Basic theory, values and skills enabling beginning social work practice intervention at various system levels. Combines classroom skills and laboratory experiences. F

5420 Social Work Practice II (3) Assessment, planning, methodology and skills development fundamental to social work practice. Combines classroom skills and laboratory experiences. W

5440 Family Therapy in Social Work Practice (3) Application of practice theory to assist in acquisition of skills in family therapy. Prereq: Completion of core or consent of instructor. W

5441 Transactional Analysis (2-3) Theory, therapy, and therapeutic technique of transactional analysis. Lectures, discussion, and experiential modules supplement knowledge of transactional analysis skills to use transactional analysis as treatment modality. Prereq: Completion of core or consent of instructor. W

5442 Short-term Treatment (2-3) Theory and practice of short-term treatment focusing on nature of methods, characteristics of clients responsive to this approach, and designs of programs providing short-term treatment services. Specific techniques of assessment and treatment applied to practice with individuals in crisis. Prereq: Completion of core or consent of instructor. W

5443 Seminar on Behavior Therapy (2-3) Behavior modification methodology applied to clinical assessment, choice of designs to assess treatment interventions, skill in evaluating data on effectiveness of treatment interventions. Prereq: Completion of core or consent of instructor. F

5444 Social Work Practice with the Poor (2-3) Problems, issues, and dilemmas of practice in social services with poor and attention to skill development and service delivery systems which make that practice possible. Prereq: Completion of core or consent of instructor. W

5450 Social Work Treatment with Individuals and Families I (3) Social work with individuals and small groups. Prereq: Completion of core or consent of instructor. W

5470 Contemporary Treatment Modalities: Individual and Family (3) Well-established and developing treatment modalities in terms of essential concepts. Differential facets and theory-based linkages. Prereq: Completion of core or consent of instructor. F

5480 Social Work Practice with Groups (3) Development of knowledge and skill in use of group methods in social work practice; organization and formation of group, structure and methods of group interactions, group experiences, understanding and enhancing group functioning. Prereq: Completion of core or consent of instructor. F

5514 Interpersonal Skill Development (2-3) Training group employed to enhance interpersonal com-