University Calendar For 1984-85

Winter Quarter, 1984

- January 3-4 (Tuesday-Wednesday)
- January 5 (Thursday)
- January 30-February 3 (Monday-Friday)
- February 8 (Wednesday)
- March 14 (Wednesday)
- March 16 (Friday)

Spring Quarter, 1984

- March 22-23 (Thursday-Friday)
- March 26 (Monday)
- April 20-21 (Friday-Saturday)
- April 30 (Monday)
- April 30-May 4 (Monday-Friday)
- May 21-25 (Monday-Friday)
- June 5 (Tuesday)
- June 8 (Friday)

Summer Quarter, 1984

- June 14-15 (Thursday-Friday)
- June 16 (Monday)
- July 4 (Wednesday)
- July 5 (Thursday)
- July 18-19 (Wednesday-Thursday)
- July 19 (Thursday)
- July 23 (Monday)
- July 23-27 (Monday-Friday)
- August 6 (Monday)
- August 22 (Wednesday)
- August 25 (Saturday)

Fall Quarter, 1984

- September 17-19 (Monday-Wednesday)
- September 20 (Thursday)
- October 24 (Wednesday)
- October 26 (Friday)
- October 28-November 2 (Monday-Friday)
- November 10 (Saturday)
- November 22-24 (Thursday-Saturday)
- December 9 (Thursday)
- December 10 (Monday)

Winter Quarter, 1985

- January 3-4 (Thursday-Friday)
- January 5 (Saturday)
- February 4-8 (Monday-Friday)
- February 8 (Friday)
- March 16 (Saturday)
- March 16 (Tuesday)

NOTE: Deadlines for degree requirements described on pp. 21-22.
Course Loads
Change of Registration
15. Graduation
Proficiency Examinations
English Proficiency
Law Courses
Auditors & Audited Courses
Correspondence Study
Transfer Credits
16. Change of Program
Residence Requirements
Theses and Dissertations
Academic Termination
Appeals Procedure
Facilities and Services
16. Housing
Vehicle Operation
and Parking
Services to the Physically
Disabled
17. The University Library
Computing Center
Center for International
Education
Ombudsman Office
Graduate Research Centers and
Institutes
17. Energy, Environment,
and Resources Center
18. Transportation Center
Space Institute
Water Resources
Research Center
Off-Campus
Graduate Centers
Requirements for
Advanced Degrees
19. Master's Degrees
Specialist in Education
Degree
20. Doctoral Degrees
21-22. Summary of Procedures
for Degrees
Colleges and Schools
23. Institute of Agriculture
College of Agriculture
26. College of Veterinary Medicine
36. College of Business
Administration
47. College of Communications
51. College of Education
64. School of Health, Physical
Education, and Recreation
69. College of Engineering
88. College of Home Economics
94. Intercollegiate Programs
98. College of Law
103. College of Liberal Arts
148. College of Medicine-
Knoxville
149. College of Nursing
151. School of Architecture
152. School of Biomedical Sciences
154. School of Library and
Information Science
156. School of Planning
158. School of Social Work
162. Index
International Student Affairs
Director, 201 Alumni Hall
Registrar
Bob L. Cochran, 215 Student Services
Building
Timetable of Classes
Supervisor of Registration,
Registrar's Office
Veterans' Benefits
209 Student Services Building
Financial Assistance
Assistantships—Head of department
or program in which you plan to major
Fellowships and Scholarships—Assistant
Director, Graduate Admissions and Records
Loans, Work-Study—Director of Scholarships
and Financial Aid, 115 Student Services
Building
Housing
Married students—Office of Rental
Properties, 107 S. Stadium Hall
Single students—Office of Residence
Halls, 405 Student Services Building
Handicap Student Services
Counseling Services,
900 Volunteer Boulevard
The University of Tennessee, Knoxville does not discriminate on the basis of race, sex, color, religion, national origin, age, handicap, or veteran status in provision of educational opportunities or employment opportunities and benefits. UTK does not discriminate on the basis of sex or handicap in the education programs and activities which it operates, pursuant to the requirements of Title IX of the Education Amendments of 1972, Pub. L. 92-318; and Section 504 of the Rehabilitation Act of 1973, Pub. L. 93-112, respectively. This policy extends to both employment by and admission to the University. Inquiries concerning Title IX and Section 504 should be directed to the Office of the Vice Chancellor, 525 Andy Holt Tower, 974-4391. Charges of violation of the above policy should also be directed to the Office of the Vice Chancellor.
### The Graduate School Administration

Clarence W. Minkel, B.A., M.A., Ph.D., Vice Provost and Dean of The Graduate School
Mary P. Richards, B.A., M.A., Ph.D., Associate Dean of The Graduate School
Thomas H. Klindt, B.S., M.S., Ph.D., Assistant Dean of The Graduate School
Diana C. Lopez, B.S., M.S., Director, Graduate Admissions and Records
Ben Granger, B.A., M.S.W., M.P.A., Ph.D., Dean, School of Social Work
Kenneth E. Harwell, B.S., M.S., Ph.D., Dean, UT Space Institute
A. A. Mason, B.S., Ph.D., Associate Dean, UT Space Institute
Marvin Goodman, B.S., M.S., Director, Kingsport Graduate Program
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
Jenny D. Westbrook, B.E., M.S., Ph.D., Director, Nashville Graduate Engineering Program
Ann E. Prentice, B.A., M.L.S., D.L.S., Director, Graduate School of Library and Information Science
M. S. Bronzini, B.S., M.S., Ph.D., Director, Transporation Center
E. W. Colglazier, Jr., B.S., Ph.D., Director, Energy, Environment, and Resources Center

### The Graduate Council

**Membership July 1, 1983**

#### Ex Officio Members
- Clarence W. Minkel, Vice Provost and Dean
- Alexander Van Hook, Chairperson of Research Council
- Mary P. Richards, Associate Dean
- Thomas H. Klindt, Assistant Dean

#### Appointed Members
- Dr. Robert S. Garfinkel
- Dr. Malcolm McInnis
- Dr. Kenneth B. Kenney
- Dr. Richard J. Courtney

#### Dec. 31, 1984
- Dr. Ronald E. Shrieves
- Dr. Robert A. Bohm
- Dr. Donald J. Dickenson
- Dr. David Craig
- Dr. James A. Miller
- Dr. Gerald Ubben
- Dr. George Wiegers

#### Dec. 31, 1985
- Dr. David W. Goodpasture
- Dr. Jeffrey W. Hodgson
- Dr. John T. Smith
- Dr. Percy G. Adams
- Dr. Sidney R. Jumper
- Dr. Suzanne B. Kurth
- Dr. Milton M. Klein

#### Date of Expiration Proxy

<table>
<thead>
<tr>
<th>College or Unit</th>
<th>Elected Members</th>
<th>Date of Expiration</th>
<th>Proxy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Col. of Agriculture</td>
<td>Dr. Luther Wilhelm</td>
<td>Dec. 31, 1983</td>
<td>Dr. Curtis Melton</td>
</tr>
<tr>
<td>Col. of Bus. Admin.</td>
<td>Dr. David J. Barnaby</td>
<td>Dec. 31, 1984</td>
<td>Dr. Ronald E. Shrieves</td>
</tr>
<tr>
<td>Col. of Communications</td>
<td>Dr. Robert B. Woodruff</td>
<td>Dec. 31, 1984</td>
<td>Dr. Robert A. Bohm</td>
</tr>
<tr>
<td>Col. of Education</td>
<td>Dr. Mark Miller</td>
<td>Dec. 31, 1985</td>
<td>Dr. Michael Singletary</td>
</tr>
<tr>
<td>Col. of Engineering</td>
<td>Dr. Don B. Franks</td>
<td>Dec. 31, 1983</td>
<td>Dr. Donald J. Dickenson</td>
</tr>
<tr>
<td>Col. of Home Economics</td>
<td>Dr. Paul A. Wishart</td>
<td>Dec. 31, 1984</td>
<td>Dr. David Craig</td>
</tr>
<tr>
<td>Col. of Liberal Arts</td>
<td>Dr. William A. Poppen</td>
<td>Dec. 31, 1985</td>
<td>Dr. James A. Miller</td>
</tr>
<tr>
<td>Graduate Student Council</td>
<td>Dr. Lester Knight</td>
<td>Dec. 31, 1983</td>
<td>Dr. Gerald Ubben</td>
</tr>
<tr>
<td>Col. of Nursing</td>
<td>Dr. Charles F. Moore</td>
<td>Dec. 31, 1983</td>
<td>Dr. George Wiegers</td>
</tr>
<tr>
<td>School of Social Work</td>
<td>Dr. Mancil Milligan</td>
<td>Dec. 31, 1983</td>
<td>Dr. David W. Goodpasture</td>
</tr>
<tr>
<td>UT Space Institute</td>
<td>Dr. John Lovell</td>
<td>Dec. 31, 1985</td>
<td>Dr. Jeffrey W. Hodgson</td>
</tr>
<tr>
<td></td>
<td>Dr. Patrick J. Carney</td>
<td>Dec. 31, 1983</td>
<td>Dr. Percy G. Adams</td>
</tr>
<tr>
<td></td>
<td>Dr. Arthur Echternacht</td>
<td>Dec. 31, 1984</td>
<td>Dr. Sidney R. Jumper</td>
</tr>
<tr>
<td></td>
<td>Dr. Allan G. Yeomans</td>
<td>Dec. 31, 1985</td>
<td>Dr. Suzanne B. Kurth</td>
</tr>
<tr>
<td></td>
<td>Ms. Jhan Erwin</td>
<td>Apr. 30, 1984</td>
<td>Dr. Milton M. Klein</td>
</tr>
<tr>
<td></td>
<td>Ms. Debbie Steuber</td>
<td>Apr. 30, 1984</td>
<td></td>
</tr>
<tr>
<td>Col. of Nursing</td>
<td>Dr. Sylvia E. Hart</td>
<td>Dec. 31, 1983</td>
<td>Dr. Mildred Fenske</td>
</tr>
<tr>
<td>School of Social Work</td>
<td>Dr. Roger M. Noone</td>
<td>Dec. 31, 1984</td>
<td>Dr. Robert Bonovich</td>
</tr>
<tr>
<td>UT Space Institute</td>
<td>Dr. Gideon Fryer</td>
<td>Dec. 31, 1983</td>
<td>Dr. George W. Ayres</td>
</tr>
<tr>
<td>Col. of Vet. Med.</td>
<td>Dr. Robert L. Young</td>
<td>Dec. 31, 1985</td>
<td>Dr. Maurice A. Wright</td>
</tr>
<tr>
<td></td>
<td>Dr. J. B. Jones</td>
<td>Dec. 31, 1983</td>
<td>Dr. Michael H. Sims</td>
</tr>
</tbody>
</table>
The University of Tennessee

Board of Trustees

From Congressional Districts

<table>
<thead>
<tr>
<th>Name</th>
<th>District</th>
<th>TERM EXPIRES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buford Goldstein, Elizabethton</td>
<td>First</td>
<td>June 1, 1984</td>
</tr>
<tr>
<td>A. B. Long, Jr., Knoxville</td>
<td>Second</td>
<td>June 1, 1986</td>
</tr>
<tr>
<td>Scott Probascio, Jr.</td>
<td>Third</td>
<td>June 1, 1988</td>
</tr>
<tr>
<td>William M. Johnson, Sparta</td>
<td>Fourth</td>
<td>June 1, 1987</td>
</tr>
<tr>
<td>Marcia A. Echols, Nashville</td>
<td>Fifth</td>
<td>June 1, 1991</td>
</tr>
<tr>
<td>Ben S. Kimbrough, Clarksville</td>
<td>Sixth</td>
<td>July 1, 1990</td>
</tr>
<tr>
<td>T. O. Lashlee, Humboldt</td>
<td>Seventh</td>
<td>June 1, 1988</td>
</tr>
<tr>
<td>Tom Elam, Union City</td>
<td>Eighth</td>
<td>June 1, 1986</td>
</tr>
<tr>
<td>R. Lee Winchester, Memphis</td>
<td>Ninth</td>
<td>June 1, 1984</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Name</th>
<th>TERM EXPIRES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charlotte Parish</td>
<td>June 1, 1988</td>
</tr>
<tr>
<td>Elaine McReynolds</td>
<td>June 1, 1984</td>
</tr>
<tr>
<td>Paul J. Kinser</td>
<td>June 1, 1987</td>
</tr>
<tr>
<td>Ann Baker Furrow</td>
<td>June 1, 1989</td>
</tr>
<tr>
<td>James A. Haslam, III</td>
<td>June 1, 1989</td>
</tr>
<tr>
<td>Sam Cooper</td>
<td>June 1, 1990</td>
</tr>
<tr>
<td>Jack Craddock</td>
<td>June 1, 1990</td>
</tr>
</tbody>
</table>

From Davidson County

<table>
<thead>
<tr>
<th>Name</th>
<th>TERM EXPIRES</th>
</tr>
</thead>
<tbody>
<tr>
<td>John Craig</td>
<td>July 1, 1984</td>
</tr>
</tbody>
</table>

From Hamilton County

<table>
<thead>
<tr>
<th>Name</th>
<th>TERM EXPIRES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Governor Lamar Alexander, Chairman</td>
<td>June 1, 1984</td>
</tr>
</tbody>
</table>

From Knox County

<table>
<thead>
<tr>
<th>Name</th>
<th>TERM EXPIRES</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. David Martin, Treasurer</td>
<td>June 1, 1990</td>
</tr>
</tbody>
</table>

From Shelby County

<table>
<thead>
<tr>
<th>Name</th>
<th>TERM EXPIRES</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. David Martin, B.S., M.B.A., C.P.A., Treasurer</td>
<td>June 1, 1984</td>
</tr>
</tbody>
</table>

From Weakley County

<table>
<thead>
<tr>
<th>Name</th>
<th>TERM EXPIRES</th>
</tr>
</thead>
<tbody>
<tr>
<td>James F. Harrison</td>
<td>June 1, 1990</td>
</tr>
</tbody>
</table>

Officers of the Board

<table>
<thead>
<tr>
<th>Name</th>
<th>TERM EXPIRES</th>
</tr>
</thead>
<tbody>
<tr>
<td>T. O. Lashlee, Vice Chairman</td>
<td>June 1, 1988</td>
</tr>
<tr>
<td>Edward J. Boling, President</td>
<td>June 1, 1988</td>
</tr>
<tr>
<td>A. David Martin, Treasurer</td>
<td>June 1, 1988</td>
</tr>
</tbody>
</table>

Student Member

<table>
<thead>
<tr>
<th>Name</th>
<th>TERM EXPIRES</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Counsel, Secretary of Board of Trustees</td>
<td>June 1, 1988</td>
</tr>
</tbody>
</table>

University Administration

<table>
<thead>
<tr>
<th>Name</th>
<th>TERM EXPIRES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andrew J. Kozar, B.S., A.M., Ph.D., Executive Assistant to the President</td>
<td>June 1, 1988</td>
</tr>
</tbody>
</table>

UT, Knoxville Administration

<table>
<thead>
<tr>
<th>Name</th>
<th>TERM EXPIRES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Donald G. Landen, A.B., A.M., Ph.D., Dean of the College of Liberal Arts</td>
<td>June 1, 1988</td>
</tr>
<tr>
<td>Sylvia E. Hart, B.S.N., M.S.N., Ph.D., Dean of the College of Nursing</td>
<td>June 1, 1988</td>
</tr>
<tr>
<td>Hyram Kitchen, M.S., D.V.M., Ph.D., Dean of the College of Veterinary Medicine</td>
<td>June 1, 1988</td>
</tr>
<tr>
<td>Joseph P. Goddard, B.S., M.S., Ed.D., Dean of the Division of Continuing Education</td>
<td>June 1, 1988</td>
</tr>
<tr>
<td>Gerald D. Bowker, B.A., M.A., Dean of Admissions (Undergraduate) and Records</td>
<td>June 1, 1988</td>
</tr>
<tr>
<td>MAJOR</td>
<td>DEGREE</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td><strong>College of Agriculture</strong></td>
<td></td>
</tr>
<tr>
<td>Agricultural Economics</td>
<td>MS, PhD</td>
</tr>
<tr>
<td>Agricultural Engineering</td>
<td>MS, PhD</td>
</tr>
<tr>
<td>Agricultural Extension</td>
<td>MS</td>
</tr>
<tr>
<td>Agricultural Mechanization</td>
<td>MS</td>
</tr>
<tr>
<td>Animal Science</td>
<td>MS, PhD</td>
</tr>
<tr>
<td>Entomology and Plant Pathology</td>
<td>MS</td>
</tr>
<tr>
<td>Food Technology and Science</td>
<td>MS, PhD</td>
</tr>
<tr>
<td>Forestry</td>
<td>MS</td>
</tr>
<tr>
<td>Ornamental Horticulture and Landscape</td>
<td>MS</td>
</tr>
<tr>
<td>Science</td>
<td>MS, PhD</td>
</tr>
<tr>
<td>&quot;Wildlife and Fisheries Science&quot;</td>
<td>MS</td>
</tr>
<tr>
<td><strong>College of Agriculture</strong></td>
<td></td>
</tr>
<tr>
<td><strong>College of Business Administration</strong></td>
<td></td>
</tr>
<tr>
<td>Accounting</td>
<td>MAcc</td>
</tr>
<tr>
<td>Business Administration</td>
<td>MBA, DBA</td>
</tr>
<tr>
<td>*Economics</td>
<td>MA, PhD</td>
</tr>
<tr>
<td>Management Science</td>
<td>PhD</td>
</tr>
<tr>
<td>*Statistics</td>
<td>MS</td>
</tr>
<tr>
<td><strong>College of Communications</strong></td>
<td></td>
</tr>
<tr>
<td>*Communications</td>
<td>MS, PhD</td>
</tr>
<tr>
<td>*Art Education</td>
<td>MS</td>
</tr>
<tr>
<td>Business Education</td>
<td>MS, MACT</td>
</tr>
<tr>
<td>College Student Personnel</td>
<td>MS</td>
</tr>
<tr>
<td>Curriculum</td>
<td>MS</td>
</tr>
<tr>
<td>Curriculum and Instruction</td>
<td>EdS, EdD</td>
</tr>
<tr>
<td>Education</td>
<td>PhD</td>
</tr>
<tr>
<td>Educational Administration</td>
<td>MS, EdS, EdD</td>
</tr>
<tr>
<td>Educational Psychology and Guidance</td>
<td>MS, EdD</td>
</tr>
<tr>
<td>*Elementary Education</td>
<td>MS</td>
</tr>
<tr>
<td>English Education</td>
<td>MS</td>
</tr>
<tr>
<td>Foreign Language Education</td>
<td>MS</td>
</tr>
<tr>
<td>Guidance</td>
<td>MS</td>
</tr>
<tr>
<td>Health Education</td>
<td>EdD, PhD</td>
</tr>
<tr>
<td>Industrial Education</td>
<td>MS</td>
</tr>
<tr>
<td>Instructional and Technology</td>
<td>MS</td>
</tr>
<tr>
<td>Mathematics Education</td>
<td>MS</td>
</tr>
<tr>
<td>*Music Education</td>
<td>MS</td>
</tr>
<tr>
<td>Physical Education</td>
<td>MS, EdD</td>
</tr>
<tr>
<td>*Public Health</td>
<td>MPH</td>
</tr>
<tr>
<td>Reading Education</td>
<td>MS</td>
</tr>
<tr>
<td>Recreation</td>
<td>MS</td>
</tr>
<tr>
<td>Safety Education and Service</td>
<td>MS, EdS</td>
</tr>
<tr>
<td>School Health Education</td>
<td>MS</td>
</tr>
<tr>
<td>Science Education</td>
<td>MS</td>
</tr>
<tr>
<td>Social Science Education</td>
<td>MS</td>
</tr>
<tr>
<td>Special Education</td>
<td>MS</td>
</tr>
<tr>
<td>Vocational Rehabilitation Counseling</td>
<td>MS</td>
</tr>
<tr>
<td>*Vocational-Technical Education</td>
<td>MS, EdS, EdD</td>
</tr>
<tr>
<td><strong>College of Engineering</strong></td>
<td>ME, MS, PhD</td>
</tr>
<tr>
<td>Aerospace Engineering</td>
<td>ME, MS, PhD</td>
</tr>
<tr>
<td>Chemical Engineering</td>
<td>ME, MS, PhD</td>
</tr>
<tr>
<td>Civil Engineering</td>
<td>ME, MS, PhD</td>
</tr>
<tr>
<td>Electrical Engineering</td>
<td>ME, MS, PhD</td>
</tr>
<tr>
<td>Engineering Science</td>
<td>MS, PhD</td>
</tr>
<tr>
<td>Environmental Engineering</td>
<td>ME</td>
</tr>
<tr>
<td>Environmental Science</td>
<td>ME</td>
</tr>
<tr>
<td>Industrial Engineering</td>
<td>ME</td>
</tr>
<tr>
<td>Mechanical Engineering</td>
<td>ME, MS, PhD</td>
</tr>
<tr>
<td>Metallurgical Engineering</td>
<td>ME, MS, PhD</td>
</tr>
<tr>
<td>Nuclear Engineering</td>
<td>ME, MS, PhD</td>
</tr>
<tr>
<td>Polymer Engineering</td>
<td>ME, MS, PhD</td>
</tr>
<tr>
<td><strong>College of Home Economics</strong></td>
<td>ME, MS, PhD</td>
</tr>
<tr>
<td>*Child and Family Studies</td>
<td>MS</td>
</tr>
<tr>
<td>*Consumer Studies and Housing:</td>
<td>MS</td>
</tr>
<tr>
<td>Public Policy</td>
<td>MS</td>
</tr>
<tr>
<td>*Food Science</td>
<td>MS³</td>
</tr>
<tr>
<td>*Food Systems Administration</td>
<td>MS</td>
</tr>
<tr>
<td>*Home Economics</td>
<td>PhD</td>
</tr>
<tr>
<td>*Interior Design and Housing</td>
<td>MS</td>
</tr>
<tr>
<td>*Nutrition</td>
<td>MS³</td>
</tr>
<tr>
<td>Textiles and Clothing</td>
<td>MS</td>
</tr>
</tbody>
</table>

8
<table>
<thead>
<tr>
<th>MAJOR</th>
<th>DEGREE</th>
<th>ADMISSION TEST REQUIRED</th>
<th>ADDITIONAL REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>GRE</td>
<td>GMAT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>APT</td>
<td>ADV</td>
</tr>
</tbody>
</table>

Intercollegiate
- Aviation Systems
  - *Comparative and Experimental Medicine*
    - MS, PhD
    - GRE
    - GMAT
- *Ecology*
  - MS, PhD
  - GRE
- *Industrial and Organizational Psychology*
  - MS, PhD
  - GRE
  - or GMAT
- *Life Sciences*
  - MS, PhD
- *Management Science*
  - MS

College of Liberal Arts
- Anthropology
  - MA, PhD
- *Art*
  - MFA
- *Audiology*
  - MA
- *Biochemistry*
  - MS, PhD
- *Botany*
  - MS, PhD
- *Chemistry*
  - MS, PhD
- *Computer Science*
  - MS
- *English*
  - MACT, MA, PhD
- French
  - MA
- Geography
  - MS, PhD
- *Geology*
  - MS, PhD
- *German*
  - MACT, MA

German Language and Literature
- PhD

History
- MA, PhD

Mathematics
- MM
- MA, MS, PhD
- X

*Microbiology*
- MS, PhD
- X

*Music*
- MM, MA
- X

*Philosophy*
- MA, PhD
- X

*Political Science*
- MA, PhD
- X

*Psychology*
- MA, PhD
- X

Public Administration
- MPA
- X

Sociology
- MA, PhD

Spanish
- MA, PhD
- X

Speech and Hearing Science
- PhD
- X

Speech Pathology
- MA
- X

Speech and Theatre
- MA
- X

Theatre
- MFA
- X

Zoology
- MS, PhD
- X

College of Nursing
- Nursing
  - MSN
  - X

School of Biomedical Sciences
- Biomedical Sciences
  - MS, PhD
  - X

School of Library and Information Science
- Library Science
  - MSLS
  - X

School of Planning
- Planning
  - MSP

School of Social Work
- Social Work
  - MSSW, PhD

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

1 American applicants only.
2 International applicants only.
3 EdS applicants only.
4 EdD applicants only.
5 PhD applicants only.
6 Department doctoral option offered under the major of home economics.
7 Interdisciplinary option offered in each department.
8 Offered at UT Space Institute.
9 G.S. Rating Form submitted to Office of Graduate Admissions and Records.
10 G.S. Rating Form submitted to Department.
11 Forms obtained from & returned to Department.
12 For Financial Assistance only.
The Graduate School

Clarence W. Minkel, Vice Provost and Dean of The Graduate School  
Mary P. Richards, Associate Dean of The Graduate School  
Thomas H. Klint, Assistant Dean of The Graduate School  
Diana Lopez, Director, Graduate Admissions and Records  
Clea Greenawalt, Assistant Director, Graduate Admissions and Records

The University of Tennessee, Knoxville is the official land-grant institution for the State of Tennessee. It is a comprehensive institution offering a wide range of graduate programs leading to the Master's and doctoral degrees. The University offers Master's programs in 112 fields of specialization and doctoral work in 52. Approximately 6,000 graduate students are enrolled both on and off campus. Administration of graduate student policies and procedures, and associated record keeping, is the responsibility of the Dean of The Graduate School. Much of the day-to-day administration of graduate study is conducted by department heads or faculty advisors and committees responsible for particular programs. In addition to departmental units, numerous interdisciplinary programs, institutes and centers have been developed on and in locations throughout the state.

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

The policies of The Graduate School are developed by the Graduate Council, a body composed of elected representatives from each college, the School of Social Work, the Space Institute, the Graduate Student Council, and five appointed members. Ex-officio members include the Dean, Associate Dean, and Assistant Dean of The Graduate School, and the Chair of the Research Council. The Graduate Office develops procedures to carry out the policies formulated by the Council, and has primary responsibility for Graduate School admissions and records.

A graduate student must assume full responsibility for knowledge of rules and regulations of The Graduate School and departmental requirements for the chosen degree program. Individual colleges and departments may have requirements beyond the minimum established by The Graduate School. The Graduate School News, published quarterly, includes a calendar of deadlines, new policies and procedures of The Graduate School, and changes in degree programs. The News contains the latest information on Graduate School matters, some of which may supersede this catalog. Copies of the News are available at the Office of Graduate Admissions and Records during the registration period at the beginning of each quarter. 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 Office of Graduate Admissions and Records.

Admission and Registration

Admission to The Graduate School requires a Bachelor's degree with a satisfactory grade point average from a college or university accredited by the appropriate regional accrediting agency. Admission to The Graduate School does not ensure acceptance into a specific degree program nor admission to candidacy for the degree desired. When a student is admitted to The Graduate School prior to having received the baccalaureate degree, that degree must be awarded prior to the date of first registration in The Graduate School. If a student does not enroll within one year after the requested admission, the application process must be repeated.

Types of Admissions

Admission to a Graduate Degree Program: To earn graduate credit, a student must be enrolled in one of the categories listed below. Course work taken in any other status is unacceptable for graduate credit and cannot be changed to graduate credit.

- Admission to a degree program requires a minimum grade point average of 2.5 out of a possible 4.0, or a 3.0 during the senior year. However, many departments require a higher average. The equivalent of a minimum B average is required for international students.
- In addition to meeting the minimum requirements for admission to The Graduate School, applicants at the doctoral level must have demonstrated a potential for superior academic performance. To be considered are such criteria as performance in prior undergraduate and/or graduate studies, achievement on admission tests for graduate studies, letters of recommendation from professors familiar with the applicant's capabilities, and similar evidence of scholarly achievement.

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

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

1. do not desire to pursue a degree program;
2. have already received an advanced degree;
3. need additional time to fulfill application requirements for a degree program.

There is no specific limit on the number of courses that a student may take in non-degree status. However, within 18 hours of graduate course work in this status, the student must either:

1. apply and be admitted to a specific degree program (see Change of Program, p. 18, for instructions); or
2. file a Plan of Study form with the Office of Graduate Admissions and Records for approval to continue taking courses in non-degree status. The plan of study must include a stated educational objective and a
To apply for a specific degree program, the student must submit the Request for Revision of Graduate Program form to the Office of Graduate Admissions and Records. Provisional admission does not assure admission to a non-degree or degree program. A student who hopes to enter a degree program will be directed to the appropriate department. The student who fails to complete provisional admission within seven weeks after registration will NOT be permitted to register again. Nor will the receiving department permit a student to register until all admission requirements are met. An international student on a non-immigrant visa may not enroll in the provisional status. Admission of International Students: The Graduate School accepts only students who have outstanding records. An international student must have an equivalent 4-year Bachelor's degree with at least a B average on undergraduate course work and a B+ on all previous graduate work. On various grading scales, this would indicate:
- a. 3.0 and 3.5 on 4.0 scale;
- b. 14 and 15 on 20 point scale;
- c. 80.0 from Chinese institutions;
- d. First Class or Division from Indian institutions;
- e. Upper 2nd Class Honors on various British systems.
Other grading systems will be evaluated upon receipt of transcripts. An international student may apply only for the summer or fall quarters. If a student is transferring to UTK directly after receiving a degree from a U.S. or Canadian institution, an exception may be made to enter the winter or spring quarters. Requests must be made in writing by the student and endorsed by the UTK department admitting the student. The Office of Graduate Admissions and Records must be notified if a change in the admission date occurs.

Dates for submission of applications are:
- Summer: Dec. 1
- Fall: March 15
- Winter: July 1
- Spring: Sept. 15

The following items must be received before admission will be considered:
1. A complete application form with a $10 non-refundable processing fee;
2. Official or attested university records, with certified translations if the records are not in English. (Notarized copies are not acceptable;)
3. Certification of English proficiency:
   - Every student whose native language is not English must either submit a score of 525 or above on the Test of English as a Foreign Language (TOEFL), taken within the past two years, or have received a degree from an accredited U.S. institution.
   - Documented evidence of financial resources must be provided to support the student with at least U.S. $10,000 per calendar year during the period of enrollment.
   - Results of the Graduate Record Examination (GRE) or Graduate Management Admission Test (GMAT) if required.
   - Letters of recommendation or rating forms, if required.
   - Admission must be granted and financial documentation and degree confirmation must be received prior to issuance of an I-20 or an IAP-66 form needed to obtain a visa. The Graduate School will not issue these forms after the following dates:
   - Summer: April 1
   - Fall: July 15
   - Winter: Nov. 1
   - Spring: Jan. 15

The University will not enroll any student who has not been provisionally admitted by the Immigration and Naturalization Services (INS) to attend UTK. An international student may not enroll as a provisional or non-degree student.

All students whose native language is not English must take an English proficiency examination after arrival at UTK. Refer to section on English Proficiency, page 15.

Eligibility of Seniors: Subject to approval by The Graduate School, a senior at UTK who needs fewer than 45 quarter hours to complete the requirements for a Bachelor's degree and has at least a B average (3.0) may enroll in graduate courses for graduate credit provided the combined total of undergraduate and graduate course work does not exceed 15 credit hours per quarter. Approval must be obtained each quarter from the Office of Graduate Admissions and Records.

Enrollment of Veterinary Medicine Students in Graduate Courses: A student in good standing in the College of Veterinary Medicine may enroll in UTK graduate courses without being admitted to The Graduate School, under the following conditions:
- The student's advisor must approve in advance the student's enrollment in each course.
- The student may take a maximum of 15 quarter hours of graduate courses during the D.V.M. program.
- Approval must be obtained each quarter at registration through the Office of Graduate Admissions and Records.
- The student's progress is subject to review and approval each quarter by the Associate Dean, College of Veterinary Medicine.

Admission of Faculty Members: Faculty members of UTK or the Institute of Agriculture at the rank of assistant professor or above, and employees of the administrative staff at UTK, the UT Central Administration, and the Institute of Agriculture will not normally be admitted to candidacy for a doctoral degree at UTK. Exception made on an individual basis. Further information is provided in the Faculty Handbook. Possible conflict of interest will be a major factor considered in the review of any request.

Admission Procedures

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

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

1. The completed Graduate Application for Admission (inside front cover of Graduate Catalog).
2. A $10 application fee.
3. Two copies of official transcripts from all colleges and universities attended.
4. Reference letters or rating forms (pages 8-9). Forms obtained from the college or department should be returned to the same source.
5. Scores from examinations which may be required for admission.
6. Graduate programs which require scores from the Graduate Record Examination or the Graduate Management Admission Test are shown on pages 8-9. The TOEFL is required of all students whose native language is not English, unless they have graduated from a regionally accredited U.S. institution.

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

Educational Testing Service
Princeton, NJ 08540

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

All of the above documents become the property of the University and will not be returned.

Readmission

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

Registration Procedures

Registration is required of all graduate students when using University facilities and campus services. No action is taken until a file is completed. The applicant will be notified by mail of the action taken.

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

1. The completed Graduate Application for Admission (inside front cover of Graduate Catalog).
2. A $10 application fee.
3. Two copies of official transcripts from all colleges and universities attended.
4. Reference letters or rating forms (pages 8-9). Forms obtained from the college or department should be returned to the same source.
5. Scores from examinations which may be required for admission.
6. Graduate programs which require scores from the Graduate Record Examination or the Graduate Management Admission Test are shown on pages 8-9. The TOEFL is required of all students whose native language is not English, unless they have graduated from a regionally accredited U.S. institution.

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

Educational Testing Service
Princeton, NJ 08540

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

All of the above documents become the property of the University and will not be returned.

Fees, Residency 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) previously paid to UTK Graduate School within past 12 months.)

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

MAINTENANCE FEES (all students):

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

- PER QUARTER $303
- PER QUARTER $357

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 $44 per quarter hour or fraction thereof; minimum charge $132.
- Out-of-State $102 per quarter hour or fraction thereof; minimum charge $306.

UNIVERSITY PROGRAMS AND SERVICES FEE: $46

The fee for the summer quarter is $35. Part-time students taking fewer than 9 quarter hours will be assessed at the rate of $3 per quarter hour or fraction thereof; minimum charge $9.

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.

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

Knoxville campus day students taking a course load of 3-5 hours may elect to pay the $13 student health fee plus the appropriate part-time programs and services fee.

The student health fee is included in the full $46 programs and services fee.

This fee is not refundable.

LATE REGISTRATION FEES:

All students are required to have a validated receipt to complete the registration procedure. This includes students whose fees are billed, prepaid, or waived. Students who do not complete registration on the regular dates scheduled for this purpose will be charged a late registration fee of $2 up to $60. See the University General Catalog for application of this fee. Doctoral students who must register retroactively for dissertation credit will be charged a late fee of $35 for each
quarter of retroactive registration. The payment of fees with a check which is not honored by the bank will incur a service charge of $10 to $45, depending on the date the check is redeemed.

**MUSIC FEE:**
- One-half hour lesson per week, per quarter: $20
- One-hour lesson per week, per quarter: $40

Payable at registration by students receiving individual instruction in music.

**GRADUATION FEE:**
- Master's degree candidates: $16
- Doctoral degree candidates: $51

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

**DEFERRED PAYMENT SERVICE FEE:**... $5

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

It is the student’s responsibility to take the initiative to pay all University obligations promptly.

**FEES FOR COURSES NOT TAKEN FOR CREDIT:**
- Fees for courses audited are the same as for courses taken for credit. For fee purposes, courses listed for 0 credit hours are considered as one-hour courses.

**REFUND OF FEES FOR WITHDRAWAL:**

Once a schedule has been received by the student, withdrawal from school for the quarter must be by official notification to the Withdrawal Office, Student Counseling Services Center, 900 Volunteer Boulevard, whether or not fees have been paid, classes have been attended, or the schedule is incomplete. Failure to attend class does not automatically withdraw or drop a student from 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 following regular registration permits a 100 percent fee refund. Withdrawal between 8 and 14 calendar days following regular registration permits a 50 percent fee refund. Withdrawal between 15 and 21 calendar days following regular registration permits a 25 percent fee refund. Withdrawal between 22 and 28 calendar days following regular registration permits a 10 percent fee refund. The above withdrawal refund policy does not apply to the off-campus Graduate Centers. Refunds, in accordance with the withdrawal refund policy, will be made after the drop deadline.

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 the drop becomes effective, on the date that the change of registration form is processed on a drop/add terminal. Any refund due for dropped courses will be made after the final audit at the end of the quarter.

**REFUND OF FEES FOR WITHDRAWAL:**

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

**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. 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 additions or refunds. Other information on fees, expenses, refunds, and adjustments is given in the Timetable (schedule of classes) for each quarter.

**Academic Common Market**

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

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

Residents of one of the member states who seek further information should contact the Office of Graduate Admissions and Records or the Southern Regional Educational Board, 130 Sixth Street, N.W., Atlanta, GA 30313.

**Financial Aid**

UTK offers several types of financial assistance for which graduate students may apply:

- **Assistantships and Fellowships:** Graduate assistantships, scholarships, and traineeships are offered through many departments. Information concerning these types of assistance can be obtained from the department in which the student plans to study.
General Regulations of The Graduate School

Advisor/Major Professor

Every graduate student must have an advisor from the major department. This professor advises the student about courses, supervises the student's research, and facilitates the completion of the degree program. The advisor must be approved by the department, to the Graduate School. The advisor is responsible to serve as the major professor. The major professor and student together select a graduate committee.

Prerequisites

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

Course Listings

Each course listing in the Graduate Catalog contains information in abbreviated form. This course number indicates the level at which the course is taught. All 5000-6000 level courses are graduate courses. The 3000-4000 level courses are upper division courses available for graduate credit if listed in the Graduate Catalog, unless noted otherwise. To receive graduate credit for these, a student must so indicate on the registration material.

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 (e.g. 2-3). The credit hours are followed by a course description indicating the content to be covered.

Prerequisite courses may be taken prior to the course in question. Corequisite courses may be taken prior to or concurrently with the specific course. Recommended prerequisites should be taken previously but are not mandatory.

Some courses may be repeated for a maximum number of hours toward a degree program. This number is stated for each repeatable course with the exception of Thesis 5000 and Dissertation 6000. Courses may be cross-listed with two or more departments, and an arrangement indicated by a parenthetical statement (e.g. Psychology 5432). The course description is given only under the primary department.

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

At the end of most course descriptions is a symbol indicating the quarter or frequency that the course normally is offered:

- F-Fall
- S-Spring
- W-Winter
- Su-Summer
- W-Spring
- Sp-Spring
- A-Autumn
- A-Autumn
- 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 official notification of courses offered for a specific quarter. Students should contact the appropriate department/program head concerning courses to be offered in future quarters.

Course Loads

The maximum load for a graduate student is 15 hours during any quarter. Courses audited do not count toward minimum graduate hours required for financial assistance. Registration for more than 18 hours during any quarter is not permissible without prior approval of The Graduate School, which 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. Students may enroll in only one course in a September or December mini-term.

Change of Registration

The permanent record will show all courses for which the student has registered, except those audited and those from which the student has withdrawn during the first 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 and receive a grade of F in the course. Students have the responsibility to assure that they have been dropped. Otherwise they may receive a grade of F in the course.

The deadline for change of registration (e.g. from graduate to undergraduate, undergraduate to graduate, withdrawal) is set at mid-term, approximately 35 calendar days after the first day of classes each quarter. A student may change registration for a course at any time prior to and including this date by executing a change of registration form and submitting it to the Office of Graduate Admissions and Records. The signature of the advisor or department head is required on the form for all changes. The instructor's signature is required if the course is closed and/or after the first two weeks of classes. If the student withdraws from a course or from the University after the first 5 days of classes and before the change of registration deadline, he/she will receive a grade of W on the permanent record.
Graduate School Transfer Credits

Course registration may not be changed on the student's permanent record. If the change of registration deadline, a student must present the request, together with documentary evidence of extenuating circumstances, to the Office of Graduate Admissions and Records. In addition, the student must complete a change of registration form and questionnaire signed by the instructor(s) and the student. If the request is approved, the Office of Graduate Admissions and Records will notify the Office of Admissions and Records to enter the change on the student's permanent record.

Grading System

An average of B (3.0) on course work taken at UTK is required to receive any graduate degree from the University. Grades in the Graduate School have the following meanings:

- A (4 quality points per quarter hour), superior performance.
- B+ (3.5 quality points per quarter hour), better than satisfactory performance.
- B (3 quality points per quarter hour), satisfactory performance.
- C+ (2.5 quality points per quarter hour), less than satisfactory performance.
- C (2 quality points per quarter hour), performance well below the standard expected of graduate students.
- D (1 quality point per quarter hour), clearly unsatisfactory performance and cannot be used to satisfy degree requirements.
- F (no quality points), extremely unsatisfactory performance and cannot be used to satisfy degree requirements.
- I (incomplete) the student had an incomplete report has not been received at the time of the request for graduation. Incomplete courses must be removed within two quarters, excluding the summer quarter. There will be an F, I or NC grade given on the report. The course will be included in the student's cumulative grade average until a final grade is assigned. No student may graduate with an I on the record.

P/NC (carries credit hours, but no quality points), indicates that the student may choose either a grade of P or NC. P indicates progress toward degree; an NC indicates no progress or inadequate performance. No student may repeat a course for the purpose of raising a grade already received, with the exception of NC. A student may not do additional work to raise a final grade. A graduate student may request a course to be changed from P/NC to S/NC. P indicates progress toward degree; an S indicates satisfactory performance. P/NC and S/NC may be used to satisfy degree requirements. Only one-fourth of the total credit hours required may be used to satisfy degree requirements. Only one-fourth of the total credit hours required may be used to satisfy degree requirements. Only one-fourth of the total credit hours required may be used to satisfy degree requirements. Only one-fourth of the total credit hours required may be used to satisfy degree requirements. Only one-fourth of the total credit hours required may be used to satisfy degree requirements.

P/NP (carries credit hours, but no quality points), indicates that the student may choose either a grade of P or NP. P indicates progress toward degree; an NP indicates no progress or inadequate performance. No student may repeat a course for the purpose of raising a grade already received, with the exception of NC. A student may not do additional work to raise a final grade. A graduate student may request a course to be changed from P/NP to S/NC. P indicates progress toward degree; an S indicates satisfactory performance. P/NP and S/NC may be used to satisfy degree requirements. Only one-fourth of the total credit hours required may be used to satisfy degree requirements. Only one-fourth of the total credit hours required may be used to satisfy degree requirements. Only one-fourth of the total credit hours required may be used to satisfy degree requirements. Only one-fourth of the total credit hours required may be used to satisfy degree requirements. Only one-fourth of the total credit hours required may be used to satisfy degree requirements.

A student who has completed a graduate application, paying the application fee, registering as an auditor, and paying regular fees. Graduate students paying regular fees also are entitled to audit courses. The names of all auditors properly registered will appear on the intermediate class rolls. An NC will be recorded on the official transcript until the student had an average of B (3.0) on course work taken at other institutions, not transferrable. Proficiency examinations may be given in academic examinations taken for graduate credit. Applications for proficiency examinations are available in the Office of the Registrar, 209 Student Services Building. To be eligible, a student must be admitted to the Graduate School. The request for examination must be approved by the head of the department offering the course. Students applying for this privilege must present evidence to the department that they have the knowledge equivalent to that of graduate students who have taken the same course. Upon passing such an examination, with a minimum grade of B, the student must receive graduate credit. A student who takes an examination in one-fourth of the total credit hours in a Master's degree program may be examined by this method, subject to the approval of the student's graduate committee. A fee of $10 must be paid before each examination. Proficiency examinations may not be used to raise the grade or change the credit in a course previously completed, nor may such an examination be repeated. Proficiency examinations are granted to other institutions are not transferrable.

English Proficiency

Any student whose native language is not English must present a TOEFL score of at least 525 unless the student has received a Bachelor's or Master's degree from an accredited institution in the United States. Some departments require a higher minimum TOEFL score. The student must also pass an English proficiency examination given by the University prior to initial registration. Students whose performance on the examination indicates a need for additional English study must enroll immediately for English 1221—Written and Oral English for Foreign Students (or another course assigned by the Department of English) for undergraduate credit and pass with a grade of C or better. A student may not take more than 6 additional hours of course work while enrolled in English 1221. Those students whose performance on the examination indicates that they are not prepared to enter English 1221 will be referred to a program of intensive English study prior to taking the course.

Law Courses

A graduate student may take up to 6 semester hours of law courses and apply them toward a graduate degree, upon approval of the College of Law and the student's major professor. The graduate student must register for law courses during the registration period at the College of Law and request an S/NC grade. If the student earns a 2.0 or better, an S will be recorded on the transcript. Below 2.0, an NC will be recorded and the course cannot be used toward meeting degree requirements. Grades for law courses will not be reflected in the cumulative GPA, but for law courses, letter grades for graduate courses. Refer to p. 38 for grades acceptable to meet degree requirements. Only one cumulative GPA (law or graduate) will be used in the grading system of the respective colleges, e.g., numerical grades for law courses, letter grades for graduate courses. A student enrolled in the DBA program may use 8 semester hours or more of law courses for the purpose of raising a grade already received, with the exception of NC. A student may not do additional work to raise a final grade. A student may request a course to be changed from P/NC to S/NC. P indicates progress toward degree; an S indicates satisfactory performance. P/NC and S/NC may be used to satisfy degree requirements. Only one-fourth of the total credit hours required may be used to satisfy degree requirements. Only one-fourth of the total credit hours required may be used to satisfy degree requirements. Only one-fourth of the total credit hours required may be used to satisfy degree requirements. Only one-fourth of the total credit hours required may be used to satisfy degree requirements.
presented, free of technical errors in format, suitable for binding, and reflecting upon the University and The Graduate School. If the thesis or dissertation is not accepted, the student must make corrections and resubmit the materials.

The student and major professor together share the responsibility for the accuracy and professional appearance of the completed thesis or dissertation. The student should confide with the Thesis Consultant regarding problems and questions in advance of preparing the final copy. The UTK Guide to the Preparation of Theses and Dissertations provides the correct format for theses or dissertations. A Thesis Workshop is held each fall and spring quarter for all students who will be writing theses and dissertations. The date for each Workshop is announced in the Graduate School News.

Academic Termination

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

Departments and programs may have requirements for continuation or graduation in addition to the minimum requirements set forth in this Catalog. It is the student's responsibility to be familiar with the special requirements of her/his department or program.

Appeals Procedure

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

Facilities and Services

Housing

Single Men and Women: Single graduate students are provided accommodations in facilities 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. Graduate students have tended to prefer accommodations offered in Melrose and the Apartment Residence Halls. Melrose Hall offers community living units for groups of six to ten students with personal responsibility emphasized. The UT Village Apartments, Residency Hall accommodates students in groups of four. It is the responsibility of each resident to maintain the apartment to University standards. Further information can be obtained from the Office of Residence Halls, 406 Student Services Building.

A limited number of assistant head resident positions are available for single graduate students. The assistant head resident aids the head resident in coordinating and supervising the operation of the hall. This is a live-in position with part-time responsibilities on a nine-and-a-half month appointment. Further information can be obtained from the Office of Residence Halls, 405 Student Services Building.

Married Students: The University provides 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.

Off-Campus Housing: Information and assistance in locating off-campus housing are available in the Off-Campus Housing Office, 336 University Center.

Vehicle Operation

And Parking

The University of Tennessee endeavors to provide adequate facilities for vehicles operated by students and staff. However, areas available for parking are necessarily limited. To reduce traffic congestion within the campus area, large student parking areas are located on the perimeter of the campus. Presently, FREE bus service is provided from the Main Campus to the Agricultural Campus. Also, bus service is provided to Married Student Housing Units at a nominal fee. Each person who operates a motor vehicle in connection with attendance or employment at the University is responsible for registering that vehicle with the Traffic and Parking Authority. The University Traffic and Parking Authority determines the parking policy, traffic regulations, and fees. This information is published each year in the "University Traffic and Parking Regulations" and is available at registration at the Security Building, 1115 UT Drive, and at the Campus Information Center at Circle Park.

Services to the Physically Disabled

Services 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 academic departments, the office seeks to assure that attendance at UT is as convenient as possible for students with physical disabilities. These services include assistance during registration (preregistration: collection of class schedule, payment of tuition and fees; acquisition of special parking permits, elevator keys, tickets for special events, and similar
efforts to relieve the special mobility problems of the students. The Physical Plant Office coordinates efforts to eliminate physical barriers to the extent 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 to respond to the particular needs of the physically handicapped.

The Office of Handicapped Student Services, 900 Volunteer Boulevard (Ground Floor—Student Counseling Center Building) offers a range of support to students and faculty in the areas of academic, personal, and social needs.

The University Library

The University of Tennessee, Knoxville Library owns approximately 1,450,000 volumes, more than 2,200,000 manuscripts, 62,000 microfilm reels and 1,400,000 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 supports the Associate and Research Librarians with a comprehensive collections of library materials on a permanent basis.

Library holdings in Knoxville are housed in the James D. Hoskins (Main) Library and its three branches: Agriculture-Veterinary Medicine, Music, and John C. Hodges Undergraduate Library.

The Special Collections section in the Main Library is a repository of regional and local materials, Tennesseana, and other special collections, including literary works and mementos of many Tennessee political figures. The Radiation Biology Archives comprises 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 research holdings for faculty and graduate students are augmented by the Reference Department and by Interlibrary Services. Reference provides access to bibliographic services offered by other institutions, such as computer-based data services and information retrieval, while Interlibrary Services borrows monographs and obtains copies of other material.

The Law Library on the Knoxville campus and the libraries located on the campuses in Chattanooga, Martin, Memphis, and Tullahoma are individually administered; each library of The University of Tennessee is accessible to all students and faculty in the system.

Computing Center

The University of Tennessee Computing Center (UTCC) provides computing facilities and services for the University's teaching, research, public service, and administrative activities.

UTCC offices and principal computing facilities are located on the first two floors of the Stokely Management Center (SMC) and on the P2 level and first floor of Andy Holt Tower. The computers at SMC include two IBM 370/3033's, an IBM 4341/2, a DECSystem-10 with dual KL10 processors in a symmetrical multi-processor (SMP) configuration, and a DEC PDP 11/55. (Installation of an IBM 3081 to replace the IBM 3033's is scheduled for December 1983.) An IBM 360/40 located in Andy Holt Tower is used exclusively for administrative work. Data entry services are provided with two Nixdorf 600/55 key-to-disk systems also located in Andy Holt Tower.

A IBM 3031's operate under MVS/SP with JES2, the IBM 4341 operates under VM/SP, and the IBM 360/40 operates under DOS with POWER II. The DECSystem-10 operates under TOPS-10 with Galaxy.

Time sharing features on the DEC computers include Coursewriter III and VM/CMS, with FORTRAN, P/L, COBOL, POLAR, and special purpose application programs, including extensive graphics software support. Each IBM 3031 has six million bytes of memory, the IBM 4341/2 has eight million bytes of memory, and the DECSystem-10 has 1.25 million words of memory.

UTCC maintains eight remote job entry stations for batch work and 15 sites for interactive computer work on the Knoxville campus and supplies computing services to the other campuses in the UT system through remote job entry facilities.

The Computing Center's graphics center with ten Tektronix graphics terminals, five storage and five refresh, two digitizing tablets, and a graphics plotter is located in Ferris Hall. Additional graphics equipment, including three terminals, a large digitizing tablet, and a plotter, is located in the user work area in the Art and Architecture Building. A Calcomp 1051 plotter is used to produce graphics output from jobs run on both the IBM and DECSystem-10 computers.

UTCC publishes a User's Guide which describes the use of the IBM computers 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 writeups and special user's guides are also available.

UTCC periodically offers intensive training seminars on the utilization of the IBM and DECSystem-10 computers for faculty, staff and graduate students. UTCC also offers non-credit short courses each quarter in topics such as programming languages and special purpose programs. These courses are announced in the UTCC Newsletter, the "Campus Capsule" section of the UT Daily Beacon, and "this week on campus", a publication announcing campus events.

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.

Center for International Education

This office, located at 201 Alumni Hall, assists students from other countries with the many matters that are of particular concern during their stay at UTK. The Center 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, a Friendship Family program, and activities for student spouses. To aid the international student's understanding of American life, the office 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.

The International House is located on campus, at 1515 Cumberland Ave. Provided by UT and operated by the staff of the Center for International Education, 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 around the world. The University facility is open 365 days of the year. International students applying for admission should write to The Graduate School.

Ombudsman Office

The Ombudsman Office, located in the Office of the Vice Chancellor for Research, provides an informal process of resolution for students and employees who have complaints. The Ombudsman helps, with the concurrence of the individual, work to find solutions to issues of concern.

Graduate Research Centers and Institutes

Energy, Environment, and Resources Center

Director:
E.W. Colglazier, Jr., Ph.D. California Institute of Technology

Associate Directors:
R.A. Bonn, Ph.D. Washington; L.A. Cillare, Ph.D. Tennessee
The Energy, Environment, and Resources Center was created to encourage interdisciplinary studies at UTK, directed at solving 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 state 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, utilization of energy, solar energy, energy conservation in buildings and industry, regional solid waste management, resource recovery, and energy education and information.

Transportation Center

Director: M. S. Bronzin, Ph.D. Pennsylvania State, P.E.
Associate Director: D. P. Middendorf, Ph.D. Tennessee.
Assistant Directors: J. D. Beeson, B.S. Emporia; D. H. Jones, M.S. Tennessee, P.E.

The Transportation Center, utilizing an interdisciplinary approach to transportation research, brings together University faculty and students in a setting conducive to the solution of problems associated with the transportation of goods and people. The Center provides support for undergraduate and graduate students, as well as faculty, in projects associated with research in the field of transportation. Such support, while providing needed financial assistance to students, enables the Transportation Center to undertake research that ultimately contributes to the solution of the nation's transportation problems.

The Center's contributions to the field and its success in meeting the challenges of contemporary transportation research are predicated on the philosophy that education and research, go hand-in-hand. In addition to education and research, the Transportation Center has played a leadership role in workshops, seminars, and short courses concerning such topics as rail and inland waterway operations, planning, engineering, and management; transportation safety, noise assessment, remote sensing, transportation planning and management; ridesharing, transportation brokerage, traffic engineering, and operations, and other areas.

Water Resources Research Center

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

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 needed by 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 education in fields relating to water resources and to encourage the entry of promising students into careers in these fields.

Off-campus Graduate Centers

Kingsport University Center: UTK offers at Kingsport resident graduate programs in science and engineering at both the Master's and doctoral levels. The program is operated within the policies formulated by the Graduate Council of UTK and is coordinated with the graduate and undergraduate offerings of East Tennessee State University.

Students who enroll in this program must be admitted to The Graduate School of UTK. Information about faculty appointments and research areas 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:

UTK 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. Courses are given in the late afternoons, evenings, and Saturdays, with research facilities provided by and used in cooperation with the Oak Ridge Associated Universities (ORAU) and the Union Carbide Corporation, Nuclear Division.

This program is supported under a subcontract with ORAU with principal support coming from Union Carbide Nuclear Division. UT is one of the twenty-four research and universities which sponsor ORAU, a nonprofit education and research management corporation.

The University of Tennessee-Oak Ridge Graduate School of Biomedical Sciences:

The University provides programs leading to the M.S. and Ph.D. degrees in various areas of biomedical sciences. Graduate students have the opportunity to study and do research in conjunction with the Biology Division of the Oak Ridge National Laboratory.

For complete information concerning the program see page 146.

School of Social Work: UTK 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 Knoxville, Nashville, and Memphis.

For complete information concerning the program see page 158.

The University of Tennessee Space Institute

Kenneth E. Harwell, Dean, Ph.D. California Institute of Technology
A. A. Mason, Associate Dean, Ph.D. Tennessee

The Space Institute is an interdisciplinary institute of graduate study and research offering academic programs leading to M.S. and Ph.D. degrees in selected areas of engineering and the aerospace and physical sciences.

The Institute occupies a 356-acre lakeshore campus near Tullahoma, Tennessee, conducive to the concentrated effort needed in advanced studies. Graduate degree programs are available with majors in Aerospace Engineering, Aviation Systems, Computer Science, Engineering, Engineering Science, Industrial Engineering (engineering management option), Mathematics, Mechanical Engineering, Metallurgical Engineering, and Physics. In addition to the fundamental studies characteristic of each discipline, research opportunities are available in many aspects of atmospheric and space flight such as aerodynamics, atmospheric engineering, propulsion, flight performance, materials and structures, gas diagnostics including spectroscopic and electro-optic techniques, thermal sciences, energy conversion, remote sensing, computational fluid dynamics, microprocessors, and computer graphics.

The Institute was established in part to increase the research and engineering resources of Tennessee through education and practice in relevant scientific and technical areas and in part to interface University faculty and student research with the Air Force Arnold Engineering Development Center. The faculty, research activities, and facilities of the Institute and those available at Arnold Center through appropriate contractual arrangements provide students an unusual opportunity for significant research in these areas. Students who enroll at UTI are admitted to The Graduate School, The University of Tennessee, Knoxville. Graduate research assistantships are available for qualified students. Further information may be obtained from Jerry Westbrook, Director, UT-Oak Ridge Graduate School, Post Office Box 117, Oak Ridge, Tennessee 37830.

Chattanooga Graduate Education Program:

UTK offers a graduate program in education leading to the Specialist in Education and the Doctor of Education degrees with a major in Educational Administration and Supervision. Students who enroll in this program must be admitted to The Graduate School of UTK. Information and appropriate forms may be obtained from Jerry Westbrook, 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. Students have the opportunity to study and do research in conjunction with the Biology Division of the Oak Ridge National Laboratory.

For complete information concerning the program see page 146.

School of Social Work: UTK 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 Knoxville, Nashville, and Memphis.

For complete information concerning the program see page 158.
Requirements for Advanced Degrees

Master's Degrees

Master's degree programs are available with thesis and non-thesis options. These programs require 45 or more graduate hours of coursework in addition to the M.A. and M.S. degrees, a number of other degrees are offered, including the M.A.C.T., the MBA, and the M.S.W. A complete listing is found under "Majors and Degrees Available," on pages 8-9. For specific degree requirements, consult individual program descriptions listed by college and department in this Catalog. See also the chart, page 21, for a summary of prerequisites.

Course Requirements: A candidate for a Master's degree must complete a minimum of 45 hours of graduate credit in courses approved by the student's Master's Committee, a minimum of 9 quarter hours of credit in the major must be earned in course 5000 while the student is preparing the thesis. Hours applied to the Master's degree may be entirely from one major subject or divided among two or more areas. In a 45-hour program the major subject must include at least 18 hours of graduate course work, exclusive of course 5000, and a minor subject must include not fewer than 9 or more than 18 hours of graduate credit.

At least two-thirds of the total hours in a Master's degree program must be taken at UTK in courses numbered at or above the 5000 level. Hours can be counted toward this requirement.

Master's Committee: A committee composed of the major professor and at least two faculty members at the rank of assistant professor or above should be formed as early as possible in a student's program, and must be formed by the time a student applies for admission to candidacy (refer to Advisor/Major Professor, page 14). The responsibility of this committee is to assist the student in planning a course of study and carrying out research, and to assure fulfillment of the degree requirements. If the student has a minor, one member of the committee must be from the minor department.

Admission to Candidacy: Application for admission to candidacy for the Master's degree is made as soon as possible after the student has completed any required prerequisite courses and 15 hours of graduate course work with a 3.0 average or higher in all graduate work. The student must submit the Admission to Candidacy form, with appropriate signatures, to the Office of Graduate Admissions and Records no later than commencement day of the quarter preceding the quarter in which he/she plans to graduate.

Thesis Registration: A student must be registered for course 5000 each quarter during work on the thesis, including a minimum of 3 hours the quarter in which the thesis is accepted by The Graduate School. At least 9 hours of 5000 are required for the thesis option. After receiving the Master's degree, a student is no longer permitted to register for Thesis 5000.

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, which is concerned with course work and the thesis, measures the candidate's ability to integrate material in the major and related fields, including the work presented in the thesis. This examination, scheduled through the Office of Graduate Admissions and Records, must be held at least three weeks before the date of approval and acceptance of theses by The Graduate School. Final examinations not properly scheduled must be repeated. The final draft of the thesis must be distributed to all committee members 4 weeks prior to the date of the final examination. In case of failure, the candidate may not apply for reexamination until the following quarter. The result of the second examination is final.

The result of the second examination is the culmination of an original research project completed by the student. It must be prepared according to the UTK Guide to the Preparation of Theses and Dissertations. Two copies of the thesis must be approved by The Graduate School on or before the deadline specified in the Graduate School News. Each copy must include an approval sheet, signed by the members of the Master's Committee, certifying that they have examined the final copy of the thesis and judged it to be satisfactory.

Non-Thesis Registration: All non-thesis students enrolling in a University of Tennessee degree must be registered for course 5002 if not registered for other courses. This applies to students removing incompletes from their records.

Final Examination for Non-Thesis Students: A non-thesis student must pass a final written examination on all work offered for the degree. A department may require an additional oral examination. The examination is not merely a test over course work, but a measure of the student's ability to integrate material in the major and related fields. It must be scheduled through the Office of Graduate Admissions and Records in accordance with the deadlines specified in the Graduate School News and will be conducted by the Master's committee. Final examinations not properly scheduled must be repeated. Students taking the final examination but not otherwise fulfilling the degree requirements may receive a fee of $50 instead of registering. Students finishing incomplete courses, however, must register for a minimum of 3 quarter hours. In case of failure, the candidate may not apply for reexamination until the following quarter. The result of the second examination is final.

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

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.

Admission to the Ed.S. program requires acceptance by The Graduate School, and review and acceptance by the department or area in which the student is majoring. It is recommended that students who apply for the Ed.S. have at least one year of relevant work experience. Additional information on admission requirements can be obtained from the departments offering the degree. Also see the report, page 21, for a summary of procedures for this degree. All deadlines are published quarterly in the Graduate School News.

Ed.S. Committee: A committee of at least three faculty members is assigned to each student. A minimum of two members of this committee must represent the department or area of specialization. Its responsibilities include formulating the student's program of course work, recommending admission to candidacy, directing research, and coordinating the qualifying and final examinations.

Course Requirements: The student's program involves a minimum of six quarters of study totaling no fewer than 90 quarter hours of graduate credit beyond the baccalaureate degree. A minimum of 9 hours is required outside the major department or area.

A student admitted to the program with a Master's degree, or with acceptable work beyond the Master's degree, may have program requirements modified upon recommendation of the student's committee. However, no modifications will be permitted in examination and research requirements, nor in the minimum 9 graduate hours required outside the major. All prior course work accepted for transfer must be related to the student's program objectives. A maximum of 9 hours beyond the Master's degree may be transferred from another institution to an Ed.S. program. See Transfer Credits, page 15.

Courses numbered at the 3000 and 4000 levels required for certification through UTK may not be taken for graduate credit and used as part of the course work in the major. At least one-half of the last 45 quarter hours of work, exclusive of thesis courses, must be in 5000- or 6000-level courses.

Admission to Candidacy: The Admission to Candidacy form, signed by the student's committee, is submitted to the Office of Graduate Admissions and Records before the student has completed 18 hours of course work in the Ed.S. program. A qualifying examination may be required for Admission to Candidacy if the student has a Master's degree earned six years or more prior to admission to the program. This examination may be written and/or oral.


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

b. In the thesis program, or problems in lieu of thesis, 9 hours of research credit (5180-90, and 5200) must be earned in the preparation of an acceptable piece of work. The student must continue to register for 5200 while working on the project, including the quarter it is accepted by The Graduate School.
thesis must be prepared according to instructions in the UTK Guide to the Preparation of Theses and Dissertations, and approved by the student's committee prior to submission to The Graduate School for final approval and acceptance.

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

Time Limit: Candidates have six calendar years from the time of entry into the last 45 hours of their degree programs to complete the Ed. S. degree.

Doctoral Degrees

Three doctoral degree programs are available: Doctor of Philosophy (Ph.D.), Doctor of Education (Ed.D.), and Doctor of Business Administration (DBA). Programs are listed under “Majors and Degrees Available,” pages 8-9. For specific degree requirements, consult individual program descriptions listed under “Majors and Degrees Available,” and provisions for repeating a failed examination. The request will be considered by The Graduate School upon recommendation of the department head.

Doctoral Examinations: Departments may, at their option, administer diagnostic or placement examinations to students on admission to the doctoral program to help determine the student's level of preparation, strengths, and weaknesses, and general background. Since courses bearing the same title may vary in content from institution to institution, the diagnostic or placement examinations are designed to aid in the selection of courses and to determine the student's preparation to continue doctoral studies at UT.

1. Qualifying examinations, which may be written and/or oral, may be given to students near the end of their first year in the doctoral program. Qualifying examinations are designed to test the student's progress, general knowledge of fundamentals of the field, and familiarity with the more specialized aspects of the doctoral program.

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

3. Final examinations (oral, or oral and written) on the dissertation subject, major field, and such other fields as the student's doctoral committee may specify, will be administered by all members of the doctoral committee after completion of the dissertation and all course requirements. This examination must be passed at least three weeks before the date of acceptance and approval of the dissertation by The Graduate School. The examination must be scheduled through the Graduate Office. Final examinations not properly scheduled must be repeated. The dissertation, in the form approved by the major professor, must be presented before the student's doctoral committee at least two quarters before the examination. The examination is announced publicly and is open to all faculty members.

Language Requirements: Candidates for the Ph.D., D.Litt., or D.M. degrees must demonstrate a reading knowledge of at least one foreign language in which there exists a significant body of literature relevant to their major field of study. Refer to the descriptions of individual programs in the catalog to determine the specific language (or languages) required. Language requirements must be met at UTK and cannot be transferred from another institution. When the student is prepared to take the language examination, he/she must complete an Application for Doctoral Language Examination at the Office of Graduate Admissions and Records in accordance with the dates and times for the examinations printed in the Graduate School News.

Satisfactory completion (grade of B or better) of a 3030 course in a language department may be substituted for a language examination. Admission to Candidacy: A student may be admitted to candidacy for the doctoral degree after passing the comprehensive examination, fulfilling any language requirements (for Ph.D.), and maintaining at least a B average in all graduate course work. Admission to candidacy must be applied for and approved at least two full quarters prior to the date the degree is to be conferred. The student is responsible for filing the admission to candidacy, which must be signed by the doctoral committee and approved by The Graduate School.

Doctoral Language Examination: The dissertation represents the culmination of an original major research project completed by the student. The organization, method of presentation, and subject matter of the dissertation are important in conveying to others the results of such research.

A student should be registered for the number of dissertation hours representing the fraction of effort devoted to this phase of the candidate's program. Thus, a student working full time on the dissertation should register for 12 hours of 6000 per quarter. Two copies of the dissertation (prepared according to the regulations in the UTK Guide to the Preparation of Theses and Dissertations) must be submitted to and accepted by The Graduate School. Each copy must include an approval sheet, signed by all members of the doctoral committee, which certifies to The Graduate School that they have examined the final copy and found that its form and content demonstrate scholarly excellence. Doctoral forms and a thesis card for the Ph.D. degree may be required to demonstrate a reading knowledge of at least one foreign language in which there exists a significant body of literature relevant to the major field of study. Refer to the descriptions of individual programs in the catalog to determine the specific language (or languages) required. Language requirements must be met at UTK and cannot be transferred from another institution. When the student is prepared to take the language examination, he/she must complete an Application for Doctoral Language Examination at the Office of Graduate Admissions and Records in accordance with the dates and times for the examinations printed in the Graduate School News.

Satisfactory completion (grade of B or better) of a 3030 course in a language department may be substituted for a language examination.
### Summary of Procedures for Master's and Specialist in Education Degrees

<table>
<thead>
<tr>
<th>PROCEDURES</th>
<th>UNDER DIRECTION OF</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admission as a potential degree candidate</td>
<td>Office of Graduate Admissions and Records</td>
<td>Prior to completing 18 hours of graduate courses</td>
</tr>
<tr>
<td></td>
<td>and Major Department</td>
<td></td>
</tr>
<tr>
<td>Formation of Master’s/Ed.S. committee</td>
<td>Advisor/Major professor</td>
<td>Prior to application for admission to candidacy</td>
</tr>
<tr>
<td>Submission of application for admission to candidacy</td>
<td>Master’s/Ed.S. committee</td>
<td>At least one quarter prior to graduation*</td>
</tr>
<tr>
<td>Approval of admission to candidacy</td>
<td>The Graduate School</td>
<td>Prior to graduation</td>
</tr>
</tbody>
</table>

**GRADUATION REQUIREMENTS FOR NON-THESIS OPTION**

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

**GRADUATION REQUIREMENTS FOR THESIS/PROBLEMS OPTION**

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

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

<table>
<thead>
<tr>
<th>PROCEDURES</th>
<th>UNDER DIRECTION OF</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admission as a potential degree candidate</td>
<td>Office of Graduate Admissions and Records and Major Department</td>
<td>Prior to completing 18 hours of graduate courses</td>
</tr>
<tr>
<td>*Appointment of doctoral committee</td>
<td>The Graduate School on recommendation of department head</td>
<td>Preferably during the first year of graduate study but, at the latest, prior to admission to candidacy</td>
</tr>
<tr>
<td>*Comprehensive examination</td>
<td>Major department</td>
<td>Prior to admission to candidacy</td>
</tr>
<tr>
<td><em>Foreign language examination(s)</em>*</td>
<td>Office of Graduate Admissions and Records</td>
<td>Prior to admission to candidacy</td>
</tr>
<tr>
<td>Submission and approval of application for admission to candidacy</td>
<td>Doctoral committee and The Graduate School</td>
<td>At least three quarters prior to graduation***</td>
</tr>
</tbody>
</table>

**GRADUATION REQUIREMENTS**

| Placement of name on graduation list                                    | Student                                                 | Indicate on registration materials                                   |
| Application for diploma                                                | Office of Graduate Admissions and Records                | Deadline available at registration***                                 |
| Submission of dissertation to doctoral committee                       | Student                                                 | At least two weeks prior to final examination                         |
| Scheduling of final examination                                        | Office of Graduate Admissions and Records                | Not later than one week prior to final examination***                 |
| Final examination(s)                                                   | Doctoral committee                                      | Not later than three weeks prior to dissertation deadline***          |
| Approval and acceptance of final copy of dissertation, doctoral forms, and thesis card | Doctoral committee and The Graduate School               | After final examination and not later than two weeks prior to Commencement*** |
| Removal of incomplete(s)                                               | Instructor of course                                    | Not later than one week prior to Commencement***                      |

*The order of these items varies with individual programs.  
**Not required in some programs.  
***Deadlines are printed in the Graduate School News quarterly.
Institute of Agriculture

W. W. Armistead, Vice President
Bobby H. Pentecost, Assistant Vice President

The Institute of Agriculture traces its history to 1869 when the University was designated as Tennessee’s Federal Land-Grant Institution. Under terms of the Federal Land-Grant Act, the University was enabled to offer instruction in agriculture and the mechanical 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, Milan, Grand Junction, Spring Hill, Springfield, Lewisburg, Crossville, Greeneville, Martin and a forestry branch station at Oak Ridge. Professional and technical staff are in residence at these locations.

Agricultural Extension Service

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

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

The educational program is carried on through offices in each of the 95 counties of the state. Educational emphasis includes work in four major program areas: agriculture and natural resources, community resource development, home economics, and education of young people through 4-H Clubs. County Extension staff members working directly with local people are supported in the various interests of livestock 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 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 social, 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 in 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 subject matter areas related to the major.

Both majors and minors are available in Agricultural Economics, Agricultural Engineering, Agricultural Extension, Agricultural Mechanization, Animal Science, Entomology and Plant Pathology, Food Technology and Science, Ornamental Horticulture and Landscape Design, and Plant and Soil Science. Majors only are available in Forestry and Wildlife and Fisheries Science, and minors are available in General Agriculture and Rural Sociology. The minor in General Agriculture requires 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 Master's committee in consultation with the student and will depend upon the student's background, interests, and professional objectives. For example, a student majoring in Entomology and Plant Pathology 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 minimum requirements:
1. 48 hours of course work of which 36 must be at the 5000-level or above.
2. 12 hours in agricultural economics.
3. 6 hours in quantitative methods in agricultural economics, statistics, or mathematical economics.
4. Final comprehensive written and oral examination.

Requirements of the non-thesis option for the Master of Science degree with a major in Forestry are as follows:
1. At least 36 hours must be at the 5000-level or above.
2. An advisory committee of not less than 3 faculty members will be selected. At least one member in addition to the major professor will be from the Department of Forestry, Wildlife and Fisheries. The committee will meet and schedule the student’s program during the first quarter in residence.

Agricultural Economics and Rural Sociology

Subject Area Requirements: All candidates pursuing the Doctor of Philosophy degree will be required to demonstrate competence in examinations in the following areas:
A. Major area of concentration to be selected from the following:
1. Agricultural policy
2. Agricultural marketing and price analysis
3. Farm management and production economics
4. Natural resource economics
5. Rural development
B. The core areas:
1. Agricultural economics
2. Economic theory
3. Mathematical and quantitative methods in agricultural economics

Additional Course Requirements: At least 30 hours must be in agricultural economics and 15 hours in economics. The dissertation, a minimum of 21 hours in agricultural economics and economics combined must be in courses numbered 5000 and above.

Agricultural Engineering

Concentrations:
1. Agricultural power and machinery
2. Soil and water conservation engineering
3. Agricultural structures
4. Electric power and processing

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

Additional Course Requirements: The program of each candidate shall consist of a major and supporting studies in one or more additional areas. The major shall consist of at least 36 quarter hours exclusive of research and dissertation. A minimum of 24 quarter hours shall be taken in departments outside of the Department of Agricultural Engineering.

Animal Science

Concentrations:
1. Animal nutrition
2. Animal breeding
3. Animal physiology

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

Additional Course Requirements: A minimum of 36 quarter hours credit must be completed in related fields outside of animal science.

2. At least 36 quarter hours credit in courses at the 5000 and 6000 level, exclusive of Doctoral Research and Dissertation. At least 9 of the 36 hours must be in 6000-level courses.

Food Technology and Science

Concentrations:
1. Food products
2. Food chemistry
3. Food microbiology

Supporting studies are required to provide fundamental training in sciences related to the student's specialized area. Various commodity interests can be emphasized in all three areas by judicious selection of courses and dissertation topics.

Additional Course Requirements:
1. At least 36 quarter hours credit in courses at the 5000 and 6000 level, exclusive of Doctoral Research and Dissertation. At least 9 of the 36 hours must be in 6000-level courses.
2. A minimum of 9 hours of courses for graduate credit outside of the Department of Food Technology and Science.

Plant and Soil Science

Concentrations:
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.

Additional Course Requirements: A minimum of 30 quarter hours credit must be completed in courses numbered above 5000 exclusive of Doctoral Research and Dissertation. Of which 9 must be in courses numbered above 6000.

Departments of Instruction

Agricultural Economics and Rural Sociology

MAJOR

Agricultural Economics

DEGREES

M.S., Ph.D.

Professors:
J. A. Martin (Head), Ph.D. Minnesota;
M. B. Bandeen, Ph.D. Purdue; J. R. Brooker, Ph.D. Florida; C. L. Cieland, Ph.D. Wisconsin; D. Dubov, Ph.D. California (Berkeley); L. H. Keller, Ph.D. Kentucky; T. H. Klinit, Ph.D. Kentucky;
F. O. Leuthold, Ph.D. Wisconsin; D. L. McLemore, Ph.D. Clemson; B. R. McManus, Ph.D. Purdue; S. D. Mundy, Ph.D. Tennessee; C. B. Sappington, Ph.D. Illinois.

Associate Professors:
M. C. Cuskaders, Ph.D. Michigan State; R. H. Orr, Ph.D. Illinois; R. W. Todd, J. D. Tennessee;
O. N. Walker, Ph.D. Oklahoma State.

Assistant Professors:
W. M. Park, Ph.D. Virginia Polytechnic Institute; G. D. Whipple, Ph.D. Washington 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

4120 Farm Management (3) Principles of farm organization and operation; nature of managerial processes; economic aspects of crop, livestock, labor and machinery planning; use of budgeting techniques; use of farm accounts. Prereq: Agriculture 1110 and Economics 2120. 2 hrs and 1 lab. F, W

4140 Agricultural Production Economics I (3) Application of micro-economic theory to problem of resource allocation, product selection, scale of operation of agricultural firms; economic interpretation of technical agricultural production relationships. Prereq: Agriculture 1110 and Economics 2120. W

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: Agriculture 1110 and Economics 2120, or consent of instructor. F

4250 Agricultural and Rural Planning (3) Decision-making concepts applied to design and implementation of local action programs. Case examples from the U.S. and other countries. Prereq: Agriculture 1110 and Economics 2120, or consent of instructor. Su

4310 Agricultural Finance (3) Nature and source of capital; credit problems of farmers; kinds and sources of farm credit. Agricultural insurance and taxation. Prereq: Agriculture 1110 and Economics 2120. W

4320 Agricultural Policy (3) Meaning of agricultural policy in democratic society; relationship of farm groups with governments giving rise to policy; agricultural policy and appraisal of results; policy problems. Prereq: Agriculture 1110 and Economics 2120. W

4330 Land Economics (3) Problems and policies of land use, development, taxation, tenure, population growth and demand for land; principles and theories of rent, property, value, and income. Prereq: Agriculture 1110 and Economics 2120. Sp

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

4630 Advanced Agricultural Marketing (3) Economic basis of market location and pricing; perfect market model; spatial equilibrium analysis; production and market location and transfer costs; processing and storage; consumer tastes and market flows; measuring efficiency. Prereq: 3120 or 3320 or consent of instructor. W

5000 Thesis (1-15) P/NP only. 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 Agricultural Production Economics II (3) Theoretical and empirical concepts of agricultural allocation problems under various knowledge situations with emphasis on uncertainty. Aggregate external effects of decisions made by individual agricultural firms. Decision theory with application to agriculture. Prereq: 4140 or equivalent. F

5210 Seminar: Agricultural Policy (3) Sp

5220 Research Methodology (3) Nature of scientific method, logic, philosophy, assumptions, potential and limitations of science; methodological problems of social sciences, establishing research problems, research methods. 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) Analysis of structure, conduct, and performance of agricultural marketing system; application of price theory concepts to marketing analysis; methods used to examine industry conduct and performance. Prereq: Economics 3110 or consent of instructor.

5420 Advanced Land and Natural Resource Economics (3) Economic efficiency in natural resource allocation; uses of economic tools in land evaluation. Prereq: 4330 and Economics 5110, or consent of instructor.

5440 Economics of Agricultural Development (3) Role of agriculture in overall economic development; impacts of world food situation on people, environment, development; natural and human resources for food production; agricultural technology and change; national and international food policy. Prereq: 4240 or consent of instructor. W

5610 Quantitative Methods in Agricultural Economics (3) Analytical techniques useful in estimation of functions—supply, demand and production and prediction of economic variables. Emphasis on application of multiple regression; model specification, estimation technique using computer and interpretation of results. Prereq: Statistics 4310 or Economics 5510 or consent of instructor. W

5710 Linear Programming (3) Techniques with empirical applications to problems of firm and resource maximization, profit, minimizing costs; flow, risk, allocation over space and time. Prereq: Consent of instructor. W

5820 Agricultural Price Analysis (3) Application of various theoretical concepts to analysis of prices and quantities; specification and estimation of price determination models and interpretation of results. Prereq: 3130 and 5610 or Statistics 4310 or consent of instructor.

6000 Doctoral Research and Dissertation (3-15) P/NP only. E

6120 Seminar in Agricultural Economics (3) Topics selected from the areas of economics of production, consumption and distribution in agriculture and related industries and public policies concerned with agriculture and related industries. A

6210 Agricultural and Rural Transformation Problems (3) Systematic evaluation of policy and development proposals related to agricultural modernization, food supply, and rural living. Decision-making process and useful roles of social scientists. Analysis of current issues in U.S. and developing nations. Prereq: Consent of instructor. Sp

6410 Agricultural Supply Analysis (3) Estimating agricultural supply relationships using aggregate time series data. Emphasis on programming, simulation and firm growth models with emphasis on the mathematical models and problems of model building and the logical relationship between theoretical concepts and model attributes. Prereq: 5310 or consent of instructor. A

6420 Marketing and Resource Use (3) Institutional settings for research and policy formulation; analytical tools to measure efficiencies of marketing and resource use; emerging problems in marketing and resource use. Prereq: 5410 or consent of instructor. A

Rural Sociology

3420 Rural Sociology (3) Nature of rural society; social systems concepts; rural-urban differences; nature of social relations; population characteristics and movement; problems of rural people; tenancy, farm labor, health, services, educational facilities, churches and local government; impact of industrialization. F, W

4450 Diffusion of Agricultural Technology (3) Analysis of diffusion process whereby new technology spreads from scientists to final adopters. Adoption process, communication behavior, mass media, role of professional change agents, opinion leadership, and confirmation hypothesis. Prereq: 3420 or consent of instructor.

5340 Special Problems (3) Special topics in rural sociology. Prereq: 3420 or consent of instructor. May be repeated. Maximum 9 hrs. S/NC only. E

5430 Seminar in Rural Sociology (3) Current rural sociological literature and research; relevance of general sociological theory and methodological techniques. Prereq: 3420 or equivalent. A

5450 Advanced Rural Sociology (3) Application of sociological concepts to analysis and design of new structure and function of rural life; rural social values, attitudes, and norms as they influence the family, formal and informal groups, and population shifts in changing farm technology. Prereq: 3420 or equivalent. W

5470 Research Problems in Rural Communities (3) Emphasis on problems that arise in survey research in rural areas. Sampling procedures, questionnaire construction, interviewer selection, training, control, and legitimization needs. Prereq: Undergraduate course in statistics.

5490 Rural Population Analysis (3) Analysis of U.S. and world population changes and determinants of fertility, mortality, and migration with emphasis upon changes in rural sector. Prereq: Sociol 4110 or equivalent. F

Agricultural Engineering

MAJORS

DEGREES

M.S., Ph.D.

Agricultural Engineering

M.S.

Agricultural Mechanization

M.S.

Professors:


Assistant Professor:

D. O. Baxter, M.S. Missouri.

Agricultural Engineering

4230 Selected Topics in Agricultural Engineering (3) Develop new topics as required by current trends and problems in agricultural engineering. A

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

4620 Design of Structures for Production, Process, and Storage in Agricultural Systems (3) Functional and structural design of agricultural building; emphasis on complete design of system or function, structural, and environmental aspects. Prereq: 3620. 1 hr and 2 labs. Sp

4630 Design of Processing and Materials Handling Systems (3) Development of systems and components for integrated agricultural processing considering mass and energy balances, product characteristics, equipment specifications, storage, handling and economic merit. Prereq: 3630. 1 hr and 2 labs. W

4640 Design of Agricultural Machinery (3) Functional requirements of agricultural machinery. Elements of machine components; design; 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

5000 Thesis (1-15) P/NP only. E

5240 Environmental Control in Agricultural Structures (3) Engineering analysis of factors related to processes of animal and plant life; basis for development and design of facilities and structures for confined housing of animals, controlled environment for plant growth, and storage facilities for plant and animal products. Prereq: Agricultural Mechanization 3220, Mechanical Engineering 3110 or consent of instructor. 2 hrs and 1 lab. Sp
Animal Science

MAJOR
Animal Science

DEGREES
M.S., Ph.D.

Professors:
D. O. Richardson, (Head), Ph.D. Ohio State; K. W. Berth, Ph.D. Rutgers; M. G. Bell, Ph.D. Oklahoma State; J. K. Blethen (Emeritus), Ph.D. Ohio State; W. T. Butts (Adjoint), Ph.D. Tennessee; C. C. Chamberlain (Emeritus); B. H. Erickson, Ph.D. Kansas State; O. G. Hall (Dean); Ph.D. Iowa State; S. L. Hansard (Emeritus); Ph.D. Florida; E. R. Lidvall, M.S. Tennessee; J. B. McLaren, Ph.D. Auburn; G. M. Merriman (Emeritus); D. V. M. Michigan State; R. M. Miller; Ph.D. Georgia; M. J. Montgomery, Ph.D. Wisconsin; R. L. Murphree (Emeritus), Ph.D. Wisconsin; H. V. Shirley, Ph.D. Illinois; R. R. Shroyer, Ph.D. Iowa State; R. L. Tugwell (Emeritus), Ph.D. Kansas State; C. E. Wylie (Emeritus), A.M. Missouri.

Associate Professors:

Assistant Professors:
B. R. Bell, Ph.D. North Carolina State; W. C. Cullen, Ph.D. Minnesota; J. J. Goedkyn, Ph.D. Michigan State; H. G. Kattesh, Ph.D. Virginia Polytechnic Institute; T. W. Schultz, Ph.D. Pennsylvania State; J. D. Smallding, Ph.D. Texas A. M.

3210 Anatomy and Physiology of Farm Animals (4) Skeletal and joint systems, skeletal muscles, blood and microcirculation, and the nervous, cardiovascular, respiratory, digestive, renal and endocrine systems, demonstrations of physico-chemical phenomena. Pre-req: Bio 2120 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, and parturition; initiation of lactation; endocrine regulation of reproductive phenomena. Pre-req: 3210 or consent of instructor. (Same as Zoology 3220) 2 hrs and 1 lab. F, W, Sp.


3330 Feeds and Ration Formulation (4) Feedstuffs, additives, feeding standards, nutrient requirements and ration formulation for beef and dairy cattle, sheep, horses, poultry, swine, and laboratory animals. Pre-req: 3320, 2 hrs and 2 labs. W, 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 farmed and to agriculture students. Pre-req: 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 variation according to various kinds of causative differences such as those in genetic and environmental selection and their consequences. Matings systems and their effects on populations. Pre-req: 3410 or equivalent. 2 hrs and 1 lab. F, W, 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. Pre-req: Microbiology 2910-11 or 2910-19 or consent of instructor. 3 hrs and 1 lab. F, W, Sp.

3520 Avian Diseases (3) Major diseases; characteristics, prevention and treatment, management practices and systems for domestic birds, upland game birds, and waterfowl. 2 hrs and 1 lab. F, A.
3810 Nutrition and Management of Laboratory Animals (3) Principles of feeding, breeding, and handling of animals in scientific investigations; specific species; requirements, peculiarities, and responses to 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: 3210. W

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 methods and techniques in collecting, evaluating, processing, and preserving semen; in vitro fertilization; evaluation of males and females; pregnancy determination; and parturition. Prereq: 3210 or consent of instructor. 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 feeding trials to demonstrate basic animal nutrition; feeding preparation and feeding of experimental diets. Prereq: 3330. W

4810 Beef Cattle Production and Management (4) Principles of nutrition, physiology, and breeding in a complete beef cattle management program. Structure of industry, enterprise establishment and systems of production, production practices and herd improvement programs. Prerequisites: completion of animal science sophomore and junior core courses or consent of instructor. 3 hrs and 1 lab. F, Sp

4820 Dairy Cattle Production and Management (4) Principles of nutrition, physiology and breeding in a complete dairy cattle management program. Structure of industry, enterprise establishment and systems of production, production practices, and herd improvement programs. Prerequisites: completion of animal science sophomore and junior core courses or consent of instructor. 3 hrs and 1 lab. F, W

4830 Pork Production and Management (4) In-depth treatment of pork production, nutrition, breeding, physiology and marketing in a complete pork production and management program. Structure of the industry, enterprise establishment, systems of production, production practices, and herd improvement programs. Prerequisites: completion of animal science sophomore and junior core courses or consent of instructor. 3 hrs and 1 lab. F, Sp, A

4840 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

4850 Light Horse Production and Management (4) Integration of principles of nutrition, physiology and breeding into light horse management program. Structure of industry, systems and practices of production, individual and group animal care and management; tack, equipment and facilities; and pleasure and commercial producers. Prerequisites: completion of animal science sophomore and junior core courses or consent of instructor. 3 hrs and 1 lab. W

4860 Lamb and Wool Production and Management (4) Integration of principles and selection, nutrition, breeding, physiology and marketing into complete lamb and wool production and management program. Structure of industry, enterprise establishment and systems of production responses and economic returns. Prerequisites: completion of animal science sophomore and junior core courses or consent of instructor. 3 hrs and 1 lab. W

5000 Thesis (1-15) P/NP only. E

5011 Problems in Lieu of Thesis (1-6) May be repeated. F, A

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

5210 Endocrine Relations in Animal Production (4) Endocrine glands related to growth and reproduction; hormone preparation for altering growth and reproductive rate. Prereq: 3210 or consent of instructor. 2 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: 3520 or 4320. 2 hrs and 1 lab. W, A

5240 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 or 4320. 2 hrs and 1 lab. Sp, A

5311 Analytical Techniques in Animal Nutrition (3) Physical and chemical analyses of feeds, ingredients and biological fluids associated with nutrition research and production programs. Prerequisites: completion of animal science sophomore and junior core courses or consent of instructor. 3 hrs and 1 lab. F, Sp

5322 Advanced Experimental Animal Nutrition (3) Animal experimental techniques for digestion, absorption, nutrient balances and radioisotope tracer techniques. Prereq: 5211. 1 hr and 2 labs. Sp

5333 Nonruminant Animal Nutrition (4) Physiology and chemistry of growth and development in the nonruminant system of nonruminant animals during the life cycle. Concepts and methodology concerning nutrient requirements, interrelationships, availability and deficiencies of nutrients. Nonnutritive additives, toxins, poisons, and disease effects, nutritional effects on products. Prereq: 3210, 3330 or consent of instructor. 3 hrs and 1 lab. W

5344 Ruminant Animal Nutrition (3) Digestive physiology of the ruminant stomach, rumen fermentation, determination of nutrient requirements and feed intake regulations of ruminant animals. Prereq: 3330. F

5410 Genetics of Animal Populations (3) Populations and individuals, gene and zygotic frequencies; statistical techniques; forces influencing genetic changes; application to animal breeding. Prereq: 3420 or consent of instructor. 2 hrs and 1 lab. F, A

5510-20 Advanced Animal Physiology (5, 5) Advanced animal physiology (primarily mammalian physiology): 5510—Membrane neuron, central nervous system, cardiovascular system, and control mechanisms. 5520—Respiratory, renal, gastrointestinal, and reproductive physiology, acid base mechanisms, and metabolism. Should be taken in sequence if both courses are taken. Prerequisite: General undergraduate anatomy and physiology and Biochemistry 4110 or equivalent or consent of instructor. Biochemistry 4120 also recommended. (Same as Zoology 5510-20). 4 hrs and 1 lab. W, Sp

5710 Methods of Evaluating Experimental Data in Animal Science (3) Interpretation of data from experiments in animal science based upon such statistical procedures as analysis of variance, covariance, simple and multiple regression, and multiple regression. Prereq: Statistics 2521 or equivalent. 2 hrs and 1 lab. W

5720 Design and Interpretation of Experiments in Animal Science (3) Review of principles of experimental design and application to research in animal science analyzing data from experiments with unequal and disproportionate subclass frequencies; situations and procedures for use of computers in statistical analyses. Prereq: 5710. 2 hrs and 1 lab. Sp

5910 Seminar (1) Current developments and literature in animal sciences. May be repeated. Maximum 3 hrs. F, W, Sp

6000 Doctoral Research and Dissertation (3-15) P

6211 Advanced Topics in Animal Physiology (1-6) Recent advances and concepts, research techniques, current problems. May be repeated. Maximum 6 hours. E

6220 Environmental Physiology of Farm Animals (3) Environmental factors and measurement, physiological mechanisms of response to environmental factors and measurement; interrelationship of animals and environment in terms of productivity and health. Prereq: Consent of instructor. 2 hrs and 1 lab. W, A

6230 Animal Growth and Development (3) Physiological and nutritional aspects of growth of farm animals; effects of growth rates on physiological and productive functions. Prereq: 5344, 5510, 5520 or consent of instructor. Sp, A

6240 Physiology of the Heart (4) Cardiac physiology: ultrastructural, biochemical, and physical effects. Latest techniques to assess myocardial function. Prereq: 5510 and 5520, and upper division course in cell physiology and consent of instructor. 3 hrs and 1 lab. W

6311 Advanced Topics in Animal Nutrition (1-6) Recent advances and concepts, research techniques, current problems. May be repeated. Maximum 6 hours. E

6322 Advanced Animal Nutrition (3) Chemical forms, digestion, absorption, intermediary metabolism, deficiencies, excesses and interaction of nutrients, energy, proteins, vitamins, and minerals. Prereq: 5333 or 5344 and Biochemistry 4120 or Nutrition 5110 or consent of instructor. May be repeated. Maximum 6 hours. E

6411 Advanced Topics in Animal Breeding (1-6) Recent advances and concepts, research techniques, current problems. May be repeated. Maximum 6 hours. E

6420 Animal Breeding Research Methods and Interpretation (3) Obtaining valid estimates of genetic parameters in animal breeding studies; least squares adjustment of data; partition of variance; phenotypic, genetic, and environmental correlations; repeatability; heritability; and selection indexes. Prereq: 5410 and 5710. W, A

6510 Seminar (1) Animal nutrition, breeding, physiology and products. May be repeated. Maximum 6 hours. E

Entomology and Plant Pathology 27

Institute of Agriculture/Entomology and Plant Pathology

6010 Biology of Soil Microorganisms (4) Morphology and physiology of microorganisms; the decomposition of organic matter, chemical transformations and interactions between soil organisms and higher plants. Prereq: Introductory microbiology or 3130. 3 hrs and 1 lab. Sp, A

6410 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. W, A

6415 Forest Pathology (3) Symptoms, etiology, and control of forest tree diseases, including wood decay and other diseases important to urban and production forestry. Prereq: Consent of instructor. 2 hrs and 1 lab. W, A

MAJOR DEGREE

Entomology and Plant Pathology

M.S.


Assistant Professors: L. E. Klostermeyer, Ph.D. Nebraska; B. B. Reddick, Ph.D. Clemson.

Associate Professors: E. C. Bernard, Ph.D. Georgia; P. L. Lambdin, Ph.D. Virginia Polytechnic Institute.

Assistant Professors: L. E. Klostermeyer, Ph.D. Nebraska; B. B. Reddick, Ph.D. Clemson.
Institute of Agriculture/Food Technology and Science

5000 Thesis (1-15) P/NP only. E.

5100 Research Methods and Instrumentation in Plant Pathology and Entomology (3) Techniques for the identification, classification, and deterioration of plant pathogens and insects affecting crops, livestock, and residences. Obtaining of insects and damaged specimens; diagnostic characteristics and control measures. Prereq. 3130.

5120 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. Prereq. 3210 or equivalent. 2 hrs and 1 lab. W, Sp.

5210 Plant Parasitic Nematodes (4) Morphology, physiology, taxonomy, and ecology of plant parasitic nematodes with emphasis on host-parasite relationships. Prereq. 3 hrs biological science or consent of instructor. (Same as Zoology 3210.) 2 hrs and 2 labs. W, A.

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

5230 Field Crop and Vegetable Insects (3) Taxonomy and biology of family field crop and vegetable insects affecting field and vegetable crops. Prereq. 3210 or equivalent. 2 hrs and 1 lab. F.

5240 Plant Virology (4) Symptomatology, cytology and virology of plant viruses; structure, replication, classification, and classification of plant viruses; serology of plant viruses. Prereq. 3210 or equivalent. 2 hrs and 2 labs. W, A.

5250 Medical and Veterinary Entomology (4) Morphology, taxonomy, biology and control of arthropod parasites and vectors of pathogens of humans and animals. Ecology and behavior of vectors in relation to pathogen transmission and control. Prereq. 3210, general entomology, or consent of instructor. 3 hrs and 1 lab. Sp.

5260 Insect Pest Management (4) Principles and applications of biological, cultural, genetic, behavioral, and chemical methods of control to maintain pest populations below economic threshold levels. Prereq. 3210, Zoology 3110, or consent of instructor. 3 hrs and 1 lab. W, A.

5310 Special Problems in Entomology (1-6) Comprehensive individual study of current problems. May be repeated. Maximum 9 hrs. E.

5320 Special Problems in Plant Pathology (1-6) Comprehensive individual study of current problems. May be repeated. Maximum 9 hrs. E.

5330 Special Problems in Nematology (1-6) Comprehensive individual study of current problems. May be repeated. Maximum 9 hrs. E.


Food Technology and Science

MAJOR

DEGREES

Food Technology and Science

M.S., Ph.D.

Professors:

J. T. Miles (Head), Ph.D. Wisconsin; L. J. Collins, Ph.D. Maryland; H. O. Jaynes, Ph.D. Illinois; W. W. Overcast (Emeritus), Ph.D. Iowa State.

Associate Professors:

P. M. Davidson, Ph.D. Washington State; B. J. DeMott, Ph.D. Michigan State; F. A. Draughn, Ph.D. Georgia; D. L. Lovelady, Ph.D. Kansas State; S. L. Melton, Ph.D. Tennessee; M. J. Riemann, Ph.D. Kansas State.

Assistant Professor:

J. R. Mount, Ph.D. Ohio State.

3200 Dairy Products I (4) Procurement, processing and deterioration of manufacture of fresh and condensed dairy products. 3 hrs and 1 lab. W.

3840 Meat Science (3) Processing methods, carcass characteristics of meat animals, slaughter, cutting, selection, curing, freezing and cookery. 2 hrs and 1 lab. W, Sp.


4030 Dairy Products II (4) Principles in the manufacture of butter and special dairy products. Prereq. 3200. 3 hrs and 1 lab. Sp.

4130 Food Chemistry I (3) Minerals, fats, oils and vitamins in food as affected by processing and storage. Prereq. Nutrition and Food Sciences 3150 or equivalent. 2 hrs and 1 lab. Sp.

4140 Food Chemistry II (3) Reactions of proteins, carbohydrates and natural food colorants in food materials. Protein structure, food enzymology and browning reactions. Effects of storage and processing on proteins and carbohydrates with emphasis on nutritional value and functionality. Prereq. Nutrition and Food Sciences 3150 or equivalent. 2 hrs and 1 lab. F.

4200 Food Processing I (4) Prevention of spoilage and deterioration of foods. Methods of preservation. Prereq. Agricultural Mechanization 3510, 3 hrs and 1 lab.

4210 Additives (3) Substances used in food manufacturing with emphasis on properties and functions. Prereq. Nutrition and Food Sciences 3140 or equivalent. 3 hrs. F, W, Sp.

4310 Food Packaging (3) Characteristics and applications of materials and containers to packaging requirements and methods of packaging foods. Prereq. 3200. 2 hrs and 1 lab. Sp.

4400 Food Processing II (5) Design of food quality assurance programs with emphasis on sanitation. Application of general analytical techniques, regulations and unit operations to quality control in food industry. Prereq. 3810. 3 hrs and 2 labs. W.

4410 Food Crop Products (3) Food products from crops with emphasis on types, manufacturing systems, quality attributes, and utility. Sp.

4420 Bakery Products (3) Baking ingredients and their interactions during production and storage of bakery products. Prereq. 4130 and Chemistry 2230 or equivalents. 2 hrs and 1 lab. Sp.

4810 Food Microbiology II (4) Standard methods for examination, cultivation, and identification of bacteria associated with food spoilage and food poisoning. Prereq. 3810. 2 hrs and 2 labs. F.

4840 Meat Products Manufacturing (3) Prepared meat products with emphasis on sausage making and information relating to cost controls, inspection, and meal science. Prereq. 3840 or consent of instructor. 1 hr and 2 labs. W.

4920 Analysis of Physical Properties of Foods (4) Physical states of food materials, water, viscosity, colloids, gels, foams, crystals, color. Quantitation and changes induced by processing. Prereq. 4200 and Agricultural Mechanization 3510 or consent of instructor. 3 hrs and 1 lab. W.

4940 Advanced Meat Science (3) Qualitative and quantitative characteristics of meat and poultry as related to palatability, cookery, preservation, packaging and merchandising. Prereq. 3840. F.

5000 Thesis (1-15) P/NP only. E.

5100 Seminar (1-5) Reports and discussions of selected topics from research literature. May be repeated. Maximum 3 hrs. F, W, Sp.

5120 Food Color (3) Chemistry of natural food pigments and measurement, notation, and preservation in food. Prereq. Nutrition and Food Sciences 3140 or equivalent. 2 hrs and 1 lab. Sp.

5130 Food Enzymology (3) Enzymes and native enzymes in manufacturing, processing, and spoilage of food. Prereq. Nutrition and Food Sciences 3150 or equivalent, Sp.

5140 Food Flavors (3) Food flavor maintenance and improvement. Natural and synthetic compounds in manufacture of foods with predictable consumer acceptance. Technology of flavor manufacture and formulation. Techniques for determining flavor profiles. Prereq. 4210. 2 hrs and 1 lab. W, A.

5150 Fats and Oils (3) Application of scientific principles to commercial technology of fats and oils. Prereq. 4130. 2 hrs and 1 lab. W, A.

5200 Research (1-5) Research in selected areas. Completion of departmental head, credits and hours to be arranged. May be repeated. Maximum 10 hrs. E.

5310 Food Products Development (3) Fundamentals of art, science, and technology applied to research, development, and marketing of new food products and processes. Prereq. 4210. 2 hrs and 1 lab. F.

5320 Food Thermobiology (3) Fundamentals of heat transfer as related to rate of destruction of microorganisms and to rate of loss of food quality through calculation of minimum safe thermal processes for hermetically-sealed packages of foods. Prereq. 4200. 2 hrs and 1 lab. W, A.

5420 Instrumental Analysis of Foods (3) Application of current instrumental methods to control food manufacturing processes. Prereq. 4140. 2 hrs and 1 lab. F.

5510 Meat Technology (3) Physical and chemical changes that occur during conversion of muscle to meat, the influence these changes have on quality and composition; meat processing, preservation, and quality control. Prereq. 3840. 2 hrs and 1 lab. Sp.

5530 Advanced Food Microbiology (3) Identification of desirable and undesirable microorganisms in food products and relationship to manufacturing operations. Isolation and characterization of microorganisms from foods and equipment. Prereq. 4810 or Microbiology 3810. 3 labs. W.

6000 Doctoral Research and Dissertation (3-15) P/NP only. E.

6010 Advanced Topics in Food Technology and Science (1) Selected readings, discussions and presentations of current topics, topics to be announced in advance. May be repeated. Maximum 6 hrs. S/NC only, F, W, Sp.

6410 Advanced Food Processing (3) Role of processing treatments in modification of food properties; texture, color, and flavor characteristics. Prereq. 5120, 5140, and Food Science 5510 or consent of instructor. Sp.

Forestry, Wildlife and Fisheries

MAJORS

DEGREES

Forestry

M.S.

Wildlife and Fisheries Science

Ph.D.

Professors:


Associate Professors:


Assistant Professor:

E. P. Dougall, Ph.D. Oregon State.
Forestry

4320 Forest Environments and Ecology (3) Environments of forests and associated land: emphasis on the application of ecological principles to contemporary problems. Prereq: 6 hrs of biology, botany, or zoology.

3040 Forests and Trees of Eastern North America (4) Forest formations and associations of North America east of Great Plains; dendrology and silvics of trees; identification, nomenclature and species-site relationships. Weekly field trips during scheduled labs plus one weekend field trip. Prereq: 8 hrs basic biology or botany. 3 hrs and 1 lab.

3050 Forests and Trees of Western North America (3) Forest formations and associations of North America west of Great Plains; dendrology and silvics of trees. Audivoial presentation: edaphic, topo-graphic and climatic site variables as they control species distributions. Prereq: 8 hrs basic biology or botany. 2 hrs and 1 lab.

3110 Forest Measurements and Biometry (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, 3 hrs and 1 lab. W

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

3220 Forest Products and Utilization (3) Harvesting, collection, storage, and treating of forest products. Prereq: 3012 or consent of instructor. Sp, W

3320 Principles of Silviculture (3) Influence of site factors on reproduction, growth, development, and structure of forest vegetation; classification of forest structure; silvicultural laws. Prereq: 3020, 3040, Plant and Soil Science 2130. W

4002 Utilization (3) Wood-using industries; processes involved in production of sawmills, tree-logs, lumber grading; pulpwood operations, floating plants, treating plants; plant layout, flow diagrams. Prereq: 3120 or consent of instructor. 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: 3260, 4006. S/NC only. Sp

4006 Silvicultural Methods (3) Methods and application of intermediate and regeneration cuttings; site preparation, planting and seeding, modifications of cutting methods to obtain desired goods and benefits. Prereq: 3060, 3320, 4002, 4003. Sp

4020 Forest Watershed Management (3) Water as a forest resource; role of forests in the hydrologic cycle; control of water quantity, quality, and regime; watershed planning. Prereq. 3320 or consent of instructor. 2 weekend field trips. W

4210 Forestry Organization and Administration (3) Planning, organizing, and leadership concepts and cases; problem analysis and decision making in forest resources management. Prereq: Consent of instructor. 2 hrs and 1 lab. F

4220 Forest Resource Management (3) Decision-making principles, forestry as integration of resource uses. Models of forestry as system: concepts of forest economics and valuation; taxation of forest firm. Prereq: 4150.

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; productivity of forest types; management of a complete plan based on optimizing forest uses. Prereq: 4210. Sp

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 interpretation trails and overviews. Prereq: 3240 or equivalent. 2 hrs and 1 lab.

4300 Forest Policy (3) History of forestry in 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 organizations in public and private sectors. Prereq: 4004. W

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

4420 Forest Tree Improvement (3) Forest tree improvement and selection; principles and purposes of tree improvement and forest genetics; principles of tree cytology and population genetics; important tree traits may be required; 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.

4430 Regional Silviculture of the United States (3) Factors that influence silviculture management of important tree species in North America. Importance of forests and forestry to a region; physiography, geology, soils, climate and weather; sites and site types, ecology, problems of protection, and silvical characteristics of the more important species. Prereq: 4006 or consent of instructor. W

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

4450 Recreational Behavior in Forest Environ-ments (3) Review of sociological and psychological theories relevant to forest recreation, management, and administration. Implication and application of behavioral concepts to forest recreation problems. Review of methodologies for assessing recreational behavior. Prereq: 3240 and 6 hrs in behavioral psychology and/or sociology, or consent of instructor.

4540 Wood Drying and Preservation (4) Concepts of wood drying including wood-moisture relations, specific gravity, moisture content, density, and shrinkage. Commercial drying practices. Relationship of wood moisture content to attack by wood destroying organisms. Methods and materials used in commercial treating systems. Prereq: 3120, Mathematics 1851. Physics 1220, or consent of instructor. 3 hrs and 1 lab.

4550 Wood Composites and Gluing (4) Fundamentals of plywood and composite product manufacturing. Wood adhesive technology. Application of gluing to manufacturing processes of plywood and composite products. 3 hrs and 1 lab. Overnight weekend plant trips required. Prereq: 4230 or equivalent. 2 hrs and 1 lab.

4560 Forest Products Marketing and Market- ing (3) Discussion of market structure for various sectors of forest products industry including standing timber, intermediate and harvest cuts. Prereq: 3120, 4150 or consent of instructor.

5000 Thesis (1-15) P/NP only. E

5022 Seminar in Forest Tree Biology (3) Growth, reproduction, and physiology of forest trees; forest ecology; variability and taxonomy of forest trees. Prereq: 3020 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 special genetic techniques and heritability in forest trees; gains with different breeding methods; planning and conducting forest genetics research. Prereq: 4240, Biology 3110, and consent of instructor. W, A

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

5260 Industrial Forestry (3) Structure and analysis of wood-using firms and industries. Forest taxation, 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 in industrial forestry. Executives 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. W, A

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

Wildlife and Fisheries Science

4323 Wildlife Management (3) Lives and ecological relationships of wild animals; biological, social, and economic aspects of their management. 2 hrs and 1 lab. F

4450 Game Mammals (4) Classification, identification, distribution, natural history, and management principles of game mammals in North America. Prereq: 3320 or 1 yr of zoology. 2 hrs and 2 labs. F

4460 Game Birds (4) Biology, classification, identification, distribution, and management of game birds in North America. Prereq: 3320 or 1 yr of zoology. 3 hrs and 1 lab plus one weekend field trip. W

4510 Fish Populations (4) Principles and methods of fish population estimation; sampling techniques and equipment; population dynamics; age and growth. Prereq; Biology 3130, 8 hrs mathematics, or consent of instructor. 3 hrs and 1 lab or field period. W

*Graduate credit for non-forestry majors only.
Plant and Soil Science

DEGREES

Plant and Soil Science

M.S., Ph.D.

MAJOR

Plant Soil Science

Professors:

F. L. Allen, Ph.D. Minnesota; W. A. Krueger, Ph.D. Illinois; D. A. Leitzke, Ph.D. Michigan State; D. B. Williams, Ph.D. North Dakota State; H. A. Fabrig, Ph.D. Iowa State; L. J. Jeffery, Ph.D. North Dakota State; L. M. Josephson (Emeritus), Ph.D. Wisconsin; W. L. Parks, Ph.D. Purdue; J. H. Reynolds, Ph.D. Wisconsin; L. N. Skotol, Emeritus, M.S. Kansas State; M. E. Springer (Emeritus), Ph.D. California (Berkeley); H. D. Swingle (Emeritus), Ph.D. Louisiana State.

Associate Professors:


Assistant Professors:

D. T. Kendall, M.A. Louisiana State.

*3110 Soil Fertility and Fertilizers (4) Properties of soils in relation to plant nutrient availability and uptake. Methods of soil fertility evaluation and principles of fertilizer use; manufacture and properties of fertilizers. Prereq: 2130. 3 hrs and 1 lab. W

*3120 Grain and Oil Crops (3) Distribution, improvement, manufacture, and utilization of corn, small grains, grain sorghum, soybeans and related crops. Prereq: 2130, 8 hrs biological science. 3 hrs and 1 lab. F, Sp

*3140 Forage Crops (4) Characteristics, adaptation, improvement, culture, harvesting, and marketing of cotton and tobacco. Prereq: 2130, 8 hrs biological science. 3 hrs and 1 lab. F, Sp

*3160 Cotton and Tobacco (4) Characteristics, adaptation, improvement, culture, harvesting, and marketing of cotton and tobacco. Prereq: 2130, 8 hrs biological science. 3 hrs and 1 lab. F, Sp

*3170 Vegetable Crops (4) Characteristics, economic importance, adaptability and production of vegetables for fresh and processing markets with emphasis on both warm and cool season crops. Prereq: 2130, 8 hrs biological science. 3 hrs and 1 lab. F

*3180 Fruit Crops Management (4) Soils, planting, cultivation, development of fruit crops plantations; pest control, harvesting, packing, storage, and pruning. Prereq: 2130, 8 hrs biological science. 3 hrs and 1 lab. W

*3220 Soil Management (4) Soil management for crop production including cropping systems, fertilizer use, and tillage operations for specified soil and farming conditions. Prereq: 2130. 3 hrs and 1 lab. F, Sp

*3250 Soils in Forestry (3) Soil as a medium for tree growth; relation of physical, chemical, and biological properties of soils to tree growth and management of forest stands. Soil properties of importance in road location, recreational development, and watershed management. Prereq: 2130. Forestry 3320. 2 hrs and 1 lab. W

*3610 Statistics for Agricultural Sciences (3) Application of statistical techniques to interpretation of agricultural research. Notation, descriptive statistics, probability distributions, confidence intervals, student’s t and chi-square tests, analysis of variance, mean separation procedures, linear regression and correlation. Prereq: Math 1550 or 1850 or equivalent. 3 hrs and 1 rec. W, F

4110 Soil Chemistry (4) Colloidal systems; properties and behavior of colloidal soil materials; relation of chemical properties of soils to soil availability. Prereq: 2130 and Physics 1210. 3 hrs and 1 lab. F

3650 Landscape Construction and Contracting (4) Construction methods, materials and practices of landscape installation and contracting. Site layout procedures, hardscape and drainage, landscape construction materials; application through detail design drawings and small scale projects. Landscape contracts, specifications and bidding procedures. Prereq: 3310, 3610; Agricultural Mechanization 2120 recommended. 1 hr and 2-3 hrs. Sp

4150 Nursery Production (4) Modern methods of producing liners, field and container grown woody ornamental plants. History and evolution of nursery industry and modern production recommendations for woody ornamental plants. Prereq: 3030, 3810 and Plant and Soil Science 2130. 2 hrs and 2 labs. F

4160 Nursery Management (3) Modern management methods for wholesale and retail nurseries, garden centers, and landscape contractors. Prereq: 3310. 2 hrs and 1 lab. W

4180 Park Design (4) Design criteria for parks and outdoors recreation systems. Park site selection, analysis, planning and management as related to physical and recreational features. Evaluation of aesthetic and functional quality of parks and their impact on environmental quality of rural and suburban communities. Prereq: 3620. 2 hrs and 2 labs. Sp

4190 Advanced Landscape Design (4) Comprehensive application of landscape design principles and knowledge through the completion of a design project. Analysis, programming, planting design, construction detailing, estimating, specifications, contracts and bidding. Prereq: 3510, 3620, 3630. 1 hr and 2-3 hrs. lab. Sp

4220 Advanced Turfgrass Management (4) Principles and scientific basis of turfgrass culture; adaptation, ecology, physiology, soil fertility and grass nutrition; climatic influences on grass culture; physiology of clipping and water management; traffic effects and compaction; and the physiological influences of pest infestations and control measures. Prereq: 3510, 3 hrs and 1 lab. W

4320 Specialty Floriculture (3) Specific practices in production of minor cut flower and potted plant crops. Production methods for scheduling flowering or vegetative growth of specialty florist crops in controlled environments. Prereq: 3410. 2 hrs and 1 lab. Sp

4410 Individual Problem Study (1-5) May be repeated. Maximum 15 hrs. E

5000 Thesis (1-15) P/NP only. E

5100 Special Problems in Ornamental Horticulture and Landscape Design (3) May be repeated. Maximum 9 hrs. E

5120 Golf Course Design, Development, and Management (4) Principles and applications in design, development, and management of golf courses. Selection and utilization of grass varieties and other plant materials and development of specifications for nutritional, chemical, and mechanical maintenance. Financing, equipment, labor management, and public relations. Prereq: 4220 and consent of instructor. 2 hrs and 2 labs. Sp

5410 Historical Microtechnique (4) Preparation of plant tissue for microscopic examination, paraffin and plastic embedding, microtomy and mounting of sections, fixing, staining, staining schedules and photography. Prereq: General biology or botany; general and organic chemistry; and consent of instructor. 2 hrs and 2 labs. W

5700 Seminar (1) Current literature and developments in ornamental horticulture and landscape design. May be repeated. Maximum 3 hrs. F

5810 Nursery Production (4) Preparation and use of growing media for woody ornamental plants; nutrition of ornamental plants including diagnosis, prevention and control of mineral deficiencies; fertilization and programming of fertilizer programs for container and field grown ornamentals. Prereq: 4150; Plant and Soil Science 3110; Botany 3210. 3 hrs and 1 lab. W

Ornamental Horticulture and Landscape Design

MAJOR

Ornamental Horticulture and Landscape Design

DEGREE

Ornamental Horticulture and Landscape Design

M.S., Ph.D.

Professors:

G. D. Chater (Head), Ph.D. Ohio State; D. D. Williams, Ph.D. Pennsylvania State; L. M. Callahan, Ph.D. Rutgers; H. v.d. Werken, Garden City State College, Bermuda.

Associate Professors:


Assistant Professor:

D. T. Kendall, M.A. Louisiana State.

*3030 Plant Propagation (3) Physiology, methodology, and environmental requirements for propagation. Prereq: 3 hrs of biological science. 2 hrs and 1 lab. F

*3110 Greenhouse Management (3) Factors involved in management of greenhouses for production and research. Structures, soils, pest control measures, heating, ventilating, lighting, water supply, crop succession. Prereq: Consent of Instructor. 2 hrs and 1 lab. F

3620 Intermediate Landscape Design (4) Application of principles and techniques of landscape design. Refinement of graphic skills. History of landscape design related to contemporary applications and relative unmet environments: Principles of design and implementation. Use of plant materials in the design of small and moderate scale landscape situations. Prereq: 3610, 3810 or equivalent. 1 hr and 2-3 hrs. F

3630 Landscape Construction and Contracting (4) Construction methods, materials and practices of landscape installation and contracting. Site layout procedures, hardscape and drainage, landscape construction materials; application through detail design drawings and small scale projects. Landscape contracts, specifications and bidding procedures. Prereq: 3310, 3610; Agricultural Mechanization 2120 recommended. 1 hr and 2-3 hrs. Sp

*3960 Special Topics in Ornamental Horticulture and Landscape Design (3) May be repeated. Maximum 9 hrs. E

5000 Thesis (1-15) P/NP only. E

5100 Special Problems in Ornamental Horticulture and Landscape Design (3) May be repeated. Maximum 9 hrs. E

5120 Golf Course Design, Development, and Management (4) Principles and applications in design, development, and management of golf courses. Selection and utilization of grass varieties and other plant materials and development of specifications for nutritional, chemical, and mechanical maintenance. Financing, equipment, labor management, and public relations. Prereq: 4220 and consent of instructor. 2 hrs and 2 labs. Sp

5410 Historical Microtechnique (4) Preparation of plant tissue for microscopic examination, paraffin and plastic embedding, microtomy and mounting of sections, fixing, staining, staining schedules and photography. Prereq: General biology or botany; general and organic chemistry; and consent of instructor. 2 hrs and 2 labs. W

5700 Seminar (1) Current literature and developments in ornamental horticulture and landscape design. May be repeated. Maximum 3 hrs. F

5810 Nursery Production (4) Preparation and use of growing media for woody ornamental plants; nutrition of ornamental plants including diagnosis, prevention and control of mineral deficiencies; fertilization and programming of fertilizer programs for container and field grown ornamentals. Prereq: 4150; Plant and Soil Science 3110; Botany 3210. 3 hrs and 1 lab. W

*Graduate credit for non-majors only.

Graduate credit for non-majors only.
Institute of Agriculture/Veterinary Medicine

4120 Principles of Crop Breeding (4) Genetic principles and applications for crop improvement. Prerequisite: Biology 3110 or equivalent. 3 hrs and 1 lab.

4250 Agricultural Pesticides (4) Regulation of pesticides in agricultural production. Effects of environmental factors (light, heat, water, soil, etc.) on physiological processes (respiration, photosynthesis, germination, flowering, etc.). Prerequisite: 2130 and 4410. 3 hrs and 1 lab.

4320 Soil Formation, Morphology and Classification (4) Soil parent materials, basic pedogenic processes, soil morphology and interpretation of morphology, taxonomic classification of soils. Use of soil surveys. Prerequisite: 2130. 3 hrs and 1 lab.

4350 Soil Survey (2) Techniques of mapping soils, development of mapping legends and documentation and testing of mapping unit descriptions and interpretations. Prerequisite or corequisite: 4520. 1 hr. 1 lab.

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

4410 Crop Physiology and Ecology (4) Application of principles of plant physiology and ecology to crop production. Effects of environmental factors (light, heat, water, soil, etc.) on physiological processes (respiration, photosynthesis, germination, flowering, etc.). Prerequisite: 2130 and 4410. 3 hrs and 1 lab.

4710 Principles of Weed Science (4) Principles of cultural, biological, and chemical control of weeds, influence of environment, principles of herbicide selectivity and activity, types of herbicides and specific recommendations for various crop and non-crop uses. Prerequisite: Agriculture 1140 or 1120; organic chemistry 2130 and any Plant and Soil Science course at 3000-level except 3610. 3 hrs and 1 lab.

5000 Thesis (1-15) P/NP only. E

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

5240 Soil Productivity and Management (3) Concepts of soil productivity and management, quantification of soil 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. Prerequisite: 3220 and 4110 or consent of instructor. W, A

5250 Pedology (4) Factors and processes of formation of soils, physico-chemical and biological properties of the soil system and their relation to soil fertility, plant growth and animal production. Prerequisite: 4320 or consent of instructor. 3 hrs and 1 lab. W, A

5310 Design and Interpretation of Experiments (4) Experimental design and procedures; field plot techniques; analysis and interpretation of data from agricultural experiments; linear models and contrasts, analysis of variance for nested, randomized block designs, soil morphology and interpretation of morphology, taxonomic classification of soils. Use of soil surveys. Prerequisite: 2130. 3 hrs and 1 lab.

5340 Soil Physics (4) Physical and chemical relations among soil, liquid, and gaseous phases of soil system and their relation to density, moisture, aeration and plant growth. Introduction to soil moisture thermodynamics; physically characterize a soil. Prerequisite: 4110 or consent of instructor. 3 hrs and 1 lab. W, A

5370 Advanced Soil Fertility (3) Concepts of soil chemistry as they relate to nutrient absorption by plant roots; interpretation of these concepts to soil fertility, plant analysis and soil management. Prerequisite: 4110. W, A

5390 Advanced Soil Chemistry (3) Structural properties of clay minerals, mineralogical reactions, ion exchange. Donnan Equilibrium, double layer theory. Prerequisite: 4110 or consent of instructor. Sp.

5500 Seminar (1) May be repeated. Maximum 3 hrs. E

5710 Advanced Plant Genetics (3) Mutations in the plant genome: controlling elements, induced mutations, genome organization, polyplody, tetrasomic inheritance, apomixis, incompatibility systems, and genetic engineering of higher plants. Prerequisite: Basic genetics or consent of instructor. F, A

5720 Quantitative Genetics (3) Genetic constitution of populations; estimation of genetic parameters; recombination and measurement of continuous variation; estimation of variable components and genetic advance under different breeding procedures. Prerequisite: Biology 3110 or equivalent; 3610 or equivalent. W, A

5750 Advanced Plant Breeding I (4) Developing breeding program objectives; historical and theoretical development of concepts of components of variation, heritability, selection intensity, methods of selection, linkage in relation to selection, genotype by environment interaction, and genetic resistance and vulnerability to pests. Prerequisite: 4120, 5310 or concurrent registration, or consent of instructor. 3 hrs and 1 lab. W, A

5760 Advanced Plant Breeding II (4) Concepts and utilization of heterosis, inbreeding, stability parameters, selection indices, methods of selection, and germplasm resources in breeding program for improvement of plant species. Prerequisite: 5750 or consent of instructor. 3 hrs and 1 lab. Sp, A

5810 Advanced Crop Climatology and Ecology (4) Quantification of climatic and meteorological factors affecting agricultural plant production on crop growth; world climates, crop distribution and productivity, and their interaction; general and specific relations among environmental factors, crop organisms and agricultural systems. Prerequisite: 3610 or equivalent; 4410, or Botany 3210 or 4310. 3 hrs and 1 lab. F, A

5820 Advanced Crop Physiology (4) Photosynthetic efficiency in field and relationship with evapotranspiration. Hardiness development and tolerance for field stresses: drought, cold, heat, flooding, photoperoxidation, flowering, and seed production. Nitrogen-fixing relations of bacteria with legumes and grasses. Prerequisite: 4410. 3 hrs and 1 lab. W, A

5840 Postharvest Physiology (3) Preharvest and postharvest factors affecting quality of stored fruits and vegetables. Synthetic and degradation processes in maturation and ripening of plants. Indices of plant maturation and quality. Handling and storage techniques for fruits and vegetables. Prerequisite: 4410. W, A

5850 Mechanisms of Herbicide Action (3) Principles of plant physiology, plant morphology, and metabolic systems and enzymatic activity. Prerequisite: 4410 or consent of instructor. Sp.

5855 Plant Growth Regulation and Control (1) Laboratory course in plant growth, regulation and control under field, greenhouse, laboratory and storage environments. Prerequisite or corequisite: 5840, 5850, or 5560. May be repeated. Maximum 4 hrs. E

5860 Growth Control with Chemicals (3) Characterization of action and use of plant growth regulators with special emphasis on practical aspects of use for controlling plant growth, development and metabolism to increase efficiency and production of agricultural plants. Special consideration to current commercial uses. Prerequisite: Botany 5210 or equivalent. Sp.

6000 Doctoral Research and Dissertation (3-15) P/NP only. E

6100 Topics in Soil Science (1-3) Student needs and interests determine course content. Prerequisites: 3220 or equivalent. 3 hrs and 1 lab. E

6200 Topics in Plant Breeding and Genetics (1-3) Student needs and interests determine course content. Prerequisites: 3220 or equivalent. 3 hrs and 1 lab. E

6300 Topics in Crop Physiology and Ecology (1-3) Student needs and interests determine course content. Microclimatology of agroecosystems, crop dormancy and responses to stress, physiology of crop growth and reproduction, interactions between physiology and germplasm in crop production, theory and application of mathematical and quantitative methods in crop physiology and ecology research. May be repeated. Maximum 9 hrs. E

6410 Experimental Designs (3) Principles of balanced and unbalanced designs used in agricultural research: use of linear models, dummy variables, simple multivariable linear models, response surfaces, discriminant analysis, multiple regression, heterogeneity of slopes, and other techniques. Prerequisite: 5310 and Statistics 4310 or equivalent. F, A

College of Veterinary Medicine

H. Kitchin, Dean
C. F. Reed, Associate Dean
W. H. Grau, Jr., Associate Dean

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

The college is organized into six academic departments: Animal Science (jointly with the College of Agriculture), Environmental Practice, Microbiology (jointly with the College of Liberal Arts), Pathobiology, Rural Practice, and Urban Practice.

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

Most veterinarians are engaged in private practice. The majority of these are in general practices which deal with the diseases of all kinds of animals. About one-fourth of the veterinarians in the United States are engaged exclusively in pet or companion animal practice. A good number of veterinarians deal with the health problems of zoo animals, laboratory animals, wildlife, and aquatic species.

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

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

Facilities
Administrative offices of the College of Veterinary Medicine are located in Morgan Hall on the agricultural campus. The Department of Animal Science is housed in Brehm Animal Science Building, also on the agricultural campus, and the Department of Microbiology is located in Walters Life Sciences Building on "The Hill" of The University of Tennessee, Knoxville.

The Veterinary Medicine Building on the agricultural campus houses the departments of Environmental Practice, Rural Practice, Urban Practice, and Pathobiology. Additionally, the Veterinary Teaching Hospital, clinics, and the Agriculture/Veterinary Medicine Library are contained within this modern structure of 246,000 gross square feet.

The college has research facilities on Cherokee Farm adjacent to the UT Hospital. Satellite teaching-research facilities are located in Middle and West Tennessee.

Admission Requirements
Admission to the professional program of the College of Veterinary Medicine is limited to that number for which an education of high quality can be provided with the resources available to the college.

To qualify for admission, a candidate must have completed at least the following minimum pre-veterinary requirements:

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Minimum Credits</th>
<th>Quarter</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>English, including speech</td>
<td>12</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Humanities</td>
<td>12</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Social Sciences</td>
<td>12</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Mathematics through calculus</td>
<td>8</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Chemistry: general</td>
<td>12</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Organic</td>
<td>12</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Biochemistry</td>
<td>6</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Physics</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biology or zoology</td>
<td>12</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Microbiology</td>
<td>4</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Animal science, including nutrition and genetics</td>
<td>13</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

115 76

Admission Procedure
Admission of new students will be for the fall quarter each year. Applicants will be screened carefully by a faculty committee to determine those best qualified for admission within the college enrollment quota.

Applications must be completed and mailed so as to reach the Director of Admissions by January 15 each year. All pre-veterinary requirements must be completed by the end of the spring term of the year in which the student plans to enroll in the College of Veterinary Medicine.

Course Load
The professional curriculum of the College of Veterinary Medicine requires a specific number of hours each quarter. A student may enroll for fewer or more than that number only with the permission of the dean. Because of the sequential and highly integrated character of the professional curriculum, all courses in a given quarter are considered prerequisite to those in the succeeding quarter.

Extramural Programs
The opportunity to participate in off-campus learning experiences may be available for a limited number of students during the latter half of the final year of the professional curriculum. Selection of an extramural learning experience will require approval by the department concerned and the College of Veterinary Medicine Curriculum Committee. The extramural program identified by the student must represent a learning experience not available within The University of Tennessee, Knoxville.

Professional Curriculum
The professional curriculum in veterinary medicine is an 11-academic quarter, year-round program, including summers. The first year (three quarters) consists mostly of pre-clinical subjects such as anatomy, physiology, microbiology, parasitology, and general pathology. The second year (four quarters) includes the study of diseases, their causes, diagnosis, treatment, and prevention. The final calendar year is devoted to intensive training in the solving of animal disease problems, including extensive clinical experience in the teaching hospital. The curriculum also provides for education in the science and art of veterinary medicine and in paramedical subjects such as animal behavior, medical communication, professional ethics, jurisprudence, economics, and practice management.

Only students officially enrolled in the professional veterinary curriculum may register for 8000-level courses.

<table>
<thead>
<tr>
<th>FIRST YEAR</th>
<th>Hours</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall Quarter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vet. Animal Science 8510</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Vet. Animal Science 8540</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Vet. Medicine 8310</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Vet. Microbiology 8101</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Vet. Animal Science 8240</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Winter Quarter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vet. Animal Science 8520</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Vet. Animal Science 8550</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Vet. Microbiology 8102</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Vet. Animal Science 8250</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Environmental Practice 8611</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Spring Quarter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vet. Microbiology 8103</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Pathobiology 8730</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Pathobiology 8710</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Vet. Medicine 8210</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Vet. Medicine 8311</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Environmental Practice 8612</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>21</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TOTAL: 62 hours</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SECOND YEAR</th>
<th>Hours</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer Quarter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vet. Medicine 8341</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Vet. Medicine 8362</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Vet. Medicine 8343</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Vet. Medicine 8352</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Vet. Medicine 8320</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Vet. Medicine 8363</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Winter Quarter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vet. Medicine 8360</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Vet. Medicine 8361</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Vet. Medicine 8351</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Vet. Medicine 8366</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Vet. Medicine 8344</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Vet. Medicine 8365</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>Spring Quarter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vet. Medicine 8370</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Vet. Medicine 8371</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Vet. Medicine 8364</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Vet. Medicine 8375</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Vet. Medicine 8344</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Vet. Medicine 8372</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>21</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TOTAL: 88 hours</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>THIRD YEAR</th>
<th>Hours</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Sequence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summer and Fall Quarters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Core Block - 8 weeks</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Environmental Practice 8600 - 2 weeks</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Radiology 8401 - 2 weeks</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Special Services 8402 - 2 weeks</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Rural Practice - 8 weeks</td>
<td>12-16</td>
<td></td>
</tr>
<tr>
<td>Urban Practice - 8 weeks</td>
<td>12-16</td>
<td></td>
</tr>
<tr>
<td>Seminars</td>
<td>0-8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>44</td>
<td></td>
</tr>
</tbody>
</table>

1 Includes history, literature, music or art appreciation, philosophy, religion, or foreign language.
2 Includes economics, anthropology, political science, psychology, sociology, and geography.
3 Excluding laboratory.

Pre-veterinary requirements may be completed in any accredited college or university which offers courses equivalent to those at The University of Tennessee.

The colleges of Agriculture and Liberal Arts of The University of Tennessee offer a three-year pre-veterinary curriculum which satisfies all the course requirements for admission to the College of Veterinary Medicine. Students who are admitted to the College of Veterinary Medicine following completion of this pre-veterinary curriculum will receive a bachelor's degree upon completion of the first year (three quarters) of the professional veterinary medicine curriculum.
Advanced Sequence (roughly equivalent to Winter and Spring Quarters)
Core Block - 9 weeks
Pathobiology 8750 - 2 weeks
Radiology 8401-2 weeks
Free Time - 5 weeks
Rural Practice - 9 weeks
Urban Practice - 9 weeks

Third Year Credits 82
TOTAL: 232 hours

GRADUATE COURSES
8240-50 Veterinary Physiology (4,5)

GRADUATE COURSES
5540-50 Veterinary Gross Anatomy (5,5)

Graduate Program
The College also administers a graduate program involving all departments and leading to the Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees. Because of the interdisciplinary departmental administration of the College of Veterinary Medicine, the faculty have opportunities in the graduate programs of other instructional units, including Animal Science (nutrition and physiology), Microbiology (bacteriology, virology and immunology), Ecology (environmental toxicology), Public Health, and Comparative and Experimental Medicine. (Refer to other sections of this catalog for a full description of these programs.) The majority of the graduate students and graduate faculty of the College of Veterinary Medicine are involved in the Comparative and Experimental Medicine program (see page 94). This program provides a wide spectrum of interdisciplinary training that prepares graduates to assume positions in biomedical environments and in teaching or research capacities involving humans or animals.

Departments of Instruction

Animal Science—Veterinary Medicine

In addition, academic expertise of staff members at CARL and Oak Ridge is used on appropriate occasions.

PROFESSIONAL COURSES

Graduate Program
The College also administers a graduate program involving all departments and leading to the Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees. Because of the interdisciplinary departmental administration of the College of Veterinary Medicine, the faculty have opportunities in the graduate programs of other instructional units, including Animal Science (nutrition and physiology), Microbiology (bacteriology, virology and immunology), Ecology (environmental toxicology), Public Health and Comparative and Experimental Medicine. (Refer to other sections of this catalog for a full description of these programs.) The majority of the graduate students and graduate faculty of the College of Veterinary Medicine are involved in the Comparative and Experimental Medicine program (see page 94). This program provides a wide spectrum of interdisciplinary training that prepares graduates to assume positions in biomedical environments and in teaching or research capacities involving humans or animals.

PROFESSIONAL COURSES

Veterinary Medicine

In addition, academic expertise of staff members at CARL and Oak Ridge is used on appropriate occasions.

PROFESSIONAL COURSES

8240-50 Veterinary Physiology (4,5) Introduction to concepts and problems in physiology which form a base for clinical applications and for formal training in pharmacology, medicine, pathology, and surgery. Order of sequence: Cellular, cardiovascular, renal, respiratory, neural and endocrine physiology. 8240: 3 hrs and 1 demonstration, 8250: 4 hrs and 1 demonstration. F, W

8510-20 Veterinary Histology/ Embryology (4,5) Cytology, histology and organology of animal body systems, structural and functional interrelationships. Embryonic development from fertilization and origin of congenital defects. Correlated with 8240-50 and 8540-50 8510: 2 hrs and 2 labs. 8520: 2 hrs and 2 labs, F, W

8540-50 Veterinary Gross Anatomy (5,5) Lab covering gross and applied anatomy of common domestic animals (dog, cat, horse, cow). Dissection of embalmed specimens; prostectones, slides, models, and living animals. Sequence of organ system study correlated with 8510-20. F, W

8570 Special Problems in Animal Science (2-20) Certain topics in anatomy, histology and physiology. May be repeated. W, Sp

8575 Advanced Seminar in Animal Science (1-4) Applied anatomy, histology and physiology. F, Su

GRADUATE COURSES

5530 Mammalian Organography (5) Microscopic study of structure of organs of major organ systems. Prereq: Zoology 3550 or equivalent. 3 hrs and 5 labs. W

5540 In vitro Evaluation of Toxicity (3) Principles and techniques of in vitro evaluation of acute toxicity, mutagenesis, carcinogenesis, and teratogenesis. Prereq: Biochemistry 5610. 2 hrs and 5 labs.

Environmental Practice

Environmental Practice

GRADUATE COURSES

8600 Basic Clinical Rotation in Environmental Practice (3) Introductory clinical experience in laboratory animal and zoo animal medicine, epidemiology, other related disciplines. F, Su

8611-12 Pharmacology (2,5) Molecular basis of drug action; pharmacokinetic and pharmacodynamic principles; clinical and toxicological applications. Correlated with Animal Science 8240-50. Prereq: Consent of instructor and Dean, College of Veterinary Medicine. W, Sp

6000 Doctoral Research and Dissertation (3-15) P/NP only. E

6010 Advanced Topics in Environmental Medicine (1-3) Current and future research methodology, laboratory situation, recent advances in instrumentation, in analytical techniques for environmental medicine. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

Microbiology—Veterinary Medicine

Microbiology—Veterinary Medicine

GRADUATE COURSES

6105 Veterinary Bacteriology and Mycology (5) Pathogenesis of bacterial and fungal diseases. Taxonomic study relating microbial structure, metabolism and genetics to patterns of disease and mode of action of antimicrobials. 3 hrs and 2 labs. F, W

6106 Veterinary Virology (4) Structure and replication of animal viruses, classification of viruses, mechanisms of viral pathogenesis. Techniques for quantifying viruses, viral antigens, and anti viral antibodies. Fundamental for understanding best approaches to viral diagnosis and immunophrophylaxis. 2 hrs and 2 labs. W

6107 Veterinary Immunology (4) Immunobiology, mechanisms of immune reaction, diagnostic immunology, role of immune response in preserving integrity of body as well as in causing disease. 2 hrs and 2 labs. W

8101 Veterinary Bacteriology and Mycology (5) Pathogenesis of bacterial and fungal diseases. Taxonomic study relating microbial structure, metabolism and genetics to patterns of disease and mode of action of antimicrobials. 3 hrs and 2 labs. F, W

8102 Veterinary Virology (4) Structure and replication of animal viruses, classification of viruses, mechanisms of viral pathogenesis. Techniques for quantifying viruses, viral antigens, and antiviral antibodies. Fundamental for understanding best approaches to viral diagnosis and immunophrophylaxis. 2 hrs and 2 labs. W

8103 Veterinary Immunology (4) Immunobiology, mechanisms of immune reaction, diagnostic immunology, role of immune response in preserving integrity of body as well as in causing disease. 2 hrs and 2 labs. W

8175 Advanced Seminar in Microbiology (1-4) Applied microbiology such as serological diagnosis, clinical immunology. Su, F

GRADUATE COURSES

5000 Thesis (1-15) P/NP only. E

5010 Special Topics in Environmental Medicine (1-3) Abnormal metabolism, pharmacokinetic studies, toxicokinetic studies, epidemiology and techniques in molecular biology: aortic absorption, gas chromatography, ultracentrifugation, extractive techniques and radioimmunoassay. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

5020 Experimental Animal Surgery (4) Competence in performing humane surgical modifications of experimental animals. Techniques of anesthesia. Drug administration and postoperative care. Prereq: Zoology 4650, 4410, 3080, and/or consent of instructor. Sp

5611-12 Pharmacology (2,5) Molecular basis of drug action; pharmacokinetic and pharmacodynamic principles; clinical and toxicological applications. Correlated with Animal Science 8240-50. Prereq: Consent of instructor and Dean, College of Veterinary Medicine. W, Sp

In addition, academic expertise of staff members at CARL and Oak Ridge is used on appropriate occasions.

PROFESSIONAL COURSES

8240-50 Veterinary Physiology (4,5) Introduction to concepts and problems in physiology which form a base for clinical applications and for formal training in pharmacology, medicine, pathology, and surgery. Order of sequence: Cellular, cardiovascular, renal, respiratory, neural and endocrine physiology. 8240: 3 hrs and 1 demonstration, 8250: 4 hrs and 1 demonstration. F, W

8510-20 Veterinary Histology/ Embryology (4,5) Cytology, histology and organology of animal body systems, structural and functional interrelationships. Embryonic development from fertilization and origin of congenital defects. Correlated with 8240-50 and 8540-50 8510: 2 hrs and 2 labs. 8520: 2 hrs and 2 labs, F, W

8540-50 Veterinary Gross Anatomy (5,5) Lab covering gross and applied anatomy of common domestic animals (dog, cat, horse, cow). Dissection of embalmed specimens; prostectones, slides, models, and living animals. Sequence of organ system study correlated with 8510-20. F, W

8570 Special Problems in Animal Science (2-20) Certain topics in anatomy, histology and physiology. May be repeated. W, Sp

8575 Advanced Seminar in Animal Science (1-4) Applied anatomy, histology and physiology. F, Su

GRADUATE COURSES

5530 Mammalian Organography (5) Microscopic study of structure of organs of major organ systems. Prereq: Zoology 3550 or equivalent. 3 hrs and 5 labs. W

5540 In vitro Evaluation of Toxicity (3) Principles and techniques of in vitro evaluation of acute toxicity, mutagenesis, carcinogenesis, and teratogenesis. Prereq: Biochemistry 5610. 2 hrs and 5 labs.

Environmental Practice

Environmental Practice

GRADUATE COURSES

8600 Basic Clinical Rotation in Environmental Practice (3) Introductory clinical experience in laboratory animal and zoo animal medicine, epidemiology, other related disciplines. F, Su

8611-12 Pharmacology (2,5) Principles of pharmacokinetics as well as pharmacodynamic properties of veterinary drugs: mode of action, pharmacokinetic effects, chemical and physical properties, metabolism, toxicities, important idiosyncrasies, clinical application. Correlated with 8240, 8250, and 8311. W, Sp

8660 Environmental Clerkships (2-20) Advanced clinical experience and training in practice of laboratory and zoo animal medicine. Prereq: 8600, Pathobiology 8700, Rural Practice 8900, and Urban Practice 8800. May be repeated. W, Sp

8670 Special Problems in Environmental Practice (2-16) Public health and epidemiology. May be repeated. W, Sp

8675 Advanced Seminar in Environmental Practice (1-4) Comparative medicine, public health, epidemiology, and pharmacology. Su, F
**PROFESSIONAL COURSES**

8700 Basic Pathobiology Rotation (3) Practice and/or demonstrations in laboratory diagnosis; postmortem examination and clinical pathologic, parasitologic, and microbiologic techniques. Su, F

8710 Veterinary Pathology (5) Causes of disease, disturbances of cell growth, inflammation, and neoplasia. 3 hrs and 2 labs. Sp

8730 Veterinary Parasitology (4) Parasitology (protozoology, helminthology, and entomology) and relation to disease in animals. 3 hrs and 1 lab. Sp

8760 Advanced Pathobiology (3) Further training in clinical laboratory diagnostic procedures, and in postmortem examinations. W, Sp

8770 Special Problems in Pathobiology (2-10) Opportunity to design and execute research problems. May be repeated. W, Sp

8775 Advanced Seminar in Pathobiology (1-4) Diagnostic topics: cytology, electron microscopy, histologic techniques. Su, F

**GRADUATE COURSES**

5000 Thesis (1-15) P/NP only. E

5010 Comparative Pathology (5) Lectures and lab. Pathogenic mechanisms. Comparative aspects. Lectures reinforced by lab study of gross, microscopie and ultrastructural lesions. Prereq: Zoology 3060, 3200. F, A

6000 Doctoral Research and Dissertation (3-15) P/NP only. E

6010 Special Topics in Pathology (1-3) E

6020 Special Problems in Pathobiology (1-5) Necropsy, histopathology, clinical research, pathology, parasitology, clinical immunology, clinical bacteriology and mycology, and clinical virology. May be repeated. Maximum 20 hrs. E

6030 Veterinary Biopsy (1-2) Examination of biopsy specimens and interpretation of observations. Preparation of specimens for sectioning. Prereq: Consent of instructor. May be repeated. Maximum 4 hrs. E

6035 Correlative Post-Mortem Pathology (1-3) Gross and microscopic post-mortem examination of animals. Correlative interpretation of clinical diseases and lesions. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

6040 Veterinary Pathology Seminar (1) Microscopic slides and transparencies of lesions from cases examined by pathologist, residents, and graduate students. Interpretation of observations. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. F

6045 Pathobiology Seminar (1) Subjects of current interest in biomedical science. Students present one seminar per term enrolled. Prereq: Consent of instructor. May be repeated. Maximum 20 hrs. Class meets once monthly. E

6050 Ultrastructural Pathology (1) Ultrastructural changes in diseased cells. Interpretation of observations. Prereq: Professional medical degree or consent of instructor. F, A

6052 Pathogenesis and Diagnosis of Virus Diseases in Domestic Animals (5) Biology of viruses and pathology of virus infection in domestic animals. Prereq: Biochemistry 4110-20, 4119; Microbiology 4430, 4439; consent of instructor. W

6055 Techniques in Pathology (3) Fixation, processing and staining of tissue specimens; specialized gross dissection techniques; photography of gross specimens and photomicrography. Prereq: Consent of instructor. 2 hrs and 1 lab. F, A

6060 Principles of Pathology (2) Advanced topics in pathobiology, including mechanisms of disease, pathophysiology, cellular degeneration, infection, immunopathology, hemostasis. Principal biochemical and morphologic responses of various cells, tissues, and organs to injury and other metabolic derangements. Participants present seminars on selected topics from current literature and textbooks. Prereq: Consent of instructor. F, A

**Rural Practice**

Professors:


Associate Professors:


Assistant Professors:


Interns:


**PROFESSIONAL COURSES**

8900 Basic Clinical Rotations in Rural Practice (12-16) Introductory clinical training in food animal, equine, and ambulatory and herd health practices. Su, F

8960 Advanced Clinical Rotations in Rural Practice (3-16) Advanced clinical training in food animal, equine, and ambulatory and herd health practices. W, Sp

8970 Special Problems in Large Animal Medicine, Surgery, and Theriogenology (2-10) Opportunity to emphasize specific career objectives. Prereq: En. Virc. 8600, Pathology 8700, Rural Prac. 8600, and Urban Prac. 8800. May be repeated. W, Sp

8975 Advanced Seminar in Rural Practice (1-4) Equine medicine, food animal surgery, clinical toxicology. Su, F

**GRADUATE COURSES**

5000 Thesis (1-15) P/NP only. E

6000 Doctoral Research and Dissertation (3-15) P/NP only. E

**Urban Practice**

Professors:


Associate Professors:


Assistant Professors:

R. C. DeNovo, Jr., D.V.M. Illinois; M. P. Nasise, D.V.M. Kansas.

Residents:


**PROFESSIONAL COURSES**

8800 Basic Clinical Rotations in Urban Practice (12-16) Introductory clinical training in anesthesiology, medicine, radiology, and surgery of companion animals. Su, F

8860 Advanced Clinical Rotation in Urban Animal Practice (1-10) Advanced clinical rotation in anesthesiology, medicine, surgery, with direct responsibility for diagnosis, care, and treatment of assigned clinical patients. W, Sp

8785 Advanced Seminar in Urban Practice (1-4) Neurology, cardiology, surgery, ophthalmology. Su, F

**GRADUATE COURSES**

5000 Thesis (1-15) P/NP only. E

6000 Doctoral Research and Dissertation (3-15) P/NP only. E

**Interdepartmental Offerings**

**Veterinary Medicine**

**PROFESSIONAL COURSES**

8010 Client Relations and Communication Skills (1) Intersessional skills as they apply to client relations and communication with colleagues, employees, general public. 1 lab. S/N/C only. Sp

8310 Introduction to Veterinary Medical Practice (2) Animal species, breed identification, basic care, feeding, restraint, handling. Introduction to physical diagnosis, intravenous techniques, blood sampling, etc. 1 hr and 1 lab. F

8311 Introduction to Veterinary Medical Practice (2) Physical diagnosis, history taking, and client relations: anesthetic principles, agents, and techniques. 1 hr and 1 lab. Sp

8320 Medical Science Interaction Laboratory (3) Multidisciplinary lab, lectures and discussions to provide integrative learning and understanding of physiological, pharmacological and surgical concepts. Anesthetic and surgical principles and techniques, humane care of animals, introduction to instruments used to measure physiologic processes and drug effects, use of physiologic recordings. Correlated with 8240, 8250, 8611 and 8612. 2 hrs and 1 lab. Su

8340 Integumentary System (4) Diseases of integumentary system of animals, with emphasis on laboratory examination, interpretation of pathologic features, diagnosis, and treatment. 3 hrs and 1 lab. F

8341 Hematology and Introductory Clinical Pathology (4) Laboratory and clinical approach to diagnosis and treatment of hematopoietic system diseases, and principles and methods of laboratory evaluation of diseases from other systems courses. 3 hrs and 1 lab. Su

8342 Alimentary Tract (9) Physiological basis, pathology, diagnosis, and treatment of diseases of alimentary tract and digestive organs. 8 hrs and 1 lab. F

8343 Patterns of Disease (5) Host-agent relationships. Pathology, laboratory diagnosis, control and public health significance. Principles of application and application in study of diseases in animal populations. Su

8344 The Art of Veterinary Medicine (1) Specific diagnostic problems or paramedical subjects important to veterinary medical practice: differential etiology, diagnosis, and treatment of certain disease signs or symptoms; implications for veterinarian of medical jurisprudence and ethics, practical economics, veterinary history. May be repeated. S/N/C only. F, W, Sp

8350 Reproductive System (6) Diagnosis, therapy and prevention of conditions causing reduction of the reproductive efficiency of domestic animals. Abnormalities of the mammary gland, diagnosis and prevention of mastitis. 4 hrs and 2 labs. F
Institute of Agriculture/Interdepartmental Offerings

8351 Urinary System (4) Understanding of urinary-renal system of animals in health and disease. 3 hrs and 1 lab. W

8352 Cardiovascular System (3) Pathology, diagnosis, and management of cardiovascular diseases of animals. Anatomic, physiologic, and pharmacologic principles which provide basis for medical and surgical treatment. 2 hrs and 1 lab. Su

8353 Endocrine, Metabolic and Nutritional Diseases (4) Biochemical and pathophysiologic mechanisms of endocrine, metabolic and nutritional diseases of animals; diagnosis, therapy and prevention. F

8360 Musculoskeletal System I (5) Pathology, diagnosis, and treatment of muscular and skeletal diseases of small animals; pathologic changes, interpretation of radiographs and surgical procedures. 4 hrs and 1 lab. W

8361 Musculoskeletal System II (5) Pathology, diagnosis, prognosis, and management of musculoskeletal diseases of large animals; Functional anatomy, radiographic interpretation, surgical procedures and medical therapy applicable to equines and ruminants. 4 hrs and 1 lab. W

8362 Veterinary Toxicology (3) Molecular mechanisms and pathologic and clinical features of animal diseases caused by common toxic agents. Su

8363 Public Health (2) Public health aspects of veterinary medicine and nature of related laws, ordinances and regulations. Veterinarians’ role in the protection of environment, ecology, and quantity and quality of food. Su

8364 Animal Dietetics (1) Applied nutrition of cattle, swine, horses, dogs and cats for the veterinarian. Diets and methods of feeding for both normal and special situations. Sp

8365 Radiology (4) Basic radiologic technology, radiation safety, special procedures and radiographic interpretation in diagnosis of clinical cases. 3 hrs and 1 lab. W

8366 Respiratory System (4) Detection and diagnosis of upper and lower respiratory diseases of domestic animals. Pathophysiology and pathology of infectious and noninfectious diseases. Lectures and lab with live and simulated case studies. 3 hrs and 1 lab. W

8370 Neurosciences (9) Normal and abnormal neural structure and function in animals; clinical neurology and neuropathology. 6 hrs and 3 labs. Sp

8371 Visual and Auditory Systems (3) Diseases involving eyes and ears of animals, with emphasis on anatomic, physiologic, and pathologic features. 2 hrs and 1 lab. Sp

8372 Comparative Medicine (4) Diagnosis, prevention, and treatment of diseases of laboratory animals, avian species, and marine mammals seen most commonly by practicing veterinarians. Sp

8375 Principles of Medicine (4) Physiologic and pathologic principles underlying mechanisms of disease. Selected examples of human and animal diseases; recent scientific advances and effects on veterinary medicine. Sp

8401 Clinical Radiology (3) Training in radiographic techniques and in interpretation of radiographs as part of the diagnostic process. May be repeated. E

8402 Special Medical Services (3) Clinical training in specialty areas such as anesthesiology and ophthalmology, with casework in both urban and rural animal clinics. Su, F

8460 Extramural Programs (2-20) Supervised off-campus educational program with an approved institution; limited enrollment. Prereq: Consent of department and College of Veterinary Medicine Curriculum Committee. W, Sp

GRADUATE COURSES

5343 Patterns of Disease (5) Host-agent relationships in disease of animals. Pathogenesis, laboratory diagnosis, control, and public health significance. Epidemiology and application in study of diseases in animal populations. Prereq: Consent of instructor and Director, Comparative and Experimental Medicine Graduate Program. Su

5362 Veterinary Toxicology (3) Pharmacologic basis and pathologic features of diseases of animals caused by common toxic chemicals: clinical manifestations, diagnosis, and treatment. Prereq: Consent of instructor and Director, Comparative and Experimental Medicine Graduate Program. Su

5363 Public Health (2) Public health aspects of veterinary medicine and nature of related laws, ordinances and regulations. Veterinarians’ role in the protection of environment, ecology, and quantity and quality of food. Prereq: Consent of instructor and Director, Comparative and Experimental Medicine Graduate Program. Su

5372 Comparative Medicine (4) Diagnosis, prevention, and treatment of diseases of laboratory animals, avian species, and marine mammals seen most commonly by practicing veterinarians. Prereq: Consent of instructor and Director, Comparative and Experimental Medicine Graduate Program. Sp

5375 Principles of Medicine (4) Physiologic and pathologic principles underlying mechanisms of disease. Selected examples of human and animal diseases; recent scientific advances in principles of veterinary medicine. Prereq: Consent of instructor and Director, Comparative and Experimental Medicine Graduate Program. Sp
Graduate Programs

The College of Business Administration offers programs leading to six advanced degrees: the Doctor of Business Administration, the Doctor of Philosophy with majors in Economics and in Management Science, the Master of Arts with a major in Liberal Arts jointly offer an intercollegiate program in Industrial and Organizational Psychology leading to the Master of Science degree. (See page 96.) Also, the Department of Management Science offers an intercollegiate program leading to the Master of Science degree. (See page 97.)

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.

Academic Common Market. An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UTK on an in-state tuition basis. Programs in the College of Business Administration available to residents of the states indicated include: DBA (all concentration areas)—West Virginia; MBA (Transportation and Logistics)—Virginia and West Virginia; Industrial and Organizational Psychology (M.S. and Ph.D.)—Alabama, South Carolina, and Virginia. Additional information may be obtained from the Graduate Programs office of this college.

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. Full-time students are expected to successfully complete 12 hours per quarter and part-time students 6 hours per quarter. Scheduling and sequencing of courses are done with this assumption in mind.

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 and at Oak Ridge.

The program consists of the MBA core (twelve to nineteen courses depending upon exemptions based on prior studies and/or proficiency examinations) and a concentration/electives block of eight courses. Each course is 3 quarter hours of graduate credit. Thus, the total program may consist of from 60 to 81 quarter hours.

Prerequisites. Upon matriculation, the student must have received a bachelor's degree from a regionally accredited institution. College level mathematics through at least one course in calculus is the only prerequisite requirement for entry into the program. Those electing the management science or statistics concentration must have completed two years of college level calculus. Those admitted to the accounting concentration should plan on up to two additional quarters for undergraduate prerequisite courses that are taken during the first year of the program. Although not required, completion of undergraduate courses in certain areas may qualify the student for exemption from some core courses. (See information under "Exemption from Core Courses" on page 37.)

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 under the heading "Exemption from Core Courses." 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 5010, 5020; Management Science 5010a; Marketing 5010, 5020; Mathematics 5052; Office Administration 5050; Statistics 5010a, 5020.

1Accounting 5020 and 5030 are waived for students who complete the concentration in accounting.
2See notation under the heading "MBA Concentration" in the Management Science Program section (page 44).
3See notation under the heading "MBA Concentration" in the Statistics Department section (page 46).
Concentration and Electives. A concentration area(s) may be indicated on the MBA Program Application or this declaration may be deferred until after matriculation. In any event, selection must be made no later than completion of 27 hours of MBA program coursework. In some cases, selection of an area(s) early in the program is encouraged to facilitate proper course sequencing. Requests for changes in concentration area(s) must be submitted to the Office of Graduate Business Programs.

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 (for specific courses required in some concentration areas, see departmental sections on following pages): Accounting, Economics, Finance, Forest Industries Management, Management Science, Marketing, Management, Mathematics, Transportation and Logistics.

The remaining elective courses (2 to 4) may be in fields outside the concentration area, normally selected from MBA courses offered in other colleges or departments, 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 Office of Graduate Business Programs.

Exemption from Core Courses. A student may be exempted from certain core courses on the basis of having recently completed equivalent undergraduate courses in these subjects with grades of B or higher at a nationally accredited institution. "Recently completed" means, for mathematics, completion of the last course or regular use of math tools within two to three years of matriculation, and for other areas within three to five years of matriculation. Courses in this category (and the approximate undergraduate equivalent work) are:

- Accounting 5010 (6 quarter hours, fundamentals of financial accounting)
- Business Law 5010 (6 quarter hours, the legal and social environment of business)
- Economics 5010 (9 quarter hours, principles of economics—macro and micro)
- Mathematics 5052 (12 quarter hours, including college algebra and calculus. See topics included in Mathematics 5051 and 5052)

In addition to the above, a graduate of an AACSB accredited undergraduate business program may be exempted from one or both of the core courses in the area of his/her 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 exemption must petition the appropriate department head.

A minimum of 60 quarter hours of graduate credits is required to earn the degree. If a student qualifies for exemption from a course in addition to those provided for in the two categories described above, whether by proficiency examination or otherwise, an additional course approved by the Office of Graduate Business Programs will be included in the student's curriculum for each such exempted course so as to meet the 60-hour minimum requirement.

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

Transfer Credits. Graduate level courses taken at other AACSB accredited institutions that otherwise conform to University policy (page 15) may be credited toward MBA degree requirements within the following limits:

- MBA Core: 6 hours
- Concentration Area: 3 hours (provided at least 12 hours of course work at this institution are included in each concentration area)
- Elective Area: 3 hours

The maximum number of hours that may be transferred is 9 quarter hours.

Other Requirements. The Application for Admission to Candidacy (see page 19) must be approved by two faculty members in the student's area(s) of concentration and the Associate Dean for Graduate Programs in the College of Business Administration, signed by the department head, and submitted to the Graduate Office.

To qualify for the degree, the student must achieve a B average (3.0) or above in MBA core courses required in his/her program, a B average or higher in courses comprising the concentration area(s) and a B average or higher in the overall program. In lieu of passing a written comprehensive examination the student must satisfactorily demonstrate his/her ability to analyze and solve multi-functional problems of the administrative processes and policy determination and to integrate the concepts of the various disciplines embodied in the curriculum of the program. The student is tested in these areas in the courses of the MBA core, particularly in the capstone course, Business Administration 5310—Business Policy, as well as in work required in the concentration areas.

Application and Admission. Applications are accepted to begin the full-time program in the summer quarter for those who have an undergraduate degree in an area other than business and in the fall for students who hold an undergraduate business degree.

APPLICATION DEADLINES
Note: Students are admitted for Summer and Fall quarters only.

Application deadline for Summer Quarter Admission: April 1
Application deadline for Fall Quarter Admission: July 1

To obtain application materials, write or call:
Associate Dean
Graduate Business Programs
College of Business Administration
The University of Tennessee
Knoxville, TN 37996-0570
Telephone: (415) 343-1050

There are no admissions for spring or winter quarters. To be considered at admission sessions, the applicant's file must be complete. A complete file includes the Graduate School application, transcripts of prior college work, the MBA program application, two application evaluations and the GMAT score report. The first two items should reach The Graduate School 10 days before the MBA application deadline to allow for internal processing. Other items should reach the Office of Graduate Business Programs by the deadline date.

For admission to the MBA program, consideration is given to (1) applicant's academic record with particular attention to the last two years of undergraduate work and previous graduate studies, (2) scores on the GMAT and the TOEFL (if a foreign language test is required), (3) work experience and other activities which demonstrate potential for leadership, and (4) letters of recommendation from professors and work supervisors. The admission decision is based on all factors which make up the total application; therefore, there is no automatic cut-off for either grade point averages or GMAT scores.

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.

Admissions. Applicants for the J.D.-MBA program must 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 degree. Such approval will be granted, provided that dual program studies be started prior to entry into the last 28 semester hours required for the J.D. degree and the last 24 quarter 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 qualify for credit without regard to the dual program.

The College of Law will award up to 6 semester hours of 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 credit for College of Law course 8590—Legal Accounting.

The College of Business Administration will award a maximum of 9 quarter hours of credit toward the MBA degree for acceptable performance in a maximum of 8 semester hours of approved courses offered in the College of Law.

Awarding of Grades. In the College of Law, for grade recording purposes for graduate business courses and in the College of Business Administration for law school courses, grades awarded will be converted to either Satisfactory or No Credit and will not be included in the computation of the student's grade average or class standing in the college where such grades are so converted. The College of Law will award a grade of Satisfactory for a graduate business course in which the student has earned a B grade or higher and a No Credit for any lower grade. The College of Business Administration will award a grade of Satisfactory for a Law School course in which the student has earned a 2.3 grade or higher and a No Credit for any lower grade.

The DBA Program

The primary objective of the Doctor of Business Administration (DBA) degree is to prepare a select number of qualified students for careers in university-level teaching and research, and for responsible positions in business and government.

Students seeking a DBA degree must be recommended for acceptance by the College of Business Administration to The Graduate School. Actual admission is based on the applicant's overall standing compared with other applicants and with the number of vacancies in each department. Applications for the fall quarter (and all supporting documents) should be received by the College of Business Administration not later than March 1. Late applications are considered only is space is available.

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

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

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

There are five areas of concentration offered in the DBA program:

- Accounting
- Finance
- Management
- Marketing
- Transportation and Logistics

More detailed information concerning these specific areas is available by writing directly to each department chairperson.

Degree Requirements. Doctoral students must file a program of study that has been approved by the doctoral advisory committee and the Associate Dean for Graduate Business Programs by the end of the second quarter of coursework after entry into the program. This committee is nominated by the department chairperson in a student's intended area of concentration, subject to the Graduate Council's policies and procedures. Following are specific degree requirements:

A. Residence. Students must complete at least three years of full-time coursework beyond the baccalaureate degree, with two years of residence on the Knoxville campus.

B. Program Prerequisite Areas. Students must complete appropriate courses at the graduate level, or other approved concentrations of coursework, in the following areas:

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

All work in the above areas is subject to approval by the temporary Doctoral Advisory Committee and the Associate Dean for Graduate Business Programs. Specific majors may have prerequisites not listed above.

C. Economics. Economics 5110-20 (or equivalent) is required, except that Management 5610-20 (or equivalent) may be substituted with prior approval.

D. Research Methods. A minimum of 15 quarter hours of graduate research methods must be completed. At least 6 quarter hours in statistics courses beyond Statistics 5050 are required. The remaining 9 quarter hours can be completed in additional statistics (not to include Statistics 5050) courses or in other areas such as research methodology, management science, computer science, econometrics, and psychometrics.

E. Major Area. The major area of concentration is the focal point of the DBA program. Students are expected to master the literature and research techniques in their concentration area, and to do quality research as evidenced by the preparation of an acceptable dissertation. A minimum of 18 quarter hours of coursework is required, including at least 9 hours of doctoral seminars. Graduate work in the major field taken at other institutions is considered by the temporary doctoral advisory committee in approving the specific coursework required. Available major areas are: accounting, finance, management, marketing, and transportation/logistics.

F. Collateral Area. A minimum of 12 quarter hours of graduate coursework is required in an area outside, but complementary to, the major area. The student may choose the collateral area from one of the following: one of the five major business areas listed above, economics, statistics, or a related area in another school or college of the University.

Comprehensive Examinations. Comprehensive written examinations over the major and collateral areas are required of each person seeking candidacy for the DBA degree. The major area examination is administered in two sessions of approximately four hours each and the collateral area examination in one session of approximately four hours. Written examinations may be supplemented with oral examinations. For a doctoral student having a collateral area in the College of Law, the results of only an oral examination may be deemed acceptable.

Admission to Candidacy. Students may apply for admission to candidacy for the DBA degree after maintaining at least a "B" average in coursework, successful completion of comprehensive examinations and acceptance of a research proposal for the dissertation by the student's doctoral committee.

Doctoral students are advised to give serious attention early in their program to the composition of their doctoral committee. In accordance with Graduate School policy, the student and the major professor identify a doctoral committee composed of at least four faculty members, three of whom, including the chair, must be approved by the Graduate Council to direct doctoral research. When the doctoral committee has been formed, the temporary doctoral advisory committee ceases to exist.

Admission to candidacy must be approved at least two full quarters prior to the date the degree is conferred (admission in the fall quarter permits graduation in the following spring quarter). Advancement to candidacy must occur no later than four years after the student enters the program.

Application for admission to candidacy must include a listing of all courses taken in each of the fields required for the degree (business functional areas, basic disciplines, concentration area and collateral area). Graduate courses accepted from other institutions must be included. Under "Other Requirements" the date of acceptance of the research proposal by the doctoral committee should be indicated. The application must be approved by the student's doctoral committee.
Applicants for management science and either the GMAT or the Graduate Record Examinations are required. Educational Testing Service, P. O. Box 966, Princeton, New Jersey 08540, and from most institutions English as a Foreign Language (TOEFL). University degree in economics, management, and statistics may submit results of the Test of English as a Foreign Language (TOEFL). The College of Business Administration is fully accredited by the American Assembly of Collegiate Schools of Business and is associated with other leading graduate schools of business as a member of the Graduate Management Admission Council.

Requirements

A graduate student in the College of Business Administration whose grade point average at any point 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 the next 12 quarter 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 Associate 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 10-11, M. Acc., MBA, and DBA applicants are required to take the Graduate Management Admission Test (GMAT). Applicants for programs in economics, management science, and statistics may submit results of either the GMAT or the Graduate Record Examination (GRE) aptitude portion. Applicants for management science and statistics programs must have completed at least two years of college level calculus and be proficient in a computer language. Applicants whose native language is other than English must submit results of the Test of English as a Foreign Language (TOEFL). Scheduled dates and locations for taking these 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 10-11), M. Acc., 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 fully accredited by the American Assembly of Collegiate Schools of Business and is associated with other leading graduate schools of business as a member of the Graduate Management Admission Council.

Minimum Academic Performance Standards

A graduate student in the College of Business Administration whose grade point average at any point 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 the next 12 quarter 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 Associate 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 10-11, M. Acc., MBA, and DBA applicants are required to take the Graduate Management Admission Test (GMAT). Applicants for programs in economics, management science, and statistics may submit results of either the GMAT or the Graduate Record Examination (GRE) aptitude portion. Applicants for management science and statistics programs must have completed at least two years of college level calculus and be proficient in a computer language. Applicants whose native language is other than English must submit results of the Test of English as a Foreign Language (TOEFL). Scheduled dates and locations for taking these 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 10-11), M. Acc., 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 fully accredited by the American Assembly of Collegiate Schools of Business and is associated with other leading graduate schools of business as a member of the Graduate Management Admission Council.

Fellowships and Assistantships

Fellowships. Information concerning nonservice fellowships administered by The Graduate School as well as application blanks may be obtained from the Graduate Office. Information on College-administered fellowships is available from the Office of Graduate Business Programs in the College of Business Administration.

Assistantships. A limited number of teaching assistantships and assistantships that require from 10 to 20 hours of service per week are available through the departments of the College. Remuneration includes payment of fees and out-of-state tuition as well as monthly stipend. 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 office of the Associate Dean for Graduate Programs. Applications must be received by March 1 for consideration of assistantships and fellowships 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 is limited to 36 participants per week. 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 and that of others in monograph form so that significant developments in the various business disciplines and economics can achieve widespread exposure. In addition, the Center staff does contract research on business and economic problems for governmental organizations and private industry. The Center publishes the Tennessee Statistical Abstract and quarterly the Survey of Business. The Center is a member of the Association for University Business and Economic Research.

Management Development Programs

The Management Development Programs Department offers a variety of programs ranging from executive programs to management seminars and customized "in-plant" programs. The four-week 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.

TEDP is offered twice yearly, and enrollment is limited to 36 participants per session. The program is open to individuals 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 programs and nationally recognized professors of other institutions. Each participating faculty member has extensive experience in either consultation or actual operation in business and industry. The three-week Institute for Productivity Through Quality teaches the very successful statistical techniques that Dr. Edward Deming taught the Japanese after World War II.

Departments of Instruction

Accounting and Business Law

J. E. Kiger (Head), Ph.D. Missouri, C.P.A.

Accounting

MAJOR

DEGREE

Accounting

M. Acc.

Professors:


Associate Professors:


M. Acc.
The objective of the Master of Accountancy (M.Acc.) program is to provide persons having an undergraduate accounting background and a high level of ability and motivation with the depth and understanding of accounting which will enhance their probability of success in a career in professional accounting. Moreover, the student's educational experience should develop perspective toward the discipline of accounting and enhance their probability of success in a career in professional accounting. The program is designed for students who have completed an accredited baccalaureate degree program with a major in Accounting, and/or 5030 would result in substantial duplication of accounting work previously taken, the student shall not be permitted to earn credit in the course, but must select an equivalent number of graduate accounting courses in lieu thereof. Recommended courses include Accounting 5110, 5120, 5210, 5220, 5420, 5510, and 5640.

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. Maximum E, F.

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

520 Corporate Reporting Problems (3) Analysis of uses and limitations of accounting models of the 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 as each relates to measurement of periodic performance and financial position. Prereq: Consent of department head. May not be taken by students with credit for 4990.

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

5130 Selected Topics—Current Accounting Practice (3) Critical in-depth consideration of selected financial reporting topics of particular relevance to current accounting practice. Prereq: 5110.

5140 Selected Topics—Current Accounting Theory (3) Critical in-depth consideration of current issues in the financial accounting literature. Prereq: 5110.

5160 Graduate Internship in Accounting (3) Full-time resident professional employment for one academic quarter involving qualified job experience written report of responsibilities, and evaluation of student performance. Prereq: Consent of instructor.

5210 Seminar in Advanced Managerial Cost Accounting (3) Analysis of conceptual and current issues impacting on development and practice of managerial cost accounting. Cost allocation, planning, and control under conditions of uncertainty, responsibility accounting concepts. Prereq: 4230 or consent of instructor.

5220 Budgetary Planning and Control Systems (3) Alternative approaches to organizing of planning and control systems to meet organization's needs and objectives. Control systems and corporate structure, discretionary expense centers, profit centers, investment centers, transfer pricing, and control in not-for-profit organizations. Prereq: 5220 or 5030.

5310 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 Prereq or coreq: Statistics 4415 or equivalent.

5320 Advanced Auditing (3) Case-oriented, including audit of specific asset, liability, revenue and expense accounts. Emphasis 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 taxation with emphasis on tax planning and research. Prereq: 3120 with C or higher; 3430 with C or higher. (Available only to MBA students who do not have credit for 4430.)

5340 Consolidations and Business Combinations (3) Theory and practice of accounting for interrelated 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 individual research projects. Includes individual research projects. Prereq: 4430 or equivalent.

5430 Tax Planning (3) Advanced study of income tax problems emphasizing alternatives available to minimize tax liability compatible with achieving tax-planning objectives. Prereq: 4430 or equivalent.

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

5450 Taxation of Partnerships and Partners (3) Formation, operation, termination, and liquidation and other special problems of partnerships. Prereq: 5420.

5460 Taxation of Corporations and Shareholders (3) Organization and structure, distributions, liquidations, reorganizations, and special problems including Subchapter S Corporations and Personal Holding Companies. Prereq: 5420.

5490 Tax Policy (3) Current policies explored through historical development and current status of various taxes of taxing jurisdictions—local, state, and federal. Emphasis on taxation of entities: directed research in selected topics within field of taxation. Prereq: 5430, 5450, 5460.

5510 Not-for-Profit Accounting (3) Theory and practices of budgetary control, financial reporting, measures of output and accomplishment, and financial and performance auditing for nonprofit entities. Prereq: 8 hrs of accounting and consent of instructor.

5640 Seminar in Accounting Information Systems (3) Literature on accounting information systems and advanced systems analysis and design concepts informational needs of other functional areas of business and interfacing of these areas. Prereq: 4630 or equivalent.

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

5950 Seminar in Accounting Research (3) Integration of areas of financial, managerial, tax, and auditing, including directed problem-oriented research in selected topics. Prereq: 5110, 5120, 5210, 5220. (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.
THE MASTER'S PROGRAM

The minimum requirements for a graduate major in Economics for the Master of Arts degree consist of the following: (1) Economics 5111-12 and 5121-22, (2) 9 additional hours in economics at the 5000 level, or (3) a thesis, 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.

THE DOCTORAL PROGRAM

Subject Area Requirements

1. Students will be required to complete requirements in core subject fields as indicated:
   a. Economic theory: by comprehensive examination or by completion of Economics 5111-12 and 5121-22 with a B average or higher, and an additional 9 hours of economics.
   b. History of economics: Economics 5150 and 3 hours at the 6000 level.
   c. Mathematical and quantitative methods: Economics 5180, 5190, and 5510. The 5510 requirement may be waived for students completing Economics 6170, 6180 and 6190.
   Students must achieve a grade average of B or higher for all courses offered to fulfill requirements of subparagraphs b, c and d, or as an alternative, may petition to satisfy any one or all of these three fields by some other means such as comprehensive examination.

2. Students will be required to demonstrate their competence by comprehensive examination in three fields with the approval of the department head. At least two of which must be selected from the following: economic development; economics of centrally planned economies; a field, as agreed to by the department, at least two of which must be completed.

3. Exceptions to the foregoing are discouraged but may be petitioned by writing directly to the department head who will decide with the faculty advisor.

4. Students will be required to complete a minimum of 72 quarter hours of course work beyond the Bachelor's degree, plus the dissertation which carries 36 quarter hours of credit. At least 54 hours shall be in economics.

5. MBA Concentration: Economics. Minimum Course Requirements for MBA Concentration: As approved by the area MBA faculty advisor.

Assistant Professors:
R. A. Holler, Ph.D. North Carolina; J. W. Mayo, Ph.D. Washington (St. Louis); K. L. Murphy, Ph.D. Michigan State; H. Thompson, Ph.D. Washington (D.C.); D. Houston.

THE MASTER'S PROGRAM

The minimum requirements for a graduate major in Economics for the Master of Arts degree consist of the following: (1) Economics 5111-12 and 5121-22, (2) 9 additional hours in economics at the 5000 level, or (3) a thesis, 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.

THE DOCTORAL PROGRAM

Subject Area Requirements

1. Students will be required to complete requirements in core subject fields as indicated:
   a. Economic theory: by comprehensive examination or by completion of Economics 5111-12 and 5121-22 with a B average or higher, and an additional 9 hours of economics.
   b. History of economics: Economics 5150 and 3 hours at the 6000 level.
   c. Mathematical and quantitative methods: Economics 5180, 5190, and 5510. The 5510 requirement may be waived for students completing Economics 6170, 6180 and 6190.
   Students must achieve a grade average of B or higher for all courses offered to fulfill requirements of subparagraphs b, c and d, or as an alternative, may petition to satisfy any one or all of these three fields by some other means such as comprehensive examination.

2. Students will be required to demonstrate their competence by comprehensive examination in three fields with the approval of the department head. At least two of which must be selected from the following: economic development; economics of centrally planned economies; a field, as agreed to by the department, at least two of which must be completed.

3. Exceptions to the foregoing are discouraged but may be petitioned by writing directly to the department head who will decide with the advice of an ad hoc committee of three tenured members of the faculty. This petition is to be submitted at least nine months before the student takes the comprehensive exam in question.

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

MBA Concentration: Economics. Minimum Course Requirements for MBA Concentration: As approved by the area MBA faculty advisor.

Assistant Professors:
R. A. Holler, Ph.D. North Carolina; J. W. Mayo, Ph.D. Washington (St. Louis); K. L. Murphy, Ph.D. Michigan State; H. Thompson, Ph.D. Washington (D.C.); D. Houston.

THE MASTER'S PROGRAM

The minimum requirements for a graduate major in Economics for the Master of Arts degree consist of the following: (1) Economics 5111-12 and 5121-22, (2) 9 additional hours in economics at the 5000 level, or (3) a thesis, 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.

THE DOCTORAL PROGRAM

Subject Area Requirements

1. Students will be required to complete requirements in core subject fields as indicated:
   a. Economic theory: by comprehensive examination or by completion of Economics 5111-12 and 5121-22 with a B average or higher, and an additional 9 hours of economics.
   b. History of economics: Economics 5150 and 3 hours at the 6000 level.
   c. Mathematical and quantitative methods: Economics 5180, 5190, and 5510. The 5510 requirement may be waived for students completing Economics 6170, 6180 and 6190.
   Students must achieve a grade average of B or higher for all courses offered to fulfill requirements of subparagraphs b, c and d, or as an alternative, may petition to satisfy any one or all of these three fields by some other means such as comprehensive examination.

2. Students will be required to demonstrate their competence by comprehensive examination in three fields with the approval of the department head. At least two of which must be selected from the following: economic development; economics of centrally planned economies; a field, as agreed to by the department, at least two of which must be completed.

3. Exceptions to the foregoing are discouraged but may be petitioned by writing directly to the department head who will decide with the advice of an ad hoc committee of three tenured members of the faculty. This petition is to be submitted at least nine months before the student takes the comprehensive exam in question.

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

MBA Concentration: Economics. Minimum Course Requirements for MBA Concentration: As approved by the area MBA faculty advisor.

Assistant Professors:
R. A. Holler, Ph.D. North Carolina; J. W. Mayo, Ph.D. Washington (St. Louis); K. L. Murphy, Ph.D. Michigan State; H. Thompson, Ph.D. Washington (D.C.); D. Houston.
C 42
College of Business Administration/Economics

5111-12 Microeconomic Theory I, II (3, 3) Theory of consumer choice and demand; theory of the firm; microeconomic analysis of money markets; market structures; derived demand and factor pricing; introduction to welfare economics, capital theory. Should be taken in consecutive quarters. Prereq: 3110 or equivalent. F, W

5120 Fundamentals of Macroeconomics (3) Determination of levels of employment and prices for economy as a whole; relationships between interest rate, levels of income and unemployment, and prices. Prereq: Consent of instructor. May be repeated for credit with consent of instructor. W

5121-22 Macroeconomic Theory I, II (3, 3) Monetarist and income-expenditure approaches to questions of income and price level determination; applications to contemporary macroeconomic problems. Should be taken in consecutive quarters. Prereq: 3120 or equivalent. W, Sp

5150 History of Economic Thought (3) Development of economic ideas from mercantilists through Alfred Marshall; emphasis given to classical and neoclassical traditions.

5180-90 Mathematical Methods in Economics (3, 3-5) Topics in mathematical reasoning: differentiation and integral calculus, difference and differential equations, linear algebra and stochastic models to topics in mathematical programming, 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: Introductory statistics 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 cyclical phenomena. Should not be taken by students who contemplate taking Economics 6170-80-90. Sp

5810 Financial Markets and Intermediaries (3) (Same as Finance 5810) W

5830 Commercial Banking (3) (Same as Finance 5830) F

6111 Advanced Microeconomic Theory (3) Consumer behavior, production, and exchange in partial and general equilibrium settings. Prereq: 4170, 4180, 5112, or equivalent. F

6121 Advanced Macroeconomic Theory (3) Theory and techniques of statistical testing of economic hypotheses and construction and estimation of econometric models. Review of classical least squares regression, constrained regression, least squares, and multiple regression models, and methods of estimation 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

ECONOMICS OF CENTRALLY PLANNED ECONOMIES

5310 Economic Systems (3) Study and appraisal of underlying theories and operation of capitalism, socialism, communism, and other economic systems. F

6331 Theory and Practice of Economic Planning (3) Leading issues in imperative and indicative planning as a strategy for economic development. May be repeated with consent of department. F

ECONOMICS OF LABOR AND HUMAN RESOURCES

4420 Economics of Human Resources (3) Analysis of current problems in human resource development and examination of policies aimed at their solution. Problems include unemployment, education policies, affirmative action; discrimination based on sex or ethnicity, or others. Prereq: 2520.


6470 Public Policy in the Labor Field (4) Governmental regulation of wages, hours, and other aspects of labor relations. Work benefits in areas of income, human resource development, equal employment opportunity, occupational health and safety, social insurance, and immigration policy. Prereq: 6450 and 6460.

INTERNATIONAL TRADE AND ECONOMIC DEVELOPMENT

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: 3210 or 3220. W

4231 The Political Economy of Latin America (3) Description, analysis, and comparison of major economic policies and problems of various Latin American countries. Sp

4232 The Political Economy of Asian Development (3) Description, analysis, and comparison of major economic policies and problems of various Latin American countries. Sp

4260 Economics of Resources and Environment 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: 2520. W

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 United States (3) Interpretation of American economic structure and policies from colonial times. W

5610 Location and Regional Development Theory (3) Theory of location of productive activities: aggregation, 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 and regional forecasting. Methods of analysis include regional descriptive statistics, gravity and potential concepts, regional income and product accounts, shift and share analysis, economic base studies, and regional input-output, linear programming, and econometric models. W

6211 International Economics: Trade (4) Pure theory of classical, neoclassical, and modern international trade. Comparative advantage, free trade, and welfare, and technological change, growth and migration, tariffs and subsidies, and customs unions. Prereq: 5112 or consent of instructor.


6213 International Monetary Economics (4) Theories of exchange rate determination, applications to compromise of trade, protection arguments, economic costs and consequences of protectionist devices, adjustment to trade liberalization, U.S. trade policy. Prereq: 6211.

6214 Economic Development: Western Impact on Asia and Africa (4) Study of the impact of Western technological development on the rest of the world of the rest of the world and the world of the rest of the world. Prereq: 25 hrs of upper division college credit in undergraduate social science or consent of instructor.

6242 Seminar in Economic Development (4) Topics vary with interests of students. Prereq: 6241 or consent of instructor.

6250 Seminar in European Economic History (3) Selected topics in European economic history. Prereq: Consent of instructor. May be repeated with consent of department. W

6260 Seminar in American Economic History (3) Selected topics in American economic history. Prereq: Consent of instructor. May be repeated with consent of department. Sp

6270 Seminar in Economic History of the Third World (3) Selected topics in economic history of non-Western 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 topical and regional research in international economics and analysis. May be repeated. Maximum 6 hrs. Sp, A

6620 Regional Economics Workshop (3) Selected topics in applied regional research. Emphasis on student participation in analysis of market data, forecasting, simulation, and mathematical and computer programming. May be repeated. 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 formulating public policy towards environmental problems. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. Sp, A

INDUSTRIAL ORGANIZATION

4350 Industrial Organization Analysis (3) Monopoly and competition in the United States economy; market structure, business behavior, and economic performance and interrelationships. Prereq: 2510. W

4351-52-53 Seminar in Industrial Organization and Public Policy (4, 4, 4) Organization of industry in modern mixed enterprise economy. Problems of monopoly and competition and their social control under international capital movement. Prereq: Consent of instructor. Sp, A

MONETARY ECONOMICS

5820 Monetary Theory and Policy (3) Relationship of money, credit and liquidity to income, interest rates, employment and prices as well as examination of basic of monetary policy on economic activity. Prereq: 5020 or equivalent.
6510-20 Seminar: Monetary Theory (3.3) Study of money, credit and liquidity as related to income, interest, employment, output, and prices. Prereq: 5112 and 5122.

PUBLIC FINANCE

5710 Public Finance: Revenues (3) Allocative, distributive, and stabilization effects of alternative revenue systems. Prereq or coreq: 5020 or equivalent.

5720 Public Finance: Expenditures (3) Functions and growth of public sector, public goods, and benefit/cost analysis. Prereq or coreq: 5020 or equivalent.

5730 Finance Administration of Government (3) Budgeting and cash management in public sector. Prereq: 5020 or consent of instructor. Sp

5740 Seminar in Public Finance (3) Selected topics: public choice, pricing government services, fiscal policy, and fiscal dynamics. Prereq: 5710 or consent of instructor.


Finance

Professors:
W. W. Doftelew (Chairman), Ph.D. Pennsylvania; L. P. Anderson, Ph.D. Wisconsin; D. S. Ridlew, Ph.D. Oregon; E. W. Lambert, Jr., Ph.D. (Part-time); D. H. Alabama; G. C. Philpott, Ph.D. New York; R. E. Shivehs, Ph.D. California (Los Angeles); C. F. White (Emeritus), Ph.D. Pennsylvania.

Associate Professors:
A. L. Auxier, Ph.D. Iowa; T. P. Boehm, Ph.D. Washington (Stevy); W. C. Goosby, Ph.D. Wisconsin (Milwaukee); J. M. Wachowicz, Jr., Ph.D. Illinois (Champaign-Urbana); C. A. P.

Assistant Professors:
D. J. Christiansen, Ph.D. Wisconsin State; W. P. Lau, Ph.D. Wisconsin; J. D. Ogden, Ph.D. Purdue; R. A. Weir, Ph.D. North Carolina.

MBA Concentration: Finance. The curriculum offers courses for those interested in careers in corporate financial management, security analysis and investments, banking and financial institutions, real estate investment and development, business risk management, and financial planning and services.

DBA Concentration: Finance

Minimum Course Requirements for MBA Concentration: At least four and not more than six courses from the following: 4700, 5130, 5140, 5145, 5420, 5430, 5610, 5620, 5630, 5810, 5820, and 5990.

4700 Business and Public Risk Management (3) Identification and measurement of pure risks facing business or governmental unit associated with property, liability and personal exposures. Implementation of most economical methods of dealing with risks at lowest cost consistent with good financial management practices.

5002 Non-Thesis Graduate Completion (3-15) Required for the non-thesis student not otherwise required during the graduate program. May be used toward degree requirements. May be repeated. S/NC only. E


5020 Financial Management II (3) Development of theories of capital budgeting, capital structure, and dividend policy under conditions of uncertainty. Valuation tools to be used in corporate risk analysis into financial decision making process. Prereq: 5010, Economics 5020. Prereq or coreq: Statistics 5020.


5240 Investment Analysis (3) Principles and techniques for evaluation of investment desirability of marketable securities, with emphasis on common stocks and corporate bonds. Financial statement analysis, of price-earnings ratios, and recent mathematical valuation models. Prereq: 5020 or consent of instructor.

5430 Portfolio Analysis and Management (3) Development of basic concepts and varied methodologies in selection, management, evaluation, and review of asset portfolios. Modern analytical and statistical techniques. Prereq: 5420 or consent of instructor.

5510 International Financial Management (3) Analysis of international financial aspects of the financial management of multi-national firms. Integration of relevant topics from corporate finance, international financial markets, international monetary theory, and management of foreign exchange risk. Prereq: 5020.

5610 Real Estate Finance (3) Valuation, financial analysis, and investment in income-producing property. Tax aspects of acquisition, operation and sale. Syndication and debt underwriting methods. Prereq: 5010 or consent of instructor.

5620 Economic Analysis of Housing and Urban Land Markets (3) Intrametropolitan mobility, neighborhood transition and federal housing policy. Difficulties in obtaining efficient and equitable solutions to variety of urban problems. Relevance of empirical and theoretical economics literature to policy makers and entrepreneurs. Prereq: Economics 5020 or consent of instructor.

5630 Real Estate Investment Analysis (3) Application of contemporary appraisal and feasibility analyses to real estate investment and development. Use of computer models for discounted cash flow and mortgage equity analysis. Prereq: 5010 or consent of instructor.

5610 Real Estate Market and Intermediaries (3) Capital formation and allocation in the economy. Role of financial intermediaries and markets. Theory and structure of interest rates. Analysis of money and bond markets; study of international financial markets. Prereq or coreq: 5010. (Same as Economics 5610.)

5830 Commercial Banking (3) Analysis of management policies of financial institutions, including assets, liabilities and capital management. Description of legal, economic, and regulatory environment, and implications for management. Examination of bank structure and competition, and changing trends in the U.S. financial system. Prereq: 5010. Prereq or coreq: Economics 5030. (Same as Economics 5830)

5990 Research in Finance (3) Directed research on topics of mutual interest to the student and staff member. Prereq: 5020. May be repeated. Maximum 6 hrs.

6000 Doctoral Research and Dissertation (3-15) P/NP only. E

6410-20-30 Seminar in the Theory of Finance (3, 3, 3) Theories of financial decision making under conditions of certainty and uncertainty: financial theory of the firm, asset pricing theory, market efficiency, and theory and models of interest rates. Prereq: Consent of instructor.

Management

Professors:

Assistant Professors:

MBA Concentrations: Management, Forest Industries Management. DBA Concentration Management.

Minimum Course Requirements for MBA Concentrations: Management—As approved by the area faculty advisor, Forest Industries Management—5110, 5130; Forestry 5260, 5270.

5000 Thesis (1-15) P/NP only. E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise required during the graduate program. May be used toward degree requirements. May be repeated. S/NC only. E

5010 Organization Theory and Behavior (3) Basic concepts of organization theory, organizational behavior and management processes.

5020 Operations Management (3) Management processes of planning, operating and controlling of production systems. Management concepts and quantitative techniques with systems frameworks to operating problems. Prereq: Management 5100; Statistics 5100; Statistics 5200, F, Sp, Su

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

5130 Managerial Planning and Control (3) Processes of management planning and controlling with emphasis on corporate strategic planning. Sp

5140 Corporate Management Simulation (3) Application of functional areas and strategic concepts in complex business simulation. Prereq: 5020; Accounting 5030, Finance 5020, Marketing 5260.

5170-80-90 Proseminar in Industrial and Organizational Psychology (3, 3, 3) Introduction to basic concepts and ideas required for graduate study in industrial and organizational psychology. Must be taken as a sequence of 30 credits over at least a two-year period. (Same as Psychology 5170-80-90.) F, W, Sp

Wm. Voight Professor of Insurance.
Bellow National Bank Professor of Finance.
K. O. Butcher, Sr. Professor of Banking and Finance.
Alumni Distinguished Service Professor.
5210 Personnel Management (3) Analysis and appraisal of the personnel function. F
5220 Wage and Salary Administration (3) Analysis of policies and procedures F
5230 Human Problems in Administration (3) Review and critique of research in industrial human relations. (Same as Psychology 5450.)
5250-60 Industrial and Organizational Psychologist (1-3, 1-3) Readings in industrial and organizational psychology. Available only by permission of the instructor and with supervising faculty member. May be repeated. Maximum 6 hrs. S/NC or letter grade, E
5280 Independent Study, Project or Research in Management (1-3) Topic of mutual interest to student and faculty member. Available only by permission of the instructor and with supervising faculty member. May be repeated. Maximum 6 hrs. S/NC or letter grade.
5320 Management Problems in Industrial Relations (1-3) Analysis and management problems. (Same as Psychology 6250-60.)
5350-520-60 Industrial and Organizational Psychologists (Same as Psychology 5380.)
5410-20-30 Production Management (3, 3, 3) Quantitative approach to solution of production management problems. Prereq: 5020 or consent of instructor. F
5610-20 Organizational Behavior (3, 3) Behavioral methodology and perspective, including review of empirical behavioral research in organizations. Must be taken in sequence. F, W
5630 Research Methods in Management (3) Methodological issues in management research. Review of experimental design, measurement problems, data sources and collection, and application of statistical methods, followed by critique of student research proposals. Prereq: DBA student status or consent of instructor. S/NC only. Sp
5710-20-30-40 Organizational Business Management (3) Analysis of environment of international business firms and impact of internal and external factors on managerial decisions. Sp
5810 Energy Management: Theory and Practice (3) Energy resources and energy systems; decision criteria, trade-offs, system analysis, energy audits, technical parameters, conservation methods, worldwide energy supply and demand, new energy technologies. E
6000 Doctoral Research and Dissertation (3-15) Supervised practice. One credit hour each quarter until degree is completed. E
6120 Advanced Organizational Theory (3) Analysis of functioning of complex organizations: structure, culture, and adaptation. M
6130 Seminar in Contemporary Management Issues (3) Contemporary management policy issues. May be repeated. E
6250-60-70 Seminar in Industrial and Organizational Psychology (3, 3, 3) Advanced problems in organizational psychology. Areas include performance evaluation, executive development, group process, 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 (1-15) Supervised practice. One credit hour for each 30 hours of such practice. Maximum 15 credits. (Same as Psychology 6900.)

Management Science

Major

Management Science

Degree

Ph.D.

Professor:

R. S. Garfinkel (Chairperson), Ph.D. Johns Hopkins.

Associate Professors:

J. H. Ho, Ph.D.; D. Rubinfeld, Ph.D.; R. E. Rosenthal, Ph.D.

Georgia Institute of Technology.

Management Science Committee:

Members of the Management Science faculty and in addition: J. S. Bradley, Mathematics; K. C. Gilbert, Management; E. Glushoff, Economics; B. A. Ralston, Geography; R. Shrieves, Finance; C. C. Thiessen, Statistics; M. G. Thompson, Computer Science.

MAA CONCENTRATIONS

For students whose MBA concentration area is Management Science, the MBA Core is revised as follows: substitute Management Science 5310 for 5010, Statistics 5110 for 5010, and with approval of student's advisor, substitute Statistics 5120 for 5020. The concentration area must include Management Science 5330 and 5340.

MASTER OF SCIENCE PROGRAM

See page 97 for details of the Master of Science program in Management Science.

THE DOCTORAL PROGRAM

The Ph.D. program in Management Science is designed to prepare students for research, and teaching related to the application of mathematical tools to complex decision making. Three primary objectives of the program are:

1) to provide, through management science course work, a thorough knowledge of common Management Science/Operations Research mathematical models and their use;

2) to provide sufficient advanced study in a supporting area to qualify the graduate for a joint faculty position in the supporting area and management science. The candidate may choose from the business functional areas (accounting, finance, marketing, production management, and transportation and logistics) or other disciplines, (e.g., computer science, forestry, ecology, and public administration);

3) to develop in the student, through course work in mathematics, statistics, and computer science, a high degree of mathematical maturity which will serve the graduate well throughout a life-long career, whether in management, research, or teaching.

Degree Requirements:

General University requirements for the doctoral degree are stated on page 20.

Course work is required a minimum of 72 quarter hours of course work taken for graduate credit (exclusive of thesis or dissertation) is required. The candidate must complete a minimum of 36 quarter hours at The University of Tennessee, Knoxville, at least 9 of which must be at the 6000 level. Entering students who have completed graduate studies in applicable fields will be granted course credits for work which is equivalent to required courses in the program.

The program includes approximately 24 to 30 quarter hours of course work in the applied concentration area.

Qualifying Exam Examinations. The student must demonstrate mastery of probability theory and statistical inference (Statistics 5110-20-30) by passing a written qualifying examination.

Mastery of 18 to 21 quarter hours in mathematics and management science coursework must be demonstrated by passing a written qualifying examination. Topics normally include numerical analysis (either Mathematics 4225, 4245, 4040 and 5655, or Mathematics 5655-65-75) and real analysis (Mathematics 4510-20-30). Other options may be approved. In exceptional circumstances the faculty will consider waiving the mathematics and/or statistics qualifying examinations.

These requirements must be completed by the end of the first year of the program.

There is no foreign language requirement. Comprehensive Examinations. Prior to admission to candidacy for the degree, and normally after completion of the second year of the program, the student must pass a written comprehensive examination covering the theory of deterministic and stochastic management science models. Topics included in this examination are determined on an individual basis. Students will be expected to demonstrate an integrative ability that goes beyond simple mastery of course content.

Research and Dissertation. The student must complete 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 examination which is beyond the minimum 72 hours of course work, normally is completed in the third year of the program.

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

5000 Thesis (1-15) P/NC only. 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 Quantitative Analysis for Management Decisions (3) Assignment, transportation and general linear programming problems; decision theory, Markov chains and queuing. Prereq: 5010. May not be taken for credit by students who have received credit for 5310. W


5350 Mathematical Programming Computational Systems (2) Practical aspects of using state-of-the-art mathematical programming systems. Students will write compatible programs and report writing software for specific applications. E

5340 Application of Management Science Methods (3) Application of methods from 5310-20-30 to large-scale management problems. 5350 may be taken concurrently. E

5810 Special Topics in Management Science (3) Prereq: Consent of instructor. S/NC only. Maximum 9 hrs.

5910 Management Science Problems (1-6) Directed study on subject of mutual interest to student and staff member.
Minimum Course Requirements for MBA Concentration: 5300, 5350, 5400, 5410.

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 Marketing and Distribution Management (3) Analysis of channel and distribution structure, institutions, functions, and marketing problems. Systems concepts and analytical decision process. Prereq: Acct 5120 or economics 5010. Prereq or coreq: Statistics 5010. W, Sp

5020 Marketing Strategy and Decision Making (3) Management of basic marketing functions. Integration of functional decisional areas into development of marketing strategy, both domestic and international. Prereq. 5010. Prereq or coreq: Economics 5020; Statistics 5020. Sp, Su, W

5120 Sales Force Management (3) Basic communication theory affecting objectives and problems of sales force management. Recruitment, selection, training, motivation, evaluation, and control of sales force. Territory, costing, territory design, and routeing. Prereq. 5200. F

5250 Promotion Management (3) Management of promotional activities within firm: advertising, publicity, and sales promotion. Emphasis on advertising, setting objectives, budgeting, segmentation, media selection and evaluation of effectiveness. Prereq. 5020. Sp

5230 Analysis and Design of Marketing Systems (3) Macroenvironmental and microenvironmental factors affecting marketing systems. Conceptual framework for examining marketing agency and channel interrelationships, public policy, cost and efficiency, and innovation in marketing from viewpoint of decision maker. Prereq. 5200. Sp

5300 Marketing Research (3) Investigation and solution of problems: application of research methods to functional areas of marketing. Research concepts, methods, and techniques. Prereq: 5020; Statistics 5010. F

5350 Buyer Behavior Analysis for Marketing (3) Buyer behavior patterns with emphasis on implications for marketing analysis and executive action. Marketing and behavioral sciences. Prereq. 5200. F

5400 Analyzing Market Opportunity for Marketing Decisions (3) Basic determinants of opportunity within markets, framework for identifying and organizing information required to assess market opportunity. Approaches to analyzing buyers in markets, forecasting, evaluation of demand, analyzing industry and competitor service. Emphasis on applying market opportunity analysis results to marketing decisions. Prereq. 5020. W

5410 Advanced Marketing Strategy (3) Components of marketing strategy including development of marketing mix. Consideration of alternative strategies. Coordination and control of marketing activities. Prereq: 5300 and 5350. W

5450 International Marketing Management (3) Development and management of international marketing programs. Problems involved in marketing goods and services in foreign markets. Political, cultural, and economic conditions in different countries. Prereq: 5020;

5990 Research in Marketing (3) Directed research on subject of mutual interest to student and staff member. Prereq: 5200 and 5350. May be repeated. Maximum 6 hrs. E

6000 Doctoral Research and Dissertation (3-15) Pr/P/only. E

6050 Macro/Theoretical Foundations of Marketing (3) Fundamental nature and history of marketing concepts, processes. Role of marketing theory in developing marketing discipline and in research process. Environmental and macroeconomic implications of marketing decision making. Prereq: Consent of instructor. A

6100 Design and Measurement in Marketing Research (3) Advanced design and measurement issues. Theoretical scaling considerations, applications of multidimensional scaling techniques, and conjoint analysis. Prereq: Consent of instructor. A

6150 Marketing Research Applications (3) Applications of multidimensional scaling to functional areas of marketing. Prereq: Knowledge of multivariate analysis and consent of instructor. A

6200 Buyer Behavior (3) Behavioral processes of individuals and groups in roles as buyers of goods and services. Prereq: Consent of instructor. A

6300 Marketing Decision Models (3) Model building process including application of variety of models to marketing decision making. Bayesian analysis, simulation models, brand switching models, stochastic models, dynamic models, and mathematical models. Prereq: Consent of instructor. A

6350 Current Topics in Marketing (3) Specific topics will vary with each course offering, but could include: nonbusiness marketing applications, macroenvironmental issues, market segmentation, children's television advertising, international marketing issues, marketing channels, and related areas. Prereq: Consent of instructor. A

Transportation and Logistics

Professors: W. F. Davis, Jr., Ph. D; Michigan State; J. N. Dicer, DBA Indiana; J. C. Hendrix, Ph. D; North Carolina; J. C. Langley, Jr., Ph. D; Pennsylvania State; R. A. Mundy, Ph. D; Pennsylvania State; E. P. Patton, Ph. D; North Carolina.

Associate Professors: E. R. Cadotte, Ph. D; Ohio State; J. H. Foggin, DBA Indiana.

MBA Concentration: Transportation and Logistics

DBA Concentration: Transportation and Logistics

Minimum Course Requirements for MBA Concentration: 18 credit hours required including 5010, 5110, 5130, 5220. Transportation 5010 is prerequisite to all other graduate courses in this area.

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 Survey of Transportation and Logistics (3) Intensive survey of logistical demands made by society and specific users on nation's transportation system, problems facing carriers and government. Sp


5120 Management and the Pricing Problem (3) Critical analysis of application of economic theory and regulatory restraints to pricing of carrier services. Sp

5130 Carrier Transportation Management (3) Analysis of major transportation modes and their managerial strategies. Consideration of how social, technical, and legal factors affect managerial strategies. Applications of major transportation modes and the pricing problem. Special emphasis on the economic analysis. Prereq: Management 5020. W

5220 Logistics Systems Management (3) Development of strategy for management of logistical systems. Emphasis on the development of logistical systems to support marketing decision making in uncertain environment. F

5510 Urban Transportation Policy (3) Movement of people, goods and information in urbanized areas
with special emphasis on formulation of national, state and local policy. Emphasis on evolving new urban transportation concepts. W.


5910 Advanced Law and Regulation (3) Legal rights and responsibilities of shippers and carriers. Analysis of decisions of regulatory commissions, courts, and principles of law arising from these decisions.

5990 Independent Study in Transportation/Logistics (3) Directed study in surface and air transportation, national transportation policy, transportation/logistics research developments, or subject of particular interest to student and faculty. May be repeated. Maximum 6 hrs. E.

6000 Doctoral Research and Dissertation (3-15) P/NP only. E.

6110 Seminar in National Policy (3) Critical analysis of contemporary national transportation policy issues. Prereq: 5110. F.

6210 Seminar in Transportation and Logistics Models (3) Analysis of contemporary models and methodologies in transportation and logistics research. Relative emphasis on topical coverage at discretion of instructor. Prereq: Management Science 5010; Statistics 5010 or equivalent.

6220 Research Methodology in Transportation and Logistics (3) Philosophy and design of research in transportation and logistics.

Statistics

MAJOR DEGREE

Statistics M.S.

Professors:
D. L. Sylwester (Chairman), Ph.D. Stanford; D. S. Chambers (Emeritus), M.B.A. Texas; R. A. McLean, Ph.D. Purdue; J. W. Philpot, Ph.D. Virginia Polytechnic Institute.

Associate Professors:
H. A. Lasater, Ph.D. Rutgers; G. B. Ranney, Ph.D. North Carolina State; R. D. Sanders, Ph.D. Texas; M. S. Younger, Ph.D. Virginia Polytechnic Institute.

Assistant Professor:
S. W. Ward, Ph.D. Virginia Polytechnic Institute.

THE MASTER'S PROGRAM

The Master of Science program in Statistics is designed to provide students with a basic foundation in theoretical and applied statistics for careers as consulting and practicing statisticians. A special industrial statistics concentration is available for students wishing to focus on industrial applications of statistics.

A candidate should possess an undergraduate degree with a background in calculus, but no restrictions are imposed regarding the undergraduate major. The department offers both thesis and non-thesis options for work toward the degree.

With Options I and II, two-thirds of the total hours in each program must be at or above the 5000 level.

Option I. The student must present a minimum of 48 quarter hours of approved coursework to include:

1. A minimum of 27 hours in graduate statistics courses.
2. A minimum of 9 hours in collateral work outside the department, and
3. A minimum of 3 hours credit for a directed study project.

Option II. The student may be approved for a thesis option consisting of a minimum of 45 quarter hours to include:

1. A minimum of 24 hours in graduate statistics courses, and
2. 9 hours credit for master's thesis.

Option I or II must be approved by the department. An industrial statistics concentration is available within the framework of either option.

MBA CONCENTRATION

For students whose concentration is Statistics, the MBA Core is revised to substitute Statistics 5110 for 5010. The concentration area must include 5120 and 5130. Normally, Statistics 5250-90-70 are also included which require 3450 as a prerequisite.

Statistics courses numbered 4000 and above presuppose familiarity with the basic probability distributions in statistics and with the general concepts of statistical estimation and hypothesis testing. Students unfamiliar with these concepts should seek advice from a statistics advisor concerning prerequisite course work.


4415 Sampling Techniques and Applied Theory (3) Procedures used in probability sampling for a variety of arrangements of statistical universes and development of estimators and standard errors associated with the sampling schemes. Some properties of estimators. Determination of sample size. Not available for credit to students with credit for 3410. E.

5000 Thesis (1-15) P/NP only. 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 Probability and Statistical Inference (3) Fundamentals of probability, discrete and continuous probability models, mathematical expectation, and inference concerning means. Prereq: Mathematics 3450 or equivalent and a computer programming course. May not be taken for credit by students who receive credit for 5110. F, W, Sp.

5020 Statistical Methods (3) Regression and correlation models, basic time series analysis and forecasting; inferences about one or more proportions, and tests for independence. Prereq: 5010. W, Sp.


5110 Introduction to Probability Theory (3) Classical probability and distribution theory. Prereq: Elementary linear algebra and calculus of several variables. F.


5211 Elementary Statistics (3) Introductory statistics for graduate students. Probability, sampling dis-
College of Communications

Donald G. Hileman, Dean
Paul G. Ashdown, Assistant Dean for Undergraduate Studies
Herbert H. Howard, Assistant Dean for Graduate Studies and Research

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 M.S. program (professional track) is accredited by the American Council on Education for Journalism and Mass Communication. The College is a member of the American Association of Schools and Departments of Journalism and the Broadcast Education Association. The doctoral program in Communications is listed in the Academic Common Market of the Southern Regional Education Board. Students residing in Alabama, Georgia, Kentucky, South Carolina, Virginia, and West Virginia can normally qualify for in-state fee status by applying to the Academic Common Market coordinators in their state capitals.

MASTER 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.

Applicants must meet admission requirements of The 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, core course sequences begin only in the fall quarter. 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.

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. 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 6140, 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 5500), including 3 hours of thesis seminar.

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. New students may be admitted to the program at any time; however, core courses begin only in the fall quarter. The Master's degree is not required for entry into or completion of the doctoral program. Program planning, however, will...
permit the Master's degree to be earned if desired. Students lacking academic or professional experience in communications will be required to take prerequisite courses. In general, however, the program may be completed within three academic years of full-time study beyond the Bachelor's degree. Those holding Master's degrees should anticipate two or more years of full-time study for completion of the Ph.D. degree.

The following are 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 fifty 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; (e) a statement of the applicant's goals and reasons for pursuing the doctorate. Personal interviews with members of the Ph.D. Admissions Committee are recommended and may be required. Professional experience in some field of communications is a highly desirable criterion for admission.

The course requirements for the Ph.D. are:

1. Core (57 hrs.
Communications 5120, 5121, 5140, 5200, 5410, 5420, 5470, 6100, 6140, 6141, 6200; one of the following: 5300, 5310, 5320, 6330, plus 6 additional hours of advanced research courses; Statistics 5050 and 5060; 6 graduate hours of education; 3 graduate hours of organizational behavior; Computer Science 4130 or equivalent.

2. Primary Concentration 21 hrs.
(Advisory, broadcasting, journalism, public relations, or speech communication)

(Outside the College of Communications or a second concentration in Communications)

Total 132 hrs.

Admission to candidacy must be attained at least three quarters prior to graduation and requires successful completion of a comprehensive examination. A diagnostic exam also must be taken about three quarters after entering the doctoral program. This exam covers Communications 6100, 5120-21, 5140, 6140, and one statistics course.

REQUIRED SCHOLASTIC AVERAGE
A student in the College of Communications whose grade point average, not including remedial courses, is 3.0 or higher at any time after the end of 12 hours of graduate credit will be placed on probation. A student on probation will be dropped from the program unless his or her cumulative grade point average is 3.0 or higher at the end of the probationary period. The probationary period is defined as the next 12 quarter hours of graduate 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 Studies of the College of Communications upon the recommendation of the student's faculty committee.

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.

Professors:

J. A. Crook, Ph.D. Iowa State; G. A. Everett, Ph.D. Iowa; A. D. Fletcher, Ph.D. Illinois; J. B. Haskins, Ph.D. Minnesota; D. G. Hileman, Ph.D. Illinois; D. W. Holt, Ph.D. Northwestern; H. H. Howard, Ph.D. Ohio; B. K. Linger, Ph.D. Southern Illinois; D. D. Nimmo, Ph.D. Vanderbilt.

Assistant Professors:

P. G. Ashdown, Ph.D. Bowling Green; M. M. Miller, Ph.D. Michigan State; M. W. Singleton, Ph.D. Southern Illinois.

5000 Thesis (1-19) P/NP only. E

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

5120 Communications Research Design (3) Non-experimental, quasi-experimental, laboratory and field experimental designs. Universal research processes, data gathering, and analysis. Prerequisites: 5100, 5140. Recommended prerequisite: Basic Statistics. F

5121 Communications Research Methods (3) Fundamentals and specific applications of most common data-gathering and measurement techniques in communications research; focus groups, mail, personal and telephone surveys; content analysis; mechanical and physiological measurement; observation; attitude measurement. Prerequisites: 5120. W

5200 Seminar in Communications Issues (3) Concepts and issues. Prerequisites: Survey course in Communications or equivalent. Sp

5300 Content Analysis (3) Content analysis as a research tool; the role of soundness in content analysis; applications. Prerequisites: 5120 or consent of instructor. Sp

5410 Seminar in Communications Law (3) Legal limitations, privileges, and major issues affecting mass media: law of libel and invasion of privacy, development of obscenity law; free press and fair trial, contempt of court, federal regulation of broadcasting, advertising and public relations industries; copyright and access to information. F

5420 Seminar in Communications History (3) Major trends in media development of major concepts and issues. Prerequisites: Survey course in Communications history or consent of instructor. W

5470 Seminar in Media Economics and Management (3) Economic ownership and finance, role of new technologies and marketing techniques; corporate personnel policy, budgeting and expansion. Prerequisites: 5130 or equivalent. Sp

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) P/NP only. E

6100 Introduction to Doctoral Studies (1) Doctoral degree and dissertation requirements. Committee formation and program planning. Overview of research methods and informational sources. S/N/C only. F

6140 Mass Communication Theory II (3) Application of theory to contemporary mass communication problems. Topical approach; literature reviews and analytical papers. Prerequisites: 5120, 5140, 6100. W

6141 Mass Communication Theory III (3) Continuation of 6140; detailed analysis of selected topics in theory and research. Tutorials, readings, reviews, reports, and papers in fields of interest. Prerequisites: 6140, Sp.

6300 Seminar in Communication Topics (3) Identical; presentation and analysis of special issues and problems in communication. Organization and strategy in writing research proposals. Prerequisites: 5100, 5120, 5140. Recommended prerequisite: 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. Prerequisites: 5120 or consent of instructor.

6310 Experimental Research Methods in Communications (3) Experimental methods applied to communications research problems. Causal inferences from various research designs. Control, single- and multivariate statistical applications. Laboratory and field experiment situations. Prerequisites: 5120 or consent of instructor. W

6320 Seminar in Historical Research Methods in Communications (3) Materials and methods in historical, descriptive, and legal research in communications theory and behavior. Prerequisites: 5100, 5120. Recommended prerequisite: 5130, 6100. Sp

6330 Content Analysis (3) Content analysis as mass media research technique, conceptual foundations. Research design, categorization, sampling procedures, data gathering, and analysis.

Advertising

Professors:

A. D. Fletcher, Ph.D. Illinois; J. B. Haskins, Ph.D. Minnesota; D. G. Hileman, Ph.D. Illinois.

Associate Professors:

J. D. Dunlap, Ed.D. Utah; D. W. Holt, Ph.D. Northwestern; D. Jackson, M.S. Tennessee; R. E. Taylor (Head), Ph.D. Illinois.

Assistant Professor:

M. L. Kern-Foxworth, Ph.D. Wisconsin.

3630 Advertising Copy and Layout (4) Ideas and their translation into persuasive words and pictures. Principles and techniques of copy and layout. Lec-
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: 3600 with grade of "C" or better or consent of instructor. E

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

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 with grade of "C" or better or consent of instructor. F, W, Sp

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

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 creativity, media, management, and research. Extensive individual reading; preparation and delivery of papers. Prereq: Consent of instructor. W

5340 Advertising Management (3) Agency-client relations, media strategy, creative strategy, research, and relationship between advertising and marketing function. Prereq: 4360 and 3630 or consent of instructor. Sp

5510 Advanced Advertising Research (3) Nature, scope, and application of research including measurement of advertising, media audiences, and evaluation of messages. Prereq: 4460 or consent of instructor. W

5970 Independent Study (3) E

Broadcasting

Professors: D. W. Holt (Head), Ph.D. Northwestern; H. H. Howard, Ph.D. Ohio.


Assistant Professors: B. A. Moore, Ph.D. Ohio; R. A. Shifley, M.A. Tennessee.

Communications Specialist: J. H. Carr, M.S. Tennessee.

3360 Television and Radio Advertising (3) Principles of successful radio-television advertising; emphasis on media research, rate structure, program timing, creative use of media. W

3650 Radio-Television Writing (3) Theory and techniques of writing broadcasting scripts except news and dramas. Special events, interviews, musical scripts, radio features, documentaries, and promotion material. F, W

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

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 communication majors. E

4030 Television Production (3) Overview of elements of television production: cameras, sound, lighting, 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 semi-independent course in program origination, producing, directing and performing with orientation to the professional broadcast student. Prereq: 4030 or consent of instructor. Sp

4610 Broadcast News Operation (3) Theory and practice in covering local news and public affairs events for radio and television. Gathering and production of news broadcasts, using broadcast equipment. Prereq: 3610 and 3670 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, Su

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

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

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, such as those wishing to establish their own broadcasting enterprises. Prereq: 4460 or consent of instructor. W

5620 Broadcast Law and Regulations (3) Sociopolitical control of broadcasting; effect of law, regulations, and public pressures upon station policies. Emphasis on unique situation of broadcasting among media in terms of regulation. Prereq: Journalism 4410 or 5210 or consent of instructor. F

5630 Broadcast Documentary Writing (3) Role of documentary in the mass media; selection of topics and practice in writing feature articles for small magazines. Prereq: 2230. E

5560 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; G. A. Everett, Ph.D. Iowa; J. B. Flanagan, Ph.D. Minnesota; R. W. Flynn, Ph.D. Southern Illinois; D. D. Nimmo, Ph.D. Vanderbilt.


Assistant Professors: M. W. Kerin-Fox, Ph.D. Wisconsin; D. L. Smith, M.A. San Francisco State

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

3410 Communications Law (3) Statutory law and judicial precedents affecting mass communications. Legal, ethical, and social policy, invasion of privacy, copyright, broadcasting, advertising and postal regulations. F

3720 Advanced Public Relations (3) Preparation of communications materials to gain support from various publics; planning public relations programs. Prereq: 3710. E

3810 Specialized Publications (3) Editorial and design considerations for company publications and small magazines. Prereq: 2230 and 3310 or consent of instructor. W, Sp

3900 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

4100 Instructional Writing (3) Analysis of editorial policies, practices, pages. Writing of editorials and columns, with emphasis on study and use of rhetorical devices and logic. Sp

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

4316 Reporting Public Affairs (3) Reporting news of public interest, such as government, county, state and local coverage. Prereq: 2230 and senior standing. W, Sp

4410 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. E

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

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

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

4810 Journalism in the High School (3) Functions and methods of high school publications. Staff organization, writing, 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 photography, and picture stories. Prereq: 3910 or consent of instructor. E

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. E

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 formulation and how the press in turn is influenced by public opinion. Prereq: 4410 or consent of instructor. F

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

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.

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

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)
Richard Wisniewski, Dean
C. Glennon Rowell, Associate Dean for Instructional Programs
Thomas W. George, Assistant Dean for Support Services
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, school service personnel, and selected other professionals such as health and recreation personnel at the undergraduate and graduate levels; (2) to collaborate with school personnel, educational agencies, professional groups, and others interested in the evaluation and improvement of educational opportunities, programs, and services; and (3) to promote and conduct research and development in education and other areas of responsibility.

The College of Education holds membership in the American Association of Colleges for Teacher Education. 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 Teacher Education, the Master of Science degree, the Specialist in Education degree, the Doctor of Education, and the Doctor of Philosophy degrees.

MASTERS OF 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.

The Ph.D. program provides five options for study in the departments of Curriculum and Instruction, Educational Administration and Supervision, Educational and Counseling Psychology, Physical Education, and Vocational-Technical Education. The program requirements and the options and emphases are:

The Program

<table>
<thead>
<tr>
<th>Research Area</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign or Computer Language (demonstrate proficiency)</td>
<td>0-9 Hours</td>
</tr>
<tr>
<td>General Core Requirements</td>
<td></td>
</tr>
<tr>
<td>Courses in history of education,</td>
<td></td>
</tr>
<tr>
<td>(two areas must be represented)</td>
<td>Minimum</td>
</tr>
<tr>
<td>Courses in learning theory,</td>
<td></td>
</tr>
<tr>
<td>curriculum theory, and administrative theory</td>
<td>9 Hours</td>
</tr>
<tr>
<td>(three areas must be represented)</td>
<td>Minimum</td>
</tr>
<tr>
<td>Trans-college seminar—four consecutive quarters</td>
<td>4 Hours</td>
</tr>
</tbody>
</table>

Specialization:

Major Option—A minimum of 24 hours normally selected from one or two emphases within the major option

Supporting Emphasis—A minimum of 12 hours selected from an emphasis other than those emphases selected in the major option. (May be selected from any one of the five options but not a combination of options.)

Cognate—A minimum of 9 hours selected from outside the College in addition to the designated research courses.

Dissertation Minimun

Options and Emphases

Option I. Administrative Theory and Practice
The Administration of Higher Education
Contemporary Economics and Educational Finance
Educational Planning
Facility Planning
Maintenance of School Plants
Organizational Theory
Personnel Administration
The Politics of Education
The Principalship
School Law
The Superintendent
Supervision

Option II. Theories of Curriculum Development and Foundations of Education
Anthropological, Historical, Philosophical, and Sociological Bases for Educational Planning and Curriculum
Principles and Models for Planning, Developing, and Evaluating Educational Programs
Research Design for Educational Programs

Option III. Instructional Theory and Practice
Principles and Models for Instructional Improvement
Subject Areas of Instruction and Practice: i.e., English, Foreign Languages, Mathematics, Science, Social Studies, etc.
Elementary and Early Childhood Instruction and Practice
Learning Media Services
Physical Education Instruction and Practice
Adapted Physical Education
Vocational-Technical Fields of Instruction and Practice
Option IV. Theories and Practice of Educational and Personal Adjustment Assessment (Educational, Vocational, Personality)
Behavioral Interventions
Career Development
Cognitive and Motor Learning
Consultation for the Helping Professions
Counseling Psychology
Diagnosis and Remediation of Cognitive and Motor Learning and Behavioral Problems
Educational Measurement and Research
Design
Ethnic and Sex Fairness in Counseling
Group Processes
Human Development
Learning Theory and Application
Psychological Interventions in School and Community Settings
Student Personnel Work
Training and Supervision of Counselors

Option V. Foundations of Human Movement
Factors Influencing the Learning of Motor Skills
Philo'sophical and Sociological Foundations of Sports and Physical Education
Physiological Factors Related to Fitness and Performance

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.

Departments of Instruction
Art and Music Education
C. H. Ball, Head

Art Education

<table>
<thead>
<tr>
<th>DEGREE</th>
<th>MAJOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.S.</td>
<td>Art Education</td>
</tr>
</tbody>
</table>

Professors:
Associate Professor:
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 the baccalaureate degree. The program provides both thesis and non-thesis options. Moreover, it is possible to achieve Tennessee Certification in art while pursuing the Master’s degree program.

The thesis option requires 45 quarter hours as follows:

| Quarter hours | 1. Art Education 5310, 5320, and electives | 18 |
|              | 2. Curriculum and Instruction 5710, 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. Curriculum and Instruction 5800, 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, as the student should plan his or her program carefully with a faculty advisor.

5350-60-70 Problems in Art Teaching (3, 3, 3)
Prereq: Consent of instructor. E

5002 Non-Thesis Graduation Completion (3-15)
Prereq: 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

5000 Thesis (1-15)
P/NP only. E

5150 Studies In Secondary School Music (3)
Prereq: Consent of instructor. F, W, Sp

5441-42-43 Teaching Class Piano (1, 1, 1)
Prereq: Consent of instructor. F, W, Sp


5460 Marching Band Techniques (3) Functions, organization, and direction of a school marching band. Prereq: Consent of instructor. Coreq: 3511. F

5000 Thesis (1-15)
P/NP only. E

5720 Program Development In Art Education (3)
Objectives: organization, content selection, facilities, and equipment; supervision; evaluation; professional growth; leadership; and community relationships; art for special students. Sp

5750-60-70 Problems in Art Education (3, 3, 3)
Prereq: Consent of instructor. E

Music Education

<table>
<thead>
<tr>
<th>DEGREE</th>
<th>MAJOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.S.</td>
<td>Music Education</td>
</tr>
</tbody>
</table>

Professors:

Associate Professors:

Thesis and non-thesis programs lead to the Master of Science degree in music education.

Prerequisite preparation: undergraduate degree or equivalent in music education.

All graduate students in music education must pass proficiency examinations in music theory and applied music.

Requirements for thesis program:

<table>
<thead>
<tr>
<th>Quarter hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Music Education 5210, 5220, and electives</td>
</tr>
<tr>
<td>Music electives</td>
</tr>
<tr>
<td>Professional education courses including Curriculum and Instruction 5710</td>
</tr>
<tr>
<td>Music Education 5000</td>
</tr>
</tbody>
</table>

Total 45

Requirements for non-thesis option:

<table>
<thead>
<tr>
<th>Quarter hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Course requirements</td>
</tr>
<tr>
<td>a. Music Education 5210, 5240, 5250, 5710, one seminar, and electives numbered 5000 and above</td>
</tr>
<tr>
<td>b. Music electives at 3000, 4000, and 5000 levels (not to include required undergraduate curricula courses)</td>
</tr>
<tr>
<td>c. Professional education electives including Curriculum and Instruction 5610, Educational Counseling and Psychology 4760, and Educational Counseling and Psychology 5050, 5320, or other appropriate course</td>
</tr>
</tbody>
</table>

Total 51

2. 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 evaluation procedures 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 musically 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.

3. Student’s Committee: 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)
Prereq: Consent of instructor. F, W, Sp
5840 Seminar (3) Music teaching in vocal, theoretic-
ical, historical, and appreciation area of the secondary
school curriculum. Survey of research, professional
literature and development of bibliography. Labora-
tory activities. Projects. Prereq: Admission to M.S.
program. Su, A

Continuing and Higher Education

MAJOR DEGREE

College of Student Personnel

Adult Education M.S. M.S.

Professors:
M. C. McInnis, Jr. (Head), Ph.D. Florida State;
W. H. Coffield, Ph.D. Iowa; J. P. Goodkin, Ed.D.
Tennessee; K. O. McCullough, Ph.D. Florida State;

Assist. Professor:

The Master of Science degree in Adult
Education is offered for teachers, admin-
istrators, counselors, and community
education specialists. The degree program
has two tracks: 1) a thesis option requiring a
minimum of 45 hours, and a non-thesis option
requiring a minimum of 51 hours. For each
option, 9 hours must be completed in the
behavioral sciences.

The Master of Science degree in College
Student Personnel is designed for individuals
interested in entering the field of student
personnel administration in colleges and
universities and in community or junior
colleges. The program has both a thesis and
non-thesis option. A minimum of 60 hours,
which includes 9 hours of practicum experience, is required in either option.

For further information write the Department
of Continuing and Higher Education.

5454-55-56 Student Leadership Workshops (1, 1,
1) Small group and individualized experiences to
develop knowledge and skills in leadership roles;
for resident assistants, student government leaders,
student activities, other student organizations.
Pre-
req: Consent of instructor. S/NC only.

5000 Thesis (1-15) P/NP only. 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

5060 Adult Education: A General Survey (3) His-
torical development, philosophies of adult educa-
tion agencies, programs, current issues, and literature
of adult education. F, Sp

5110 Seminar in College Teaching (3) Effective
college teaching; testing and measurement; recent
research in college instruction; major problems
and issues in higher education. Required of candidates
for the MACT degree. S/NC only. Sp

5360-70-80 Problems in Continuing and Higher
Education (1-3, 1-3, 1-3) Independent study of prob-
lems and special institutes. S/NC only. E

5410 College and University Law—The Legal En-
vironment (3) Legal precedent affecting organiza-
tion, administration, and financing of higher education:
taxation, private support, religion, tort liability, ad-
ministrative law, academic due process, and affirmative
action in employment. W

5420 College and University Law—Constitutional
Rights and Responsibilities of Students (3) Legal
precedent affecting student personnel services in
public higher education. Student discipline, housing,
organizations, activities, fees, tuition, and related
federal regulations.

5440 American Higher Education (3) Purposes,
functions, organizations, and programs. F, Sp

5450 Instruction in Higher Education (3) Prob-
lems, procedures, and techniques. W

5460 Adult Development (3) Changes in character-
istics of the adult over the life span and implications
for adult education. F

5470 The Curriculum of Undergraduate Higher
Education (3) Background, content, and organiza-
tion of instructional programs, trends and evaluation
procedures, including accreditation activities.

5510 Governance of Colleges and Universities (3)
Development, change, trends, process, and struc-
ture of collegiate governance. W

5550 Fiscal Problems in Higher Education (3)
Revenue sources and fiscal management in public
and private colleges and universities. Sp

5560 Program Planning in Continuing and Higher
Education (3) Theory and method for planning adult
education programs. W

5750 Student Personnel in Higher Education (3)
Philosophy and scope.

5770 Case Studies in College Student Personnel
(3) Prereq: 5750 or consent of instructor.

5860 The Community-Junior College (3) History
and role of two-year college, major functions, organ-
ization and administration, problems, and issues. F,
W, Sp

5955-65-75 Practicum in Continuing and Higher
Education (1-3, 1-3, 1-3) Practicum supervised in
selected areas of instruction or administration of
continuing or higher education programs. S/NC only. E

5960-70-80 Seminar in Continuing and Higher
Education (1-3, 1-3, 1-3) Problems and issues con-
fronting professionals in fields of adult or higher
education. E

5990 Practicum in College Student Personnel (3)
Prereq: 5750, 5770, Educational Psychology 5560,
or consent of instructor. May be repeated with con-
sent of instructor. Maximum 9 hrs.

4590 Advanced Seminar in Program Planning (3)
Concepts and theories related to program planning
in continuing and higher education. Prereq: 5660 or equivalent.

See also course listings under the Departments of Curriculum and Instruction,
Educational Administration and Supervision, and Educational and Counseling Psychology.

Curriculum and Instruction

MAJORS DEGREES

Curriculum and Instruction M.S.
Ed.S., Ed.D.
Elementary Education M.S.
English Education M.S.
Foreign Language Education M.S.
Instructional Media and Technology M.S.
Mathematics Education M.S.
Reading Education M.S.
Science Education M.S.
Social Science Education M.S.

Professors:
J. J. Bellon (Head), Ed.D. California (Berkeley);
R. L. Bristow, Ed.D. Kentucky; C. B. Allison, Ph.D.
Oklahoma; K. J. Blank, Ph.D. Ohio State;
B. L. Brown, Ed.D. Tennessee; W. L. Buttefish,
Ed.D. Texas Tech; M. A. Christiansen, Ph.D.
Kansas; E. S. Chisenstine (Emeritus), Ph.D.
Virginia; A. Veitch, Ph.D. Colorado;
D. J. Deassart, Ph.D. Maryland; E. D. Doak, Ed. D.
Colorado; M. Frandsen, Ph.D. Illinois; R. L. French,
Ph.D. Ohio State; L. O. Haabey (Emeritus), Ed.D.
Colorado; R. Howard, Ph.D. Ohio State;
J. M. Johnson, Ph.D. Chicago;
K. J. Joseph, Ed.D. Oklahoma; L. N. Knight, Ph.D.
Texas; A. Maffia, Ed.D. Columbia; N. Mars, Ph.D.
N. Mavs,
organizing reading classrooms and/or laboratories at
and materials for teaching basic reading skills and
ative social environment. For elementary classroom
grouping, individualization, space utilization, organ-
ficulties grades 1-8. Prereq: 3350 or 3751 or equiva-
Classroom Arithmetic Difficulties (3) Classroom
4150 School Library Administration (3)(Same asLibrary and Information
emphases as listed on page 51.
THE DOCTORAL PROGRAM
For the Master of Science degree, thesis and non-thesis options are available in the following majors: Curriculum, Elementary Education, English Education, Foreign Language Education, Instructional Media and Technology, Mathematics Education, Reading Education, Science Education, and Social Science Education. The non-thesis option requires the completion of 51 quarter hours of course work.

THE SPECIALIST PROGRAM
The Educational Specialist degree program with a major in Curriculum and Instruction encompasses concentrations in the following areas: curriculum, elementary education, English education, foreign language education, instructional media and technology, mathematics education, science education, social science education.

THE DOCTORAL PROGRAM
The Ed.D. program in Curriculum and Instruction may include emphasis upon the following concentrations: educational foundations, educational research, elementary education, English education, foreign language education, mathematics education, science education, social science education. The Doctor of Philosophy degree with a major in Education includes options and emphases as listed on page 51.

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

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

4230 Introduction to Diagnosis and Correction of Classroom Behavior (3) Classroom strategies for diagnosis and correcting arithmetic difficulties, grades 1-8. Prereq: 3350 or 3751 or equiva-

4240 Classroom Instructional Organization (3) Developing understandings and skills relating to grouping, individualization, space utilization, organ-
ized teaching, integration, and achieving an effective social environment. For elementary classroom teacher. Prereq: Senior standing.

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

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

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 pro-
gram; goals; historical settings and current develop-
ments. E

4451 Teaching in Kindergarten: Program De-
velopment (3) Curriculum planning and organiza-
classroom management. Prereq: Consent of in-
structor. E

4654 Methods and Materials in Environmental and Science Education (3) Instructional methods, materials, curriculum programs and current issues in environmental and science education for classroom teachers. May be repeated for credit. Prereq: senior or high school level. Prereq: Admission to Teacher Education.

4750 Utilization of Instructional Media (3) Introdu-
ces the basic communications process, need for
media, selection and utilization of media, and develop-
ment of instructional media programs. (Same as Library and In-
formation Science 4750 and Vocational-Technical Education 4750)

4860 Programmed Learning (3) Theories of learn-
ing as the process of interaction with programmed instruc-
tion.Prereq: Consent of instructor.

4870 Applications of Computers for Instructional Purposes (3) Computer concepts for teachers at all grade levels; computer operation; applications of computers for teaching; and current classroom uses of computers. Prereq: 3303 or consent of instructor.

5000 Thesis (1-15) P/ NP only. E

5020 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student wishes to graduate and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

5040 Studies and Theory in Language Develop-
ment (3) Studies and theory of language develop-
ment. Prereq: Consent of instructor.

5050 Seminar in Intercultural Education (3) Analy-
sis of selected problems: political factors in creation of educational policy; social stratification and its
language arts course or consent of instructor.

5070 Seminar in Intercultural Education (3) Analy-
sis of selected problems: political factors in creation of educational policy; social stratification and its
language education. Prereq: 12 hrs English or related courses or

5090 Special Topics (1-6) Topics to be assigned.

5091 Independent Study (1-6) Topics to be assigned.

5092 Supervised Readings (1-6) Topics to be assigned. May be repeated. May be offered for letter grade or S/NC. E

5100 History of European Education (3) Education in Western Culture. Prereq: 1 course in history and philosophy of education, or western civilization.

5111-12 History of American Education (3, 3) Changing goals and processes in education. Differ-
historical interpretations of role of school and re-
lationship to social structure. 5111-Colonial through common school movements. 5112-Recon-
struction to present.

5120 Principles of Education (3) Philosophic
approach to living and work of influential educators, Froebel, Pestalozzi, Comenius. Prereq: Consent of instructor.

5140 Comparative Philosophies of Education (3) Educational theory and policy proposals of the major philosophies of education. Prereq: Consent of instructor.

5141 Pragmatism in Education (3) Effects of Amer-
ican 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 ex-
tentialism as resource for humanitarian education goals and curriculum.

5150-60-70 Seminar (1-3, 1-3, 1-3) Curriculum, elementary education, secondary education, or so-
cial foundations as they relate to goals of students' programs. Maximum 9 hrs. S/NC only.

5180-90-200 Seminar Educational Specialist Re-
search and Thesis (3, 3, 3) P/ NP only.

5210 Seminar in International Education: Asia and Africa (3) Historical, philosophic, and sociologi-
cal foundations; special reference to Japan, China, India, and Nigeria.

5211 Instructional Strategies in Elementary School Social Studies (3) Specific teaching meth-
ods and instructional strategies for organizing so-
cial studies learnings. Prereq: Undergraduate social studies course or equivalent.

5212 Programs and Materials in Teaching Ele-
mentary School Social Studies (3) Analysis of new and innovative social studies program materials with
attention to methods of diversifying teaching, using materials, and to analyses of program structure. Prereq: 3270 or equivalent or consent of instructor.

5220 Advanced Study and Practice in Diagno-
sis and Remediation of Arithmetic Difficulties (3) Assessment and practicum experience with students having corrective and remedial arithmetic needs. Prereq: 4230 or equivalent. F, Su.

5240 Creative Thinking and Expression in the Elementary School (3) Gives students opportunity to examine development of creative potential across academic curriculum of elementary school. Prereq: Consent of instructor. Sp, Su.


5260 Philosophy of Education (3) Truth, know-
ledge, and valuation in relation to work of schools.
Prereq: 3010. Educational Psychology 2430 or 3810, or equivalents. E.

5261 Educational Classics (3) Selected writings on education from Plato to Dewey.

5270 The Elementary School Curriculum (3) Theoretical background and experimental ap-
plications.

5280 Teaching Language Arts in the Elementary School (3) Recent trends in methods, materials and content. Not available for credit to persons complet-
ing recent elementary language arts methods course. Prereq: 12 hrs English or related courses or consent of instructor.

5281 Teaching Social Studies in the Elementary School (3) Trends in methods, materials and content. Not available for credit to persons completing recent elementary social studies course. Prereq: 12 hrs in social science or consent of instructor.

5282 Teaching Science in the Elementary School (3) Trends in methods, materials and content. Not available for credit to persons completing recent elementary science course. Prereq: 12 hrs in science or consent of instructor.

5283 Programs and Materials in Teaching Elementary Science (3) Analysis of new and in-
novative science program materials; methods of di-
versifying teaching using materials, and analyses of program structure. Prereq: 3720 or equivalent, or consent of instructor.
528 Seminar in Teaching Elementary Science (3) Analysis of current curricular issues. Prereq: 5282 or 5283; at least one year teaching experience; or consent of instructor.

5290 Teaching of Mathematics in the Elementary School (3) Methods and materials. A student who has completed 4280 may not enroll without consent of instructor. Prereq: Consent in reading education or consent of instructor.

5291 Program and Materials in Elementary School Language Arts (3) Programs and special instructional aids associated with language arts. Prereq: 3260 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. Su

5301 Developmental Reading in the Elementary and Middle School (3) Methods and materials, basic approaches, examination of reading skills, development of functional relationship with other curricular areas. Not available for credit to persons with recent course in reading education. Prereq: Consent of instructor.

5302 Psychology of Reading (3) The reading act, relationship between learning theory and reading, role of reading in child's overall intellectual development. Must present graduate 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: Course in reading education or consent of instructor.

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: Course in reading education or consent of instructor.

5305 Trends and Issues in Teaching Reading (3) Differentiation of issues and trends through analysis of past, present, and future programs, materials, and developments. Prereq: Graduate course in reading education 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: Course in reading education or consent of instructor.

5307 Assessment and Corrective Instruction of Classroom Learning (3) Classroom assessment approaches to assessing and correcting language arts (other than reading) difficulties. Prereq: One graduate course or equivalent; elementary school language arts or consent of instructor.

5350 Curriculum Development and Evaluation (3) Examination of alternative approaches to improve current practice. Prereq: 5560 or consent of instructor. E

5360 Curriculum Development at the Local Level (3-9) Systematic approach to planning and development of curriculum at local school or system level. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/NC only.

5365 Mathematics Laboratories in Elementary School (K-9) (3) For elementary school teachers. Students who have completed 4280 may not enroll without consent of instructor. Prereq: Consent of instructor. Sp, Su

5379 Diagnosis and Correction of Classroom Reading Problems (3) Procedures, methodologies and materials. A student who has completed 4280 may not enroll without consent of instructor. Prereq: Course in reading education or consent of instructor.

5380 Practicum in Diagnosis of Reading Problems (3) Theoretical and practical applications of specific reading diagnostic instruments; testing of elementary school and/or secondary school students, preparing case study reports, and conducting parent conferences. Prereq: Course in diagnosis and correction of reading problems or consent of instructor. May be repeated. Maximum 6 hrs.

5381 Practicum in Remediation of Reading Problems (3) Application of principles of learning and teaching methodology in working with elementary and/or secondary school students on one-to-one or small group basis. Prereq: Course in diagnosis and correction of reading problems or consent of instructor. May be repeated. Maximum 6 hrs.

5382 Developmental Reading Practicum (3) Diagnosing and teaching children having developmental and corrective reading needs. Prereq: Course in diagnosis and correction of reading problems or consent of instructor. May be repeated. Maximum 6 hrs.

5400 Problems in Improvement of Instruction (1-3) Special conferences, workshops, and in-service programs. May be repeated. Maximum 9 hrs. S/NC only.

5410 The High School Curriculum (3) Identification of problems associated with curriculum study, emphasis on Tennessee curriculum framework, assessment of trends in programs of local, regional, and national significance. E

5510 Education in Cultural Perspective (3) Contributions of anthropological concepts (or primarily concepts of culture) to understanding of education processes, problems, and issues thought in our society and others. (Same as Anthropology 5510).

5511 Non-Western Education: Anthropological Approaches (3) (Same as Anthropology 5511).

5570 The Junior High and Middle School Curriculum (3) Curriculum designs and appropriate patterns of instruction to middle grade students. Prereq: 5410 or 5270 or consent of instructor. E

5580 Curriculum Planning and Development (3) Introduction to curriculum theory and basic principles. Prereq: 5410 or 5270 or consent of instructor. E

5610 Educational Statistics (3)

5620 Direction and Supervision of Student Teaching (3) Roles and responsibilities of cooperating teachers and student teachers; objectives and policies of student teaching programs; elements of clinical supervision; overview of research.

5630 Individualization of Instruction (3) Practical experience in designing individualized activities and materials. Prereq: 5560 and 5561 or consent of instructor.

5640 Newer Trends in Elementary Education (3) Trends in classroom procedures, equipment, and materials of instruction; problems involving improvement of instruction. W, Su

5650 Curriculum Laboratory for Elementary Schools (3-6) Workshops and in-service programs to improve instruction of teachers. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/NC only.

5670 Curriculum for Early Childhood (K-3) (3) Sp, Su

5680 Parent-Parent-Community Relations (3) Development of techniques for effective relations between parents and teachers, parental visitation, and influence of community on educational process. W

5690 Design of Instructional Media (3) Design and application of instructional development model to arrive at solutions for 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-preserving, syndapping, photocopying, non-phonographing, stereo-phonographing, non-programming, computer-programming, and班级 classroom audiovisual software. Prereq: 5690 or consent of instructor, Library and Information Sci

5710 Techniques of Research in Education (3) Study and application.

5720 Observation and Analysis of Instruction (3) Classroom observation and analysis procedures; development of objective observation and analysis skills. Prereq: 5691, 5692, or consent of instructor.

5760 Career Development: Workshop (1-6) (Same as Educational Psychology 5790).

5800 Seminar in Cooperative Curriculum Research (3) Action research procedures and their application to programs. E

5810 Introduction to Data Processing in Education (3) Analysis of current activities in field of educational data processing. Emphasis on curricular, administrative, and research opportunities in education, using modern electronic data processing methods and machines. Prereq: Consent of instructor.

5820 Seminar in the Teaching of Mathematics (3) Current methods and materials for grades 7-12 for experienced teachers. Prereq: 1 yr teaching experience (mathematics grades 7-12) or consent of instructor. Sp

5825 Teaching Mathematics in the Middle and Junior High Schools (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. Su

5830 Seminar in Mathematics Education (3) Current curricular issues. Emphasis on individual student projects and investigation. W

5835 Teaching Mathematics in the Senior High School and Junior College (3) Curriculum and teaching problems. Methods of teaching "analysis" courses such as Algebra II, Trigonometry, Analytic Geometry and Calculus. Prereq: 3751-52 or equivalent. Su

5841 Trends and Issues in Early Childhood (3) Historical background; trends, and issues as basis for evaluating current programs, materials and techniques of teaching. F, Sp

5842 Applications of Theory in Early Childhood Education (K-3) (3) Principles and practices from several theoretical orientations for young children (K-3). Teaching solutions to instructional evaluation methods. Prereq: Course in child development or child psychology at senior or graduate level.

5850 Seminar in the Teaching of Mathematics (3) Current and future trends in teaching mathematics. Prereq: 1 yr teaching experience (mathematics grades 7-12) or consent of instructor. Sp
Questions and problems in leadership structures, operational beliefs, and communication of ideas with regard to community decisions concerning education. F, Sp, Su

5310 School Administration and Civil Rights Issues (3) A study of school administration and its responsibilities to promote equal educational opportunity. F, Sp, Su

5420 District Level Administration (3) Role of central administrative team, and relationships, behaviors, and competencies to develop an effective school organization. F, Sp, Su

5430 Building Level Administration (3) For beginning school principals and administrators, and for those operating in rural elementary, secondary, 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 effects daily building level operations; building level methods of fiscal and logistical support measures. Sp, 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. Sp, Su

5460 Personnel Administration: Local School (3) Planning personnel needs; job analysis; recruitment; selection; placement; orientation of new staff; fair employment practices and contractual administration for both professional and supporting staff. Sp, Su

5470 Introduction to School Facility Planning (3) For school administrators; facility planning; skills in building planning, use and evaluation. Sp, Su

5480 Instructional Supervision—Local School (3) Developing a concept of supervision; instructional help, support, and service for teachers; supervision of curriculum; staff development; and staff evaluation. F, 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. W


5560 Research for Educational Administrators (3) Descriptive, experimental, and quasi-experimen-tal design with emphasis on a critical evaluation of sources to build understanding of literature. Primarily for nonthesis option students. Should be taken early in M.S. or Ed.S. program. W

5580 Seminar in Communication Skills for Edu-cational Administrators (3) Identification, development and use of interpersonal and group related communication skills. Sp, Su

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

5751 Problems in Educational Administration and Supervision: Theory (3) May be repeated. E

5752 Problems in Educational Administration and Supervision: Finance (3) May be repeated. E

5753 Problems in Educational Administration and Supervision: Transportation (3) May be repeated. E

5754 Problems in Educational Administration and Supervision: Business Management (3) May be repeated. E

5759 Problems in Educational Administration and Supervision: Personnel (3) May be repeated. E

5756 Problems in Educational Administration and Supervision: School Plant (3) May be repeated. E

5775 Problems in Educational Administration and Supervision: Organization and Structure (3) May be repeated. E

5778 Problems in Educational Administration and Supervision: School Law (3) May be repeated. E

5779 Problems in Educational Administration and Supervision: Supervision (3) May be repeated. E

5780 Problems in Educational Administration and Supervision: Supervision (3) May be repeated. E

5781 Problems in Educational Administration and Supervision: Supervision (3) May be repeated. E

5780-59-70 Independent Study in Educational Administration (3, 3, 3) Prereq: Consent of instruc-tor. E

5900 Special Topics (3) May be repeated. E

5910-20-30 Problems in Lieu of Thesis (3, 3, 3) S/NC only, E

5950 Elementary Administrators Seminar (3) For in-service training of elementary school administra-tors. Developments, problems, programs, and trends of elementary schools and management skills of elementary school administrators. Prereq: Presently an elementary school administrator or consent of instruc-tor. May be repeated. S/NC only, F

5960 Middle School Administrators Seminar (3) For in-service training of middle school administra-tors. Developments, problems, programs, and trends of middle schools and management skills of middle school administrators. Prereq: Presently a middle school administrator or consent of instructor. May be repeated. S/NC only, F

6000 Doctoral Research and Dissertation (3-15) P/NP only, E

6040 Seminar in Educational Administration and Supervision (1) Required three consecutive quar ters. S/NC only, E

6100 Internship in Educational Administration (3) May be repeated at discretion of student's commit tee. Opportunity for doctoral students and advanced graduate students to gain experience in performance of critical tasks of educational administration under supervision of practitioner and University repre-sentative. E

6110 Administrator Update (3) Current topics of concern to practicing school administrators, selected each quarter and presented by specialist. Prereq: Presently a school supervisor or administrator, or consent of instructor. May be repeated. S/NC only, E

6190 Administration in Higher Education (3) De veloping conceptual understanding of administrative theory and practice in higher education. F, Su
6984 Specialized Seminar: Preparation Programs (3) E

6976 Specialized Seminar: Supervision (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 disciplines; implications for further research; application of existing theory and research to known educational settings. Prerequisite: Consent of instructor. A

6996 Specialized Seminar: School Plant (3) Theory and practice in planning and operating educational facilities; related research in education and other disciplines; implications for further research; application of existing theory and research to known educational settings. Prerequisite: Consent of instructor. A

6997 Specialized Seminar in Organization and Structure (3) Organizational theories in education including systematic review of status of organizational and leadership research in education and related disciplines; implications for further research; application of existing theory and research to known educational settings. Prerequisite: Consent of instructor. A

6998 Specialized Seminar: School Law (3) E

Educational and Counseling Psychology

MAJORS DEGREES
Guidance M.S.
Educational Psychology M.S., Ed.D
Educational Psychology and Guidance Ed.S.
Education Ph.D.

Professors:

Associate Professors:

Assistant Professors:

Graduate programs (thesis or non-thesis option) lead to the Master of Science degree with a major in Educational Psychology with concentration areas in educational psychology, school psychology, and in community agency counseling; the M.S. degree in Guidance has concentrations in elementary or secondary guidance; the Specialist in Education and the Doctor of Education degrees have concentrations in educational psychology, school psychology, counselor education. Professional emphases

within the above programs are offered in applied behavioral analysis, educational measurement and research, career development, human development, learning-teaching instructional theory and application, personality assessment, and sex-fair counseling and teaching.

The Doctor of Philosophy degree with a major in Education includes options and emphases as listed on page 51. Appropriate courses taken in this department will satisfy requirements for certification as a school psychologist.

Write the department for information concerning the program requirements. Application deadlines to Ed.D., Ph.D. are February 14 and April 11; Ed.S. and M.S. deadlines are October 15, February 14, April 1, and July 15.

4110 Psychology of Sex Role Development (3) 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, Su, Su

4130 Mental Health (3) 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. F, Sp, Su

4320 Self-Management for Personal and Professional Development (3) Applications in career, social, emotional, and physical development. Theoretical and experiential activities. Prerequisite: Introductory course in psychology or consent of instructor. Letter grade only. F, W, Su

4350-60-70 Special Topics and Problems (1-6, 1-6, 1-6) May be repeated. S/N or letter grade.

4440 General Evaluation Procedures for Public Schools (3) Prerequisite: 3430 or equivalent. A

4620 Standardized Test (3) Use and interpretation of standardized group instruments in assessment of intelligence, aptitude, achievement, vocational interests, and personality adjustment. F, W, Su

4650 The Construction of Classroom Tests (3) Concerned with teacher-made classroom tests; instructional objectives, principles of test construction, item analysis, evaluating a test's reliability and validity, interpretation of test scores, relationship between testing and grading. W, Su

4760 Advanced Child Study (3) Prerequisite: 3430 or 3610 or consent of instructor. F, Su

4800 Psychology of the Dis advantaged Child (3) Significant behavioral differences and causes; appropriate intervention approaches. E

4810 Psychoeducational Aspects of Appalachian People (3) Exploration of psychology of people of Appalachian region through examination of history, culture, and role of education. Sp


4899 Differential Psychology (3) Nature and sources of individual differences in behavioral characteristics, and differences between racial, ethnic, socioeconomic, sex, and other groups. A

5000 Thesis (1-15) P/NP only. 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

5040 Guidance and Fifel Personnel Services in Education (3) (Same as Vocational-Technical Education 5040). F, Su
5050 Children and Adolescents (3) Mental, social, physical, and emotional growth and development of learning of children and adolescents; prevention, identification, and remediation of learning problems. W, Su

5060 Group Approaches with Students (3) Knowledge and techniques appropriate to working with groups in counseling; psychological and parent education. F, W, Su

5070 Seminar in Elementary School Guidance (3) Trends, roles, functions, 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 to field work must be met. May be repeated. Maximum 6 hrs. S/NC only.

5100 Developmental Psychology (3) (Same as Psychology 5100) F, W

5101 Advanced Psychology of Adolescence (3) Theory and research on principles and problems of adolescent development; application to individual adolescents. Prereq: 3810 or equivalent. A

5110 Psychology of Women (3) Past and current educational and psychological theory and practice with special attention to assessment, development, and research in regard to women: social context 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. W

5111 Seminar in Current Issues in School Psychology (3) (Same as Psychology 5111) S/NC only.

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.

5140-50-60 Psychoeducational Assessment (3, 3, 3) (Same as Psychology 5140-50-60) W, Sp, Su

5149-59-69 Practicum in School Psychology I (2, 2, 2) (Same as Psychology 5149-59-69) S/NC only. W, Sp, Su

5180-90-200 Educational Specialist Research and Thesis (3, 3, 3) P/NC only. 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 (3) For students not conducting research projects; interpret and evaluate statistical tables and statistical tests as reported in journals. Prereq: 5210 or consent of instructor. W, Sp, Su

5310 Diagnostic and Corrective Teaching (3) Application of psychology of learning to instruction and problem-solving situations that students encounter in classroom. Prereq: Course in general psychology. May be taken for undergraduate credit by undergraduates admitted to teacher education or consent of instructor. F, Su

5319 Field Work in School Psychology: Level I (2) (Same as Psychology 5319) S/NC only.

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 learning theory; current research and its influence upon school practice. F, Sp, Su

5331 Current Developments in Human Learning (3) Su

5340 Group Dynamics (3) Principles of group dynamics as they apply to a variety of group settings. Group counseling, personal growth, and group leadership skills. (Same as Psychology 5340) E

5350 Educational Applications of Cognitive Theories (3) Developmental theory of Jean Piaget and implications for education: Related theories such as Bruner and Ausubel. A

5360 Parent Consultation (3) Theory and practice of parent consultation on problems of school and home. Prereq: 5310, or 5320, or consent of instructor.

5560 The College Student (3) Nature, characteristics, and needs: W

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. A

5780 Career Development: Theory and Research (3) F, Su

5785 Career Development: Program Development and Implementation and Evaluation (3) Career development and preplanning programs and projects. K-adult with emphasis on development, implementation, design, and evaluation of career development. May be repeated. Maximum 6 hrs. (Same as Curriculum and Instruction 5780 and Special Education 5790.)

5800 Career Development: Workshop (1-6) Designed for in-service training of school personnel. Development of work plan and training program related to career development. May be repeated. Maximum 6 hrs. (Same as Curriculum and Instruction 5790 and Special Education 5790.)

5840 Student Appraisal (3) Gathering, interpreting, and using assessment, interest, aptitude, and achievement programs and individual counseling. Prereq: Education at Psychology or Psychology 5840 or equivalent in standardized testing. (Same as Psychology 5840.) Sp

5850-60-70 Special Topics and Problems (1-6, 1-6, 1-6) May be repeated. May be taken for letter grade or S/NC. E

5860 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 filing plans. For use both in group and individual guidance programs. W, Su

5885 Career Development: Field Experience (1-3) Application of career development principles and practices in school, community, business, and/or industry. May be taken concurrently or separately. Prereq: 5790, 5860, or consent of instructor. May be repeated. Maximum 6 hrs. E

5890 Counseling Theories and Techniques (3) Presentation, demonstration, and application. Open to students interested in counseling. (Same as Psychology 5890.) F, W, Su

5897 Prepracticum (3) Didactic experiences and counseling simulations in learning laboratory. Coreq: 5890. F, W, Su

5910-20-30 Problems in Lieu of Thesis (3, 3, 3) S/NC only.

5940 Counseling Practicum (3) Supervised practicum in counseling in elementary or secondary school guidance and/or student personnel work. Prereq: 4640, 5060 (or 5340), 5890, or consent of instructor. May be repeated with consent of department. Maximum 6 hrs E

5950-60-70 Theory and Practice of Consultation (3, 3) (Same as Psychology 5950-60.)

5959-5969 Practicum in Consultation (2, 2) (Same as Psychology 5959-69.) S/NC only.

5970 Vocational Assessment (3) Use and interpretation of tests in vocational assessment. Prereq: 4640 or Psychology 4640, and 5780, or consent of instructor. F

5975 Organizational and Administration of Personnel Programs (3) Basic principles, procedures, and policies. Prereq: 4640, 5040 or 5210, or consent of instructor. W

6000 Doctoral Research and Dissertation (3-15) P/NC only. E

6040 Seminar (1) Required in fall quarter. Maximum 5 hrs. P/NC only. F

6099 Internship (1-6) Supervised employment at departmentally approved internship sites. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. S/NC only. E

8110 Application of Research Design (3) Research design and statistical analysis unique to educational psychology, counseling, and college student personnel. Emphasis on designs "experimental in nature" Prereq: 2 courses in statistics or consent of instructor. F

6120 Application of Experimental Research Design (3) Experimental designs used by researchers in educational psychology, counseling, and college student personnel. Prereq: 6110 or equivalent. W

6319 Field Work in School Psychology: Level II (2) (Same as Psychology 6319) S/NC only.

6510 Ethical and Professional Issues in Psychology (3) Professional, ethical, and legal issues related to research, human services, teaching and public policy. Prereq: Admission to Psychology doctoral program or consent of instructor. (Same as Psychology 6510.) Sp

6550-60-70 Seminar in College Student Personnel (2, 2) Issues in college student personnel. Prereq: Consent of instructor. F, W, Su

6580 Field Work in School Psychology: Level III (2) (Same as Psychology 6580.) S/NC only.

6610-20-30 Seminar in Dissertation Proposal Writing (2, 2, 2) Preparation and evaluation of dissertation proposals. Prereq: Two consecutive statistics courses or consent of instructor. F, W, Sp

6750-60-70 Special Topics and Problems (1-6, 1-6, 1-6) Not to be taken to fulfill regular 6000-level course requirements. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. May be taken for letter grade or S/NC. E

6810 Seminar in Counseling (3) Selected counseling theory, topics, issues. Prereq: 5890 or consent of instructor. May be repeated. F, W, Sp

6840-50-60 Seminar in Professional Issues (1, 1, 1) Job selection, convention participation, publishing, writing grant proposals, consulting, etc. For final year doctoral students only. S/NC only. F, W, Sp

6910 Special Topics Seminar (3) Exploration of specific research or theoretical topics with students who have necessary background. Topic varies from quarter to quarter, depending upon instructor. Prereq: Advanced standing as doctoral student. May be repeated. S/NC only. W, Sp

6931-32-33 Practicum in Counseling Psychology (3, 3, 3) Supervised practicum with children and/or adults. Prereq: 5340, 5890, 5987, and 5940 and consent of instructor. May be repeated with consent of department. Maximum 6 hrs. W

6941-42-43 Practicum in Guidance, Counseling, and Personnel (3, 3, 3) Supervised practice in application of guidance tools and techniques. Minimum: 90 clock hours each quarter. Prereq: 5890 and consent of instructor. E

6950 Counseling Supervision (3) May be repeated with consent of advisor. Prereq: 5890, 5940, 6810, 6941. S/NC only. E
Special Education and Rehabilitation

MAJORS

Special Education

Vocational Rehabilitation Counseling

DEGREES

M.S.

V.S.

Professors:


Associate Professors:


Assistant Professors:

S. M. Benner, Ed.D. Columbus; K. H. Kopp, Ph.D. George Peabody; W. Mulkey, Ph.D. Florida State.

Instructors:

M. Griffith, M.S. Tennessee; D. D. McCampbell, M.S. Tennessee; N. E. Tedder, M.S. Minnesota; O. D. Tyler, M.S. Tennessee; K. M. Warden, M.D. Tennessee.

Lecturers:

Z. H. Brody, M.A. Tennessee; H. L. Byrd, Jr., M.S. Tennessee; J. E. Reece, B.S. Memphis State.

The Department of Special Education and Rehabilitation provides competency-based programs and experiences to prepare regular special education, and rehabilitation personnel to work with exceptional persons: children and adults who are handicapped. Specialized courses may be distributed over the several areas of exceptionality with emphasis in an area of special needs or need. Facilities are available for continuous observation and participation in direct relationships with handicapped children and adults who are hospitalized, homebound, or in residential schools, special classes, or regular classes. Course sequences may be planned in specialized areas to include (1) hearing impaired; (2) gifted; (3) learning disabilities; (4) mentally retarded; (5) multiple disabilities; (6) social or emotionally maladjusted; (7) rehabilitation counseling; (8) mediation; (9) general special education and rehabilitation. Programs lead to the master of Science degree in Special Education with an emphasis in one of the specialized areas.

Under the sponsorship of the Office of Special Education and Rehabilitative Services (S.R.A.), a specialized institute for the preparation of professionals to adapt their skills to special service to hearing impaired and deaf people is provided. For further information write the department head.

EDUCATION OF THE HEARING IMPAIRED


4210 Language Development of Hearing Impaired (3) Systems by which formal language is presented. Prereq: Admission to Teacher Education. (Same as Audiology and Speech Pathology 4210.) F, Su.

4220 Language Development of Hearing Impaired (3) Techniques; various systems by which formal language is presented. Prereq: 4210 or consent of instructor, admission to Teacher Education. (Same as Audiology and Speech Pathology 4220.) W, Su.

4230 Communication Processes for the Hearing Impaired (3) Various communicative skills required by 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. E.

4231 Communication Processes for Hearing Impaired (3) Intermediate course in manual communication 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; anatomy and physiology of hearing; nature of hearing loss; blocking, masking, and instrumentation for assessment of hearing level; interpretation of audiograms; selection and use of hearing aids; relation of audiological services to medical and other rehabilitation disciplines. Observations and practicum. F, Sp.

4250 Introduction to the Psychology and Educa- tion of the Hearing Impaired (3) For those planning to enter field of teaching deaf and hard-of-hearing. Review of history of education of deaf. Research 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.


4290 The Teaching of Reading to Hearing Impaired Children (3) Reading techniques, methods, and experimental approaches for hearing impaired children. Prereq: Admission to Teacher Education. W, Su.


5230 Linguistics in the Education of the Hearing Impaired (3) Recent research and developments in linguistics related to hearing impaired, F, Su.

5240 Seminar in Language Remediation for the Hearing Impaired (3) Current and recent developments in educational methodologies and to research pertaining to teaching language to hearing impaired. 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.

5260 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. Su.

5310-29-30 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; W, Su; Sp.

5490 Educational and Vocational Guidance of the Deaf and the Hard of Hearing (3) Techniques for diagnosis and guidance; social and personality adjustment; occupational opportunities. F, Sp.


EDUCATION OF THE MENTALLY RETARDED

4110 The Nature and Concept of Mental Retarda-tion (3) Identification, description, and study. E.

4120 Education of the Mentally Retarded Child (3) Philosophy and rationale underlying teaching and guidance of mentally retarded; methods and materials in special and regular classes. Prereq: 4110, Admission to Teacher Education. E.

4440 High School Program for the Mentally Retarded (3) Trends, issues and research relating to core and work study programs. Prereq: Admission to Teacher Education.


4922 Student Teaching of the Educable Mentally Retarded (3) Observation and supervised practi-cum. S/NC only. E.

5111 Psychology of Mental Retardation (3) Intellectual functioning, psychological theories and learning interrelations and theoretical and educational im-plications emphasized. Prereq: 4110. F, Su.

5112 Psychology of the Severely Mentally Retarded (3) Program and curriculum development for training/education of severely retarded in public schools, institutions and privately operated schools and workshops. Su.


MULTIPLE DISABILITIES

4130 Education of the Brain-Injured Child (3) Nature of brain-injured child; skills for indentifying educa-tional, physical, and emotional characteristics; special educational techniques. Prereq: Admission to Teacher Education.

4150 Education of Children with Crippling and Special Health Conditions (3) Medical and educa-tional characteristics; appropriate educational mod-ifications and associated services. Prereq or coreq 3333 or consent of instructor, admission to Teacher Education.

4840 Educational Problems of the Cerebral Palsied Child at Home and School (3) Physical, social, and educational needs of cerebral palsied; evalua-tive techniques; related services. A.

4921 Student Teaching in Crippling and Special Health Conditions (3-15) Observation and super vised practicum in home, hospital, and classroom. S/NC only. E.

EDUCATION OF THE EMOTIONALLY DISTURBED

4610 Nature and Characteristics of Learning Disabilities (3) Forms of academic and socially disturbing behavior, degrees of severity, possible causes, and relationships to each other. Relationships with respect to personality character-istics 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, and techniques; development of emotional and behavior problems, including destructive behavior. Prereq: 4610.

4630 Practicum in Residential Settings Serving Children with Disturbing Behavior (3) Practice in scientifically identifying, observing, and recording disturbing behaviors; initiation of behavior changes regarding academic and social behaviors. To perform in a capacity within a residential classroom; and to take part in discussion and evaluation of relevant academic curriculum and reinforcement schedules. Prereq: 4610 and 4620 or consent of instructor.

4640 Practicum in Public School Systems Serving Children with Learning and Behavior Problems (6) Academic tutoring in a teacher/aide capacity within regular classrooms. Particular emphasis and practice in instruction for learning-disabled and behavior problem children within the regular classroom setting. Discussion and evaluation of relevant methods and materials unique to each teaching situation. Prereq: 4610 and 4620 or consent of instructor.

4924 Student Teaching of the Emotionally Disturbed Child (3-9) Tutoring and classroom observation and teaching of the emotionally disturbed individual. Prereq or coreq: Curriculum and Instruction 4720 or 4820.

REHABILITATION COUNSELOR EDUCATION

5100 Orientation to Rehabilitation (3) History, philosophy, and legal bases for rehabilitation movement; case finding, intake, diagnosis, physical restoration, counseling, training, placement, follow-up; relation to programs of allied agencies, rehabilitation teams; facilities and programs in hospitals, institutions, community agencies, and service groups. Attention to specialization in disability categories such as mentally ill, mentally retarded, and blind.

5115 Caseload Management in Rehabilitation (3) Techniques and procedures involved in management of caseloads in state rehabilitation agencies and public practice in rehabilitation facilities; analysis of appropriate industrial management models related to rehabilitation programs; and simulated experience in work planning, decision making, and case selection.

5120 Psychosocial Aspects of Disability (3) Medical aspects and psychological impact of major disabilities; rehabilitation processes including implementation; evaluation.

5121 Job Development and Placement in Rehabilitation (3) Identifying work for handicapped persons; utilization of occupational resource materials and techniques including field experiences for analyzing jobs, procedures necessary for helping a handicapped individual successfully adjust to a work environment and assessment of future trends within labor market.

5130-40 Seminar in Rehabilitation (3, 3) Diagnostic Vocational Evaluation in Rehabilitation (3) Process, principles, and techniques used to diagnose vocational assets and liabilities of handicapped individual including furnishing of biographical data and use of evaluation interview.

5142 Diagnostic Vocational Evaluation in Rehabilitation (3) Process, principles, and techniques used to determine and predict work behavior and vocational potential. Includes rationale underlying selection and use of occupational evaluation programs, work samples, situational tasks, simulated work experiences, and job tryouts in vocational evaluation. Prereq: 5141.

5143 Interpretation of Vocational Evaluation Data in Rehabilitation (3) Procedures, principles, and techniques for interpretation of vocational evaluation data to handicapped adults, to referral agency, and to facility staff. Interpretation of data through the facilitation of staff conference, vocational counseling report writing, and follow-up. Prereq: 5141 and 5142.

5144 Development and Supervision of Client Evaluation Programs (3) Procedures involved in establishing, operating, and maintaining vocational evaluation programs. Determining and planning amount of floor space, type of equipment, type and number of personnel, communication equipment and essential to maintenance of vocational evaluation programs. Effective supervisory, referral, recording, budgeting, and staff development practices. Prereq: 5141, 5142 and 5143, or consent of instructor.

5145-46-47 Practicum in Rehabilitation (3, 3, 3) Supervised experience in area of rehabilitation with emphasis on application of concepts, principles, and skills acquired in previous or concurrent coursework. Prereq: Consent of instructor. W, Sp, Su.

5150-60 Internship in Rehabilitation (9, 9) Systematic Human Relations Training (3) Active listening, observing verbal and nonverbal behavior, establishing and communicating with handicapped individuals.

5150 Approaches to Rehabilitation Counseling (3) Approaches and techniques in individual and group counseling with handicapped adults to further develop self-awareness and self-esteem; applying techniques and utilization of alternative modes of counseling procedures in rehabilitation. Prereq: 5170 or consent of instructor.

5170 Disability Evaluation Education (3) Evaluation and Mobilization of Community Resources (3) Issues, processes, and programs relating to community resources and service integration with rehabilitation facilities and agencies. Assessment utilization and mobilization of community resources to facilitate development of innovative service programs for handicapped. W.

5170 Medical Aspects of Disability (3) Medical signs, symptoms and diagnostic procedures related to musculoskeletal, neurological, circulatory, and respiratory diseases/disorders. 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 rehabilitation services. W.

5172 Medical Aspects of Disability (3) Medical signs, symptoms and diagnostic procedures related to neoplastic, skin, digestive, genito-urinary, endocrine, mental, visual, hearing, and speech disorders. 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 rehabilitation services. Sp.

5173 Vocational Assessment in Disability Evaluation (3) Vocational assessment; resource materials; criteria for vocational assessment of disability insurance claims under Social Security; on-site job analysis and case file vocational assessment experience. Prereq: Admission to program in disability evaluation or consent of instructor. Sp.

5174 Disability and Work in Society (3) Relationship of work to physical, social, psychological, and economic development of disabled individual. Process and techniques of vocational evaluation, work adjustment services in rehabilitation. F.

5175 Principles and Problems of Disability Evaluation (3) Individual identification and analysis of principles and problems of disability evaluation process or structures; emphasis on problems of disability evaluation process or structures, and innovation, exploration of alternatives, and sharing experience within group. Prereq: 5700 or consent of instructor. W.

5176 Seminar: Functional Capacity Assessment (3) Criteria for residual functional capacity assessment in disability insurance claims evaluation; problems in achievement or acquisition of residual functional capacity assessments. Prereq: 5710-20 or consent of instructor.

5177 Current Problems in Disability Claims Evaluation (1-3) Current problems in process, content, or administration of disability claims evaluation; workshops in identification and proposal of alternative procedures, and evaluation or consent of instructor. S/NC only. A

SCHOOL SPEECH AND HEARING THERAPY

4030 Professional Aspects of Speech Language/Hearing Programs in Schools (3) Organization and administration of school programs. Other settings: hospitals, institutions, private practice, professional certification levels, legislation, careers.

4040 Appraisal of Speech and Language Disorders (4) (Same as Audiology and Speech Pathology 4040.)

4310 Stuttering (3) (Same as Audiology and Speech Pathology 4310.)

4320 Introduction to Clinical Practice in Speech Pathology (3) (Same as Audiology and Speech Pathology 4320.) S/NC only.

4330 Clinical Practice in Speech Pathology (1-6) (Same as Audiology and Speech Pathology 4330.) S/NC only.

4340 Clinical Practice in Speech Pathology (1-6) (Same as Audiology and Speech Pathology 4340.) S/NC only.

4341 Clinical Practice in Communication Disorders in Schools (3) (Same as Audiology and Speech Pathology 4341.) S/NC only.


4400 Voice Disorders (4) (Same as Audiology and Speech Pathology 4400.)

4720 Audiology I (4) (Same as Audiology and Speech Pathology 4720.)

4930 Aural Rehabilitation: Speechreading and Auditory Training (3) (Same as Audiology and Speech Pathology 4930.)

4940 Introduction to the Verbo-Tonal System (4) (Same as Audiology and Speech Pathology 4940.)

5040 Advanced Clinical Practice in Audiology Study and Practice (1-4) (Same as Audiology and Speech Pathology 5040.)

5380 Cerebral Palsy (3) (Same as Audiology and Speech Pathology 5380.)

5390 Cleft Palate (3) (Same as Audiology and Speech Pathology 5390.)

5540 Seminar in Language Pathology (3) (Same as Audiology and Speech Pathology 5540.)

EDUCATION OF THE VISUALLY HANDICAPPED

4160 Education of Partially Sighted Children (3) Curricular adjustments and materials; home visits for parents' cooperation in medical care and special needs.

4850 Eye Problems Encountered by the Teacher (3) Eye anatomy and hygiene; common diseases and defects; testing and treatment; educational adjustments for specific eye conditions; related services resources.

GENERAL COURSES

3333 Education of the Exceptional Child (3) Principles, characteristics, and special needs; local and state programs for diagnosis and care; educational provision in regular and special classes; home teaching; social and vocational guidance.

4350-60-70 Problems in the Education of Exceptional Children (3, 3, 3) Prereq: Consent of instructor.

4520 Language-Speech Handicapped Child in the Classroom (3) Recognition, diagnosis, observation of communication disorders; information on referral procedures, agencies, legislation; incorporation of speech improvement-language development activities into regular curriculum. For students not majoring in speech pathology or audiology.
5830 Seminar: Issues and Theories in the Education of the Exceptional Child (3) Current trends in education of exceptional child, application of philosophical approaches to education, analysis of current theories of integration as applied to exceptional child. Current research concerning education and/or rehabilitation of exceptional persons. Prereq: Curriculum and Instruction 5800 or Educational Psychology 5210 and consent of instructor. A

5910-20-30 Problems in Lieu of Thesis (3, 3, 3) E S/NC only. The MAC is available in the business education area.

THE SPECIALIST PROGRAM
The Ed.S. degree program is a cooperative undertaking involving all vocational service areas. Options are available in agricultural, business, distributive, home economics, 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. The Vocational-Technical Education doctoral curriculum consists of the following: professional education core, 9 hours; service area, 18 hours; vocational-technical education, 18-27 hours; cognate fields, 9-18 hours; research techniques, 15 hours (consult advisor for details); and dissertation, 36 hours. A minimum of 120 hours above the baccalaureate is required.

The Doctor of Philosophy degree with a major in Education includes options and emphases as listed on page 51.

General
4010 Development and Utilization of Advisory Committees (3) Craft advisory committees, selection, organization, implementation, and utilization.
4750 Utilization of Instructional Media (3) (Same as Curriculum and Instruction 4750 and Library and Information Science 4750.)
5000 Thesis (1-15) P/NP only. E
5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise required during any semester 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
5005 Problems in Lieu of Thesis (3) May be repeated. S/NC only.
5100 History and Organization of Vocational-Technical Education (3) Vocational and technical education in public schools through analysis of social forces, legislation, and organization models.
5200 Placement, Follow-up and Evaluation Procedures in Occupational Education (3) Methods and procedures in establishing placement programs, curriculum revision.
5300 Organization and Operation of Area Vocational-Technical Schools (3) Area vocational-technical school concept; administration and supervision of vocational and technical education programs in area schools.
5404 Guidance and Pupil Personnel Services in Education (3) (Same as Educational Psychology 5404.)
5500 Supervision of Vocational-Technical Education (3) Program planning, coordination, instruction, roles and functions of supervisors.
Agricultural Education
4230-31-32 Problems in Agribusiness Education (1-6, 1-6, 1-6) May be repeated. Maximum 9 hrs.
4240-41-42 Seminar in Agricultural Education (1, 1) Prereq: 4350 or consent of department head.
5210 Supervision of Student Teaching In Agricultural Education (3)
5220 Teaching Agricultural Mechanization in Vocational Agriculture (3) Prereq: 4350.
5230-31-32 Special Problems in Agricultural Education (3, 3, 3) May be repeated. Maximum 18 hrs.
5240 Current Literature in Agricultural Education (1-3) May be repeated. Maximum 6 hrs.
5250-51 Agricultural Education In Off-Farm Agricultural Occupations (3, 3) Developing occupational experience programs; course planning, teaching procedures. Prereq: 4350.
5260 Agricultural Education for First-Year Teachers (3) Adjustment to situation in which employed; group meetings in selected centers, and visits by instructor. Prereq: 4350.
5270 Adult Education in Agriculture (3)
5290 Supervised Occupational Experience in Agricultural Education (3) Prereq: 4350.

Business Education
5305 Methods and Materials for VOE Programs (3) Development of instructional aids, recent developments and research, individualized instruction, developmental clusters.
5306 Organization and Management of VOE Programs (3) Developing office occupations, guidelines in cooperatives, laboratory, and model office programs. Physical facilities, instructional aids, related instructional activities (clubs), enrollment, instructor and advisory committees.
5307 Measurement in Business Education (3) Evaluative methods and tools for all courses in business education and related areas of study in secondary and postsecondary business education.
5309 Evaluation of Research in Business Education (3) Prereq: Curriculum and instruction 5610 or equivalent.
5310 Graduate Seminar in Business Education (3) Review of techniques for research and preparation of proposal for thesis or problem/project.
5311-12 Special Topics in Business Education (1, 1)
5313-14-15 Practicum in Business Education (2, 2, 2)
5320 Improvement of instruction in Basic Business Courses (3) Issues, research findings, methods, and materials for improved instruction at both secondary and postsecondary levels.
5330 Improvement of Instruction in Typewriting and Clerical Programs (3) Research, principles of learning, issues and materials.
5340 Improvement of Instruction in Shorthand/Secretarial Subjects (3) Principles of learning, issues, research findings, and materials on secretarial subjects.
5350 Improvement of Instruction in Accounting and Data Processing Programs (3)
5360 Improvement of Instruction in Business Communications and Word Processing Programs (3) Basics and strategies for teaching written communications. Word processing and oral communications.

Home Economics Education
5390 Problems in Business Education (1-9) Variable topics. May be repeated. Maximum 9 hrs.
5400 Supervised Experience in Business Education (3, 3, 3)
5430-40-50 Advanced Studies in Business Education (3, 3, 3)
5460 Higher Education for Business (3)

Distributive Education
4440 Supervised Distributive Experience (3) Minimum 200 hours experience for each 3 credit hours in approved distributive business; concurrent analytical project. May be repeated. Maximum 9 hrs.
4450 Areas of Distribution (3) Marketing, product or service technology, social skills, basic skills, and distribution as they affect distributive education curriculum in secondary and postsecondary programs.
4460 Organization and Operation of Distributive Education Programs (3) Background and development needs, federal and state legislation; curriculum implications; establishing, evaluating, reporting, and improving programs.
4470 Methods and Materials in Distributive Education (3) Prereq: 4460 or consent of instructor.
4480 Coordination Techniques in Distributive Education (3) Selecting training agencies; job analysis; selecting and briefing training supervisors; advising committees; adult and community services. Prereq: 4460, 4470.
4510 Administration and Supervision of Distributive Education (3) Operation of distributive education program and work of city or county supervisor. Understanding and appreciating problems from high school principal's and department head's point of view. Trends in distributive education: community surveys, state plans, teacher-coordinator qualifications, changing curriculum.
5416-26-36 Problems in Distributive Education: Retailing (3, 3, 3)
5420 Organizing and Teaching Adult Distributive Education (3) Prereq: Organizing, promoting, teaching, and evaluating continuing education programs in distributive education; utilizing trade associations, employer agencies, business groups, and advisory committees in implementation.
5430-31-32 Special Problems in Distributive Education (3, 3, 3) Individual research, conferences, and/or workshops in teaching and supervising high school, postsecondary, and adult programs.

Home Economics Education
5510 Curriculum in Home Economics (3) Development of home economics educational programs. Prereq: 4420 or equivalent.
5515 Evaluation in Home Economics Education (3) Purpose of evaluation in development of home economics programs; techniques used in evaluation. Techniques for determining progress of students; individual problems of evaluation.
5530-31-32 Problems in Home Economics Education (1-3, 1-3, 1-3) May be repeated. Maximum 9 hrs per course.
5540 Teaching Family Relationships and Parenthood Education (3) Prereq: Organizing, promoting, and teaching methods for reaching curricular objectives in family relationships and parenthood education. Prereq: Consent of instructor.
5545 Home Economics Related Occupational Programs (3) Advanced study in planning, establishing, and evaluating home economic programs.
4890-91-95 New Developments in Industrial Education (3, 3, 3) Developments, pressing problems, and recent trends in field of industrial education as presented by a coordinating instructor in conjunction with knowledgeable resource personnel.

5810-11-12 Administration and Supervision of Industrial Education (3, 3, 3) Principles of vocational education; relationships with general education and trade and labor organizations; administering and supervising schools and classes under federal vocational education acts.

5830-31-32 Special Problems in Industrial Education (3, 3, 3)

5840 Methods of Research in Industrial Education (3)

5850 Improving Teachers in Service (3) Problems of coordination in part-time and apprentice training programs.

5860 Advisory Committees and Apprentice Training (3)

5880 Advanced Methods of Teaching Skills and Technical Information (3) Proper selection and effective application of contemporary methods and techniques in teaching of specialized skills and technical related information.


5995 New Developments in Industrial Technical Education (3) Prereq: B.S. in Industrial Education and teaching experience.

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 elementary schools; (2) administrative and supervisory work in athletics, health education, physical education, public health, and recreation; (3) recreation specialist positions in various public, voluntary, private, and commemorative 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 Service, and School Health Education. Forty-five quarter hours are required for the M.S. Approximately 30 quarter hours of work selected from courses numbered 5000 and above are required in the M.S. requirement. Course selections 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 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 chairperson. Students may be placed in all parts of this country.

DOCTORAL PROGRAM

The Doctor of Education and the Doctor of Philosophy degree are offered in Health Education and the Doctor of Education in Physical Education. See further description under Health Education and Physical Education.

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.

The Doctor of Philosophy degree with a major in Education includes options and emphases as listed on page 2.

Graduate Assistantships. A variety of graduate assistantships are offered in health education, physical education, public health, 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 health, physical education, public health, safety classes and recreation classes, leading recreational activities, supervising public health or recreation 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 37996-2700.

Departments of Instruction
Division of Health and Safety

MAJORS

Health Education  Ed.D., Ph.D.
Safety Education and Service  M.S., Ed.S.
School Health Education  M.S.

Professors:
B. C. Wallace (Head), Ed.D. Colorado State;
J. G. Tabak, Dr.P.H. California (Los Angeles);
R. H. Kirch, H.S.D. Indiana.

Associate Professors:
A. M. Blalock (Emeritus), M.A. Yale; R. J. Purnell, Ph.D. Iowa; A. F. Thompson, Ph.D. Michigan State.

Degree Programs

Health Education  Ed.D., Ph.D.
Safety Education and Service  M.S., Ed.S.
School Health Education  M.S.
School Health

3000 Foundation of Health Science (3) Personal health and contemporary health problems, i.e. mood modifying products, consumer health, industrial, personal health practices, reciprocal relationships involving humans, disease, and environment. F, Sp

3210 First Aid and Emergency Care (4) Theory and practice, medical self-help. Leads to Red Cross Certification in First Aid and Emergency Care. (Applicant must be at least 18 years of age for certification.) E

3410 School Health Instruction (3) Selection of health content in the school curriculum. F, Sp

3420 School Health Services (3) Development, maintenance, and direction of health services for students, including examination, screening, special services, communicable disease control, emergency care, and school health records. F, W, Sp

3510 The School in Community Health (3) Role of teacher in community health education; school’s responsibility in promoting healthful living and the place of school health education in community programs. Not open to health and physical education majors. E

3610 Methods in Elementary Health Instruction (3) Preparation and presentation of health topics. Teaching method emphasized and student participation stressed. Required for elementary teachers. Preq: 3510 or Public Health 1110 or Nutrition 1230. E

3620 The Teaching of Sex Education (3) Trends, content, methods, and materials in sex education. F, W, Sp

3650 Methods in Secondary Health Instruction (3) Preparation and presentation of health topics. Teaching method emphasized and student participation stressed. W

4120 Alcoholism and Alcohol Education (3) Emphasis on factors which make alcoholism a serious health and safety problem. Instructional-educational and intervention programs. F, W, Sp

4130 Suicide and Suicide Intervention (3) Emphasis on factors which make suicide a serious health problem. Instructional-educational and intervention programs. F, W, Sp

4140 Death, Dying and Bereavement (3) Theories of death, dying and bereavement. Instructional-educational and intervention programs. F, W, Sp

4410 Consumer Health and Safety Education (3) Major consumer health and safety problems; selecting, purchasing, and financing of safety and medical services. (Same as Public Health 4410.) F, W, Sp

4411 Instructor’s Advanced First Aid and Emergency Care (3) Satisfactory completion qualifies one for American National Red Cross Certification as Advanced First Aid for Emergency Care Instructor. (Applicant must be at least 21 years of age for certification.) Preq: 3210 or valid Advanced First Aid and Emergency Care Certificate. E

4412 Cardiopulmonary Resuscitation (2) Theory and skills to implement basic cardiac life support following cardiac arrest due to heart attack, drowning, electrocution, suffocation, poisoning, drug intoxication, vehicular and other accidents. Educational and preventive aspects of controlling cardiovascular disease. F, W, Sp

4420 Drug Abuse Education (3) Problems and suspected causes; pharmacology of drugs and effects on society and methods of drug abuse education.
Division of Physical Education

MAJOR

<table>
<thead>
<tr>
<th>Physical Education</th>
<th>M.S., Ed.D</th>
<th>Education</th>
<th>Ph.D.</th>
</tr>
</thead>
</table>

Degree Program

4090 History of Dance (3) Comprehensive overview of status of America's health. (Same as Public Health 3220.)

4230 International Health (3) Status of health in countries throughout world. (Same as Public Health 6230.)

4110 Adapted Physical Education (3) Classification of atypical students who require modified programs in physical activity, classes, and programs suitable for required or special physical education classes.

4140 Measurement and Evaluation in Physical Education (3) Relationship of measurement and evaluation in physical education. Administration and critique of appropriate measures of physical fitness, sports skills and knowledge. W, Sp, Su

4150 The Teaching of Creative Dance (3) Theory, methods, materials, and practical experience in presentation and integration of creative dance in grades K-6, F, A

4550 Methods of Teaching Dance (3) Principles and practical application in mini-teaching experiences. Prereq: 4030-20. may be repeated. Maximum 6 hrs.

4560 Movement Notation (3) Fundamentals with emphasis on notation and reading of elementary movement studies. Sp, A

4000 Thesis (1-15) P/NP only. 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, is not to be repeated toward degree requirements. May be repeated. S/NC only. E

5110 Administrative Problems in Health and Physical Education (3)

5120 Problems of the Curriculum in Physical Education (3)

5130 Methods in Physical Education (3) Characteristics of different school age levels, and applications of learning procedures in physical activities at these levels.

5140 Advanced Philosophy of Sport (3) Critical examination of most rigorous and sophisticated essay pieces concerning metaphysical, epistemological, and axiological status of sport. Prereq: Consent of instructor. W

5150 Systematic Philosophical Analyses of Sport (3) Critical examination of most comprehensive, systematic, and revealing accounts of metaphysical, epistemological, and axiological status of sport. Pre-req: Consent of instructor. W

5220 Readings in Physical Education (3) Comprehensive review literature in physical education and related areas. Sp

5280 Motor Behavior: A Theoretical Perspective (4) Motor behavior from information processing perspectives and current research to support theoretical base. Prereq: Undergraduate course in general psychology or consent of instructor.

5290 Motor Behavior Laboratory (2) Beginning experience in methodology and instrumentation for assessing factors related to movement and motor learning/performance. Prereq: $280 or 4140, and/or 5320 or consent of instructor.

5310 Analysis of Basic Motor Skills (3) Experimental analysis of basic motor skills, emphasizing application of these skills to physical education and athletics. W

5320 Seminar in Research Techniques in Physical Education (3) Evaluation of appropriate research techniques for assessing factors related to performance and skill development. W

5330 Psychology of Sport (3) Human behavior in sport context. Prereq: General psychology course and consent of instructor. W

5340 Motor Behavior and Skill Acquisition (3) Application of research on human movement behavior to sport and physical education. Prereq: 4890 or consent of instructor.

5410-20-30 Specialization Study in a Selected Physical Education Area (1-3, 1-3, 1-3) Complex study in selected specialized area within general fields of physical education. Prereq: Consent of instructor.

5500 Advanced Kinesiology (3) Action of muscles involved in fundamental movements, calisthenics, sports, and gymnastics. Prereq: 3340-20 or equivalent. Sp

5510 Selected Topics in Anatomy (3) Intensive study of various systems of human body. Prereq: 5500 or equivalent. May be repeated with consent of instructor. S/NC only. Sp

5550 Advanced Adapted Physical Education (3) Laws and regulations, theoretical bases for remediation or adaption, programming implications. Prereq: 4110 or equivalent. W

5580 Physical Activity and Health (5) Relationship of physical exercise to longevity, weight control, cardiovascular diseases, low back pain and other disorders, mental health, growth, and aging. Applications for maintenance of health. Prereq: Course in physiology of exercise or consent of instructor. 5 lecture per week. (Same as Public Health 5580.) Sp

5600 Applied Physiology (3) Principles of physiological findings to practical problems related to human function. Prereq: 1 yr general chemistry, or consent of instructor.

5610 Advanced Exercise Physiology (4) Principles of energy transfer in humans with special emphasis on integration of organ systems in adapting to required muscular work. Prereq: Zoology 4940 or equivalent. Recommended: 1 yr of chemistry, physics, and mathematics. 3 hrs and 1 lab. W

5620 Experimental Techniques in Applied Physiology (3) Laboratory course in experimental methodology and instrumentation. Research and applied gas analysis, human calorimetry, blood chemistry, and pulmonary function tests. May be repeated with consent of instructor. S/NC only.

5650 Social-Psychological Dimensions of Physical Activity (3) Examination of sociopsychological factors which influence performance in physical activity with emphasis on research. Prereq: Psychology 3120 or equivalent. F

5810-20-30 Seminar in Physical Education I (1, 1, 1) Current issues and problems in physical education with emphasis on outstanding studies and research in field. E

5900 Graduate Seminar in Public Health (1-2) (Same as Public Health 5900, Nursing 5900, Nutrition and Food Science 5910, and Social Work 5900.) S/NC only.

5910-20-30 Problems and Projects in Physical Education (1, 1, 1) Problems of professional interest and value to the individual student, selected by the student and approved by the major professor. S/NC only.

6000 Doctoral Research and Dissertation (3-15) P/NP only. E

6010 Seminar in Physical Education (1) Research topics in literature related to physical education. May be repeated with consent of instructor. S/NC only. E

6220 Independent Research (3) Selection of topic, development of procedure, and conduct of study including final writing of research paper. S/NC only. E

6330 Advanced Motor Behavior (3) Theoretical issues of contemporary significance in human motor behavior. Prereq: 5340 or consent of instructor. Sp

6410 Practicum in Kinesiology (3) Electromyography laboratory and film analysis of sports skills. Prereq: 5310, 5500 and Physics 2210 or equivalent. May be repeated with consent of instructor. S/NC only.

6510-20-30 Problems and Issues in Physical Education (1, 1, 1) Problems of professional interest and value to the individual student, selected by the student and approved by the major professor. S/NC only.

6710 Seminar in Applied Physiology (2) Prereq: S610. May be repeated with consent of instructor. S/NC only. F, Sp

6840 Research Participation in Applied Physiology (1-4) Advanced research techniques under supervision of faculty member whose research area
Division of Public Health

MAJOR
Public Health

DEGREE
M.P.H.

Professors:
C. B. Hamilton (Chairperson), Dr. P. H. Oklahoma; J. Gonzi, P. H. California (Los Angeles); B. C. Wallace, Ed. D. Colorado State.

Associate Professors:
J. L. McGuire, Ph. D. Michigan; R. J. Purley, Ph. D. Iowa.

Assistant Professors:
J. L. Wilson, Ed. Tennessee; V. W. Presley, Ed. D. Tennessee; S. F. Spear, Ph. D. Iowa.

Lecturer:
M. Duffy, M. D. Pennsylvania.

Master of Public Health degree with a major in Public Health. Option in community health education is available. Option in Community Education for Public Health. Options with specialization in health planning/administration or occupational/environmental health and safety are available.

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 provisions. Prereq: 1 yr biological science, 1 course in microbiology. 2 hrs and 1 lab. F, Sp

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 health 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 preparation and information to practitioners; communications among members of the modern health teams, among health agencies, and use of mass media for transmitting health information. W

4410 Consumer Health and Safety Education (3) (Same as School Health 4410).

4700-10 Field Practice in Public Health (3, 3) Field practice in public health under supervision of public health profession. S/NC 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

4840-50-60 Problems in Public Health Education (1, 1, 1) Individual identification and study of current problems in public health education. Extensive reading of literature required. E

5002 Non-Thesis Graduation Composition (3-5) 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

5010-20-30 Workshop in Public Health (3-6, 3-6, 3-6) 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 (3-5, 3-5, 3-5) Field practice or field experience under professional supervision in public health. S/NC only. E

5110 Environmental Health (3-5) Varied environmental factors in general framework of air, food, water, shelter, transportation as they affect human-life's survival, prevention of disease, performance and enjoyment. Lectures, demonstrations, laboratory, and field practice. Prereq: Consent of instructor. Su, F


5150 Industrial Toxicology (3) Elements of industrial toxicology as they relate to the improvement of occupational safety and health. Prereq: Consent of instructor. W

5220 Health and Sickness (3) Formulation of models of positive health within life cycle and within communities; Types of sickness afflicting individuals and groups. Su, Sp

5410 Epidemiology (3) Incidence and prevalence of disease in man. W, Su

5420 Administration of Public Health (3) Administrators' considerations of public health agencies including governmental, legal bases, organizational principles, personnel factors, fiscal management, and public relations. F, W, Sp

5430 Vital and Medical Statistics (4) Application of basic statistical principles to living things. F, W, Su

5440 Methods and Materials in Public Health Education (4) Theory and practice in the use of community techniques and materials in community health education. 3 hrs and 2 labs. W

5540 Factors in Problem Solving for Community Health (5) Test skills in communications and group process in route to problem identification, objective setting, problem solving and planning for health education. 4 hrs and 2 labs. W

5550 The Public Health Educator in Community Organization and Development (4) Overview of health organizations and agencies in the community facades exploration of conflicting theories and divergent styles of organization in community organization and development. Laboratory to delineate a community health campus and to practice. 2 hrs and 4 labs. F

5560 Functions and Roles of the Public Health Educator (3) Professional science is examined with special attention to roles and functions. Consideration of philosophies, techniques, motivation and differences between health education service and health education program for community learning levels. 1-2 hr lecture-senior seminar per week. F

5580 Physical Activity and Health (5) (Same as Physical Education 5580).

5705-10-15 Advanced Professional Health Education: Health Planning I, II, III (3-5, 3-5, 3-5) Theory and practice in selected areas. F, W, Sp

5735 Emergency Medical Services (3-5) Su

5750 Health and Medical Care Legislation and Law (3-5) Su

5755 Health Facilities Administration (3-5) W

5760 Health Services Administration (3-5) F

5785 Occupational Health Unit (3-5) Sp


5900 Graduate Seminar in Public Health (1-2) Scope of public health as discipline and interrelatedness to other academic and professional disciplines. Speakers both internal and external to UT. Prereq: Baccalaureate degree in health-related field or consent of instructor. May be repeated. Maximum 6 hrs. (Same as Nursing 5900, Nutrition and Food Science 5900, Historical and Social Education 5900, and Social Work 5900.) S/NC only. F, Sp

6000 Doctoral Research and Dissertation (3-15) P/NP only. E

6210 Health Aspects of Gerontology (3) (Same as School Health 6210.)

6220 Seminar on the Nation's Health (3) (Same as School Health 6220.)

6230 International Health (3) (Same as School Health 6230.)

Division of Recreation

MAJOR
Recreation

DEGREE
M.S.

Professor:
D. B. Peters (Chairperson), Ph. D. Illinois.

Associate Professor:
K. L. Krick, Re. D. Indiana.

Assistant Professor:
M. D. Blanton, Re. D. Indiana.

The Recreation Division offers the following degree programs:

Master of Science degree in Recreation (thesis and non-thesis programs) with concentrations in general recreation, recreation administration, and therapeutic recreation.

4130 Recreation Administration (3) Introduction to recreation administration, including planning, personnel, facilities, programs, services, finances, and public relations. Prereq: 3140, 3200, 3880, or consent of instructor. F, Sp

4200 Survey of Recreation for Special Populations (3) Responsibility of recreation profession to minority groups whose leisure opportunities and needs may require special services. Prereq: 3140, 3200, 3880, or consent of instructor. F

4310 Camp Administration (3) Program planning and organization, personnel management, camp site development and maintenance, camp operation for administrators and supervisors. W

4500 Specialized Study in a Selected Area of Recreation (1-9) Designed to deal with specific public health in a selected area within the broad field of recreation. For recreation students only. Prereq: Consent of instructor. May be repeated with consent of division. Maximum 9 hrs. E

5000 Thesis (1-15) P/NP only. E

5002 Non-Thesis Graduation Composition (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. F

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

5240 Therapeutic Recreation (3) Role of recreation in lives and treatment of persons with disabilities—mental, physical and medical. Possibilities for help-
ing ill and disabled realize their fullest potential. Pre-
req: Consent of instructor. W
5250 Implementation of Recreation Services for
the Ill or Disabled (3) Policies and guidelines for
organizing and implementing programs of recreation
for ill or disabled in treatment centers and other com-
community agencies. Prereq: 4200 or consent of instruc-
tor: Sp
5260 Leisure and Mental Health (3) Relationship
between leisure activity and mental health, with
emphasis on its use in therapeutic recreation. Pre-
req: Psychology 3650 or equivalent, and consent of
instructor. W
5300 Seminar in Recreation (1-6) Application of re-
search methodology and computer literacy in
selected areas of recreation related research. Pre-
sentations of students' research studies. May be re-
5340 Administration of Recreation Funds (3) De-
velopment and management of budgets for recrea-
tion 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 signifi-
cance to student. Research projects of limited nature
undertaken in lieu of thesis. May be repeated. Max-
imum 9 hrs. New problem must be undertaken for
each repetition. E
5450 Specialized Study in Recreation (1-9) Ad-
vanced comprehensive study in selected specialized
area within leisure and recreation field. Prereq: Con-
sent of instructor. May be repeated. Maximum 9 hrs.
E

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
5120.2
2. One or two minors or collateral work, 9 to
18 hours total in engineering, chemistry,
mathematics, physics, or other related fields.
3. Master's thesis, 5000, totaling 9 to 18
quarter hours.

relations, chemical thermodynamics,
corrosion, welding metallurgy and materials
joining, solidification, microscopy (electron
and optical), chemical process metallurgy,
failure analysis, mechanical behavior of
materials and structure analysis.

UTK-JAPAN COOPERATIVE PROGRAM IN
POLYMER ENGINEERING
The UTK-Japan Program provides a means
for Japanese research professors to teach
part-time in the graduate program, and

3620 Industrial Process Control (3) Design theory
and practice. Experimental process modeling (pro-
cess identification), feedback control, cascade con-
trol, feedback control, degrees of freedom, stabil-
ity analysis, controller tuning. Control systems for
number of typical industrial unit operations. Prereq:
3610.
4110 Chemical Engineering Data Analysis (3) Analytical and experimental identification of system
extremals; statistical properties of samples and
source systems; empirical modeling of processes;
statistical process control. Prereq: 3420 and Mathemat
ics 3150.
College of Engineering

W. T. Snyder, Dean
W. K. Stair, Associate Dean
W. A. Miller, Associate Dean
A. W. Spickard, Assistant Dean

Graduate degree programs of the College of Engineering provide opportunities for advanced study leading to the Master of Science degree, the Master of Engineering degree, and the Doctor of Philosophy degree. For a listing, consult majors and degrees available on page 8.

OFF-CAMPUS GRADUATE INSTRUCTION BY VIDEOTAPE

Since 1966, the College of Engineering has made use of electronic communication techniques to reach students beyond the confines of Knoxville classrooms. These remotely-taught classes make the specialized talents of engineering college faculty available to students at off-campus centers and industrial sites. This effort makes use of videotapes prepared from a regular on-campus class in specially-equipped classrooms. The tapes contain a visual and audible record of a professor's lecture and discussions with the on-campus classes and are played back at remote locations. Telephone contact is established periodically between the professor and the off-campus class to allow full discussion and questions. Occasional visits by the professor are made to each remote class and students visit the Knoxville campus at selected times.

Graduate courses have been offered to students at other campuses and established centers of the UT System (Chattanooga, Kingsport, Martin, Nashville, and Tullahoma). Graduate courses have also been made available to engineers in industrial plants. Such courses are offered to students using classroom facilities at Jackson State and Columbia State Community Colleges.

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 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

W. K. Stair, 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 to the company requesting the study. In such case, the whole expense will be carried by the parties requesting the investigation.

Departments ofInstruction
Chemical, Metallurgical and Polymer Engineering

MAJORS

Chemical Engineering
Metallurgical Engineering
Polymer Engineering

DEGREES

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

Professors:
H. F. Johnson (Head); D. Eng. Yale; D. C. Bogue, Ph.D. Tennessee; B. S. Bone, Ph.D. Massachusetts Institute of Technology; C. R. Brooks, Ph.D. Tennessee; E. S. Clark, Ph.D. California (Berkeley); L. W. Crawford, Ph.D. Cincinnati; O. L. Culberson, (Emeritus) Ph.D. Texas; J. F. Fellers, Ph.D. Akron; G. C. Frazier, Ph.D. Johns Hopkins; J. M. Holmes, Ph.D. Tennessee; H. H. Hu, Ph.D. Wisconsin; C. D. Lundin, Ph.D. Pennsylvania (Duquesne); C. J. McHargue, Ph.D. Kentucky; C. F. Moore, Ph.D. Louisiana State; B. F. Oliver, Ph.D. Pennsylvania State; J. J. Perone, Ph.D. Northwestern; J. W. Prados, Ph.D. Tennessee; J. E. Spruiell, Ph.D. Tennessee; E. E. Stanbury, Ph.D. Cincinnati; C. O. Thomas, Ph.D. Tennessee; R. A. Vandermeer, Ph.D. Illinois Institute of Technology; J. S. Watson, Ph.D. Tennessee; J. L. White, Ph.D. Indiana; M. A. Wright, Ph.D. Texas.

Associate Professors:
W. T. Becker, Ph.D. Illinois; D. B. Burns, Ph.D. Houston; R. M. Counce, Ph.D. Tennessee.

Assistant Professor:
F. Weber, Ph.D. Minnesota.

Lecturers:

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

THE MASTER'S PROGRAM

Minimum departmental requirements include the satisfactory completion of:

1. Alumni Distinguished Service Professor.
2. Space Institute, Tullahoma.

W. K. Stair, Associate Dean
W. A. Miller, Associate Dean
A. W. Spickard, Assistant Dean
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 5120.

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 conducted by 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

Applying for entrance into the doctoral program must display concrete evidence of ability to perform and report independent research to the satisfaction of the department. The Master's thesis may be offered as supporting 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, 5120, 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 comprehensive examination, usually given in two parts, and covering such materials as chemical, metallurgical, and polymer engineering operations and processes, thermodynamics, technology, mathematics, physics, chemistry, and other related fields.

4. Active participation in graduate seminars conducted by the department. Resident students must register for the appropriate 5010 every quarter offered.

5. Reading knowledge of a foreign language relevant to the candidate's research program; selection of language to be made in consultation with the faculty committee.

Approximate languages are French, German, Japanese, Russian.

PROGRAM AREAS IN METALLURGICAL ENGINEERING

The metallurgical engineering program is flexible and interdisciplinary in nature. Students may be admitted from disciplines other than metallurgical engineering; these may include physics, mechanics, chemistry, chemical engineering, mechanical engineering and materials engineering. Prospective students should consult metallurgical engineering faculty concerning development of individual special programs compatible with their backgrounds. Areas of specialization within the program may be physical metallurgy of structure-property relations, chemical thermodynamics, corrosion, welding metallurgy and materials joining and solidification, microscopy (electron and optical), chemical process metallurgy, failure analysis, mechanical behavior of materials and structure analysis.

UTK-JAPAN COOPERATIVE PROGRAM IN POLYMER ENGINEERING

The UTK-Japan Program provides a means for Japanese research professors to teach part-time in the graduate program, and provides a joint Japanese-UTK program for the admission of Japanese students into the polymer engineering graduate program. A committee of faculty from Japanese universities makes recommendations for students and a UTK committee acts on them.

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 (through chemical or metallurgical engineering) as described above (research thesis) and, a second in a joint program with the Chemistry Department having a chemical emphasis. The specialization program in the department may be completed in a four-year period for the M.S. degree, a thesis in the field, completion of Polymer Engineering 4910, 5110, 5310, 5410, and either 5230 or 5210 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, and 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, Chemistry 5531 and 5140, plus active participation in the Polymer Seminar. Ph.D. students must also pass a special written examination in polymer science and engineering 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 3620. 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 separations.

3450 Diffusional Operations (3) Diffusion, simultaneous heat and mass transfer, applications including humidification, gas absorption, extraction. Prereq: 3420. Chemical Engineering 3040.

3610 Introduction to Process Dynamics and Control (3) Process models and introduction to control system design. Mathematical models for several industrial processes from mass, component and energy balances. Industrial and laboratory data. Model linearization, LaPlace transfer analysis, block diagram algebra, transfer function models, industrial sensors and valve lab. Prereq: Chemical and Metallurgical Engineering 2020, Mathematics 2840.

3620 Industrial Process Control (3) Design theory and practice. Experimental process modeling (process identification), feedback control, cascade control, feedforward control, design of freedom, stability analysis, controller tuning. Control systems for number of typical industrial unit operations. Prereq: 3610.

4110 Chemical Engineering Data Analysis (3) Analytical and experimental identification of system extremes, analysis of statistical data, and design and source systems; empirical modeling of processes; statistical process control. Prereq: 3420 and Mathematics 5310.


4130 Introduction to Optimization (3) Principles and applications of optimization techniques. Chemical process design; unconstrained optimization, equality constrained optimization, inequality constrained optimization, and dynamic programming. Prereq: Mathematics 2840.


4420 Process Design and Economic Analysis (3) Development of process information into product design and plant design. Product specifications, equipment characteristics, capital investment, operating costs and economic merit. Prereq: 4410.

4430 Special Problems in Design and Economics (4) Extension of 4420 for student participation in the American Institute of Chemical Engineering annual contest problem; other advanced design projects. Prereq: 4420.

4450 Hydrocarbon Processing (3) Study of specialized characterization of physical properties of fossil fuel raw materials and products, and of processes for conversion of fossil fuel raw materials into products needed in industrial energy, industrial raw material and consumer markets. Prereq: 3440.

4470 Sulfur Removal from Coal and Associated Problems (5) Chemical and physical properties of domestic coals, sulfur distributions; beneficiation by both physical and chemical methods; fluidized bed combustion with both natural and synthetic SOx sorbents; stack gas SOx scrubbing. Prereq: Consent of instructor.

4480 Coal Processing to Liquid Fuels (3) Characterization of various methods; modeling of conversed systems and equipment; extraction of water and oxygen requirements; pyrolysis; catalytic hydrogenation; reactor design considerations; review and critique of selected articles from both the current literature and patents. Prereq: Consent of instructor.

4530 Chemical Engineering Reaction Kinetics (3) Chemical reaction rates in closed and flow systems, interpretation of laboratory and pilot plant data; reactor design. Prereq: 3420, Chemistry 3430.

4540 Fluid-Solid Operations (3) Heat and mass transport in fixed and fluidized beds; applications include absorption, ion exchange crystallization. Prereq: 3440-50.

4560 Advanced Process Dynamics, Simulation and Control (3) Development of process models, experimental process identification, computer simulation of processes and control strategies, and analog versus digital process control. Design using advanced control concepts as feedforward, ratio, cascade, and multivariable control. Advanced control system design for difficult control processes. Laboratory experience. Prereq: 3450 or equivalent background in basic control theory and differential equations.

4730 Mass and Energy Flow in Biological Systems (3) Basic physiological principles applicable to biological systems. Derivations of general equations of biomass and energy transfer, thermodynamics and energy balance in biological systems. Discussion of Volterra's system and biological clocks. Prereq: Consent of instructor.
4740 Introduction to Transport Phenomena in Biological Systems (3) Application of principles of transport phenomena to biological systems. Transfer of chemical energy and various cellular active transports; structure and rheology of physiological fluids, membrane and interfacial phenomena; analysis and design of artificial organs. Prereq: 3440, 3450 or consent of instructor.

4750 Microbiological Process Engineering (3) Application of chemical engineering principles and design concepts to microbiological processes; concentration, chemical engineering treatments of biological systems. Prereq: 3440, 3450, or consent of instructor.

4760 Principles of Biochemical Separation (3) Fundamental aspects and similarities of modern biochemical separation methods; classroom demonstrations, design of production and analytical systems. Prereq: Consent of instructor.

5000 Thesis (1-15) P/NP only. E

5010 Graduate Seminar (1) Prereq: Admission to graduate program. May be repeated. E

5050 Engineering Analysis (3) Analytical formulation and solution of chemical, metallurgical and polymer engineering problems involving deformation of solids, heat transfer and motion of fluids. (Same as Mechanical Engineering 5050 and Polymer Engineering 5050.)

5120 Heat Convection (3) Analysis of heat convection in fluids under viscous and turbulent flow conditions, emphasizing analytical approach, simultaneous diffusion of momentum and heat. Prereq: 5050.

5130 Methods of Optimization (3) Principles and applications of various mathematical programming techniques; linear to nonlinear; convex design and convex variational method, maximum principle, dynamic programming, and geometrical programming. Prereq: 4130.

5210 Process Dynamics (3) Analysis of recycle operation, steady state simulation and optimization of typical processes.


5310 Thermodynamics of Heterogeneous Equilibrium (3) Phase role, equilibrium between phases, phase transformations between phases, ideal and nonideal solutions. Prereq: 3040.

5320 Statistical Thermodynamics (3) Basic concept of statistical mechanics and application to evaluation of thermophysical properties. Prereq: 5310.

5510 Chemical Reactor Design (3) Nonideal flow pattern, refinery; fluid flow, mixing, heat transfer, reaction in two phase systems; introduction to heterogeneous catalysis and reactor stability. Prereq: 4530.

5610 Stagewise Mass Transfer Operations (3) Equilibrium stage, concepts applied to mass transfer operations, emphasizing nonisothermal and multiphase-component systems.

5620 Differential Mass Transfer Operations (3) Differential mass transfer operations; falling film, packed tower and bubble column contacting devices; nonisothermal and multiphase-component systems; current theories of mass transfer; mass heat and momentum transfer analogies. Prereq: Mathematics 2840.

5810 Mechanics of Viscous Flow (3) (Same as Engineering Science and Mechanics 5220.)

5900 Special Topics in Chemical Engineering (3) Special topics of current interest to chemical engineers. May be repeated; Maximum 9 hrs.

5900 Doctoral Research and Dissertation (3-15) P/NP only. E

6130 Process Optimization (3) Optimization of chemical process equipment and systems by various techniques; static and dynamic systems. Prereq: 5130.

6210 Advanced Diffusional Operations (3) Fixed and fluidized bed operations, stagewise and differential mass transfer bed concepts. Prereq: Consent of instructor.

6250 Venture Analysis in the Process Industries (3) Interactions among line functions of typical chemical company in application of modern decision theory and mathematical models to achieve optimum short and long term decision in face of external competition. Prereq: 5250.

6310 Thermodynamics of Irreversible Processes (3) Thermodynamic treatment of irreversible chemical processes, transport operations; coupling of chemical and mechanical phenomena, with special emphasis on topics and methods of interest to engineering and bioengineering students. Prereq: 5310.

6510 Applied Chemical Reaction Kinetics (3) Chemical reactions in gas and liquid phases, heterogeneous catalysis, catalyst effectiveness and role of transport in kinetics. Emphasis on development of phenomenological description although mechanistic models are discussed. Prereq: 5510.

6520 Cyclic Reactor Design (3) Principles of kinetics, heat and mass transfer applied to design and analysis of heterogeneous catalytic reactors. Prereq: 6510.

6710 Process Dynamics (3) Development of dynamic models of process equipment from conservation and rate laws; testing of models by frequency, step, and pulse response methods. Prereq: Consent of instructor.

6900 Advanced Topics of Chemical Engineering (3) Advanced topics of current interest to chemical engineers. May be repeated. Maximum 9 hrs.

Metallurgical Engineering

3050 Production Metallurgy (3) Raising, smelting, and refining. Gas liquid equilibria, slag-metal processes and solution behavior; correlation with phase constitution. Kinetics of reactions; rate laws, activated complex theory, adsorption and catalysis and applications. Prereq: 3040, Chemical Engineering 3410 and 3420 or equivalent. 3 hrs or 2 hrs and 1 lab.

3110 Engineering Materials I (4) Introductory course correlating the atomic, crystal, and microstructure of solids with mechanical, physical, and chemical properties of engineering significance. 3 hrs and 1 lab.

3120 Engineering Materials II (3) Extension of 3110 or with emphasis on control of mechanical properties of materials by selection of composition, thermal, and mechanical treatment; correlation of resultant properties with service performance. Suggested for chemical, civil, and industrial engineering students.

3130 Engineering Materials III (3) Extension of 3120 or 3110 with emphasis on control of electrical and magnetic properties of materials by specification of composition, thermal, and mechanical treatment; correlation of resultant properties with service performance. Suggested for electrical engineering students.

3140 Engineering Materials IV (3) Extension of 3120 or 3110 with emphasis on materials processing, specification and evaluation. Suggested for mechanical and industrial engineering students.

3150 Engineering Materials V (3) Extension of 3110 or 3120 with emphasis on the mechanisms and control of reactions of engineering materials with aqueous, nonaqueous, and gaseous environment. Prereq: 3110 or equivalent.

3160 Engineering Materials VI (3) Extension of 3110 or 3120 with emphasis on materials of significance in nuclear engineering; nuclear reactor corrosion; radiation materials, nuclear fuel specifications, interaction of radiation with solids to produce changes in engineering properties. Suggested for nuclear and mechanical engineering students.


3220 Diffusion and Annealing (2) Introduction to solid state kinetics; point defects, solid solutions, diffusion equations and mechanisms, annealing of cold worked structures. Prereq: 3210, Mathematics 2840.

3310 Biomedical Applications of Materials for Life Scientists (3) Principles of engineering materials; polycrystals, ceramics, mechanism of fabrication of components; corrosion; applications of prosthetic devices and dental materials. Prereq: Chemistry 1110-20 or 30 equivalency.

3520 Materials Behavior and Chemical Process Equipment Design (3) Mechanical, metallurgical and chemical considerations in design of chemical processing equipment. Prereq: Chemical and Metallurgical Engineering 2030 or equivalent; 3510; and Chemical Engineering 3420.

3710 Metallurgical Applications in Manufacturing Technology (3) Fabrication methods and principles of mechanical thermal processes for forgings and semi-finished articles; casting, powder metallurgy; plastic forming, joining, heat treatment. Prereq: 2110 or equivalent.

4240 Engineering Materials Design (3) Property control through composition, heat treatment and transformation in ferrous alloys. Plain carbon steels, alloy steels, and tool steel processing for property selection and service requirements. Prereq: 3050 or consent of instructor.

4250 Design and Analysis (3) Design and laboratory sessions on analysis of materials, requirements and performance in typical structures and components. Prereq: Senior standing.

4510 X-Ray Diffraction and Its Application (4) Basic principles and application of X-ray diffraction from materials. Theory, powder diffraction, crystallography and X-ray analysis, indexing, preferred orientation. 3 hrs and 1 lab.

4540 Fracture-Safe Design (3) (Same as Engineering Science and Mechanics 4540.)

4730 Mechanical Metalurgy I (4) Elastic behavior; description of stress, strain, and stress-strain relations; plane stress vs. plane strain loading; failure by yielding; stress concentration and notch sensitivity; ductile fractures; brittle fractures; precision casting and loading rate. Prereq: First course in Materials Science and Engineering Science and Mechanics 3311. Also suggested for mechanical engineering students.

4740 Mechanical Metalurgy II (4) Brittle fractures due to metallurgical and environmental factors; fatigue, residual stresses; creep and stress rupture; effects of micro-strain and plastic strain; stress-strain relations; fabrication by forging; deep drawing; formability testing. Prereq: 4730 or Mechanical Engineering 4540 and First course in Materials Science, or consent of instructor. Suggested for engineering science and mechanical engineering students.

4760 Casting and Welding (3) Principles and processes of casting and welding; heat transfer, solidification segregation, gas-metal and slag-metal interactions, thermal treatments, associated stresses. Prereq: 3120 or 3230. 3 hrs or 2 hrs and 1 lab.

5000 Thesis (1-15) P/NP only. E

5010 Graduate Seminar (1) Prereq: Admission to graduate program. May be repeated. E

5050 Engineering Analysis (3) (Same as Chemical Engineering 5050.)

5110 Dislocations (3) Theoretical and experimental analysis of line defects and their interactions in solids. Prereq: 4730 or consent of instructor.

5120 Plastic Deformation (3) Geometry and mechanisms of plastic deformation of single crystals; slip and twinning; work hardening; effects of temperature and alloying on short-term loading. Prereq: 5110.
5130 Plastic Deformation II (3) Plastic deformation of polycrystalline materials; theoretical and experimental analysis of texture formation resulting from deformation and annealing. Prereq: 5120.

5140 Diffusion in Solids (3) Analysis of models and experimental observations relating to diffusion phenomena; phenomenological and mechanistic description of diffusion and annealing of point defects.


5210-20-30 Welding Metallurgy (3, 3, 3) Welding processes and physical metallurgy of welding, including power supplies, heat flow, residual stresses, solidification, and solid state reactions; for both simple and complex alloys. Current theories of cold cracking, hot cracking and porosity formation are discussed. Prereq: Physical metallurgy.

5310 Solidification and Crystal Growth I (3) Solute redistribution, thermodynamic considerations, kinet- ic, convection and fluid flow effects on the solid to liquid transition. Prereq: Mathematics 4550.

5450-50 Electron Microscopy I and II (3, 3) Kinematic and dynamical diffraction theories are developed and their application to electron diffraction patterns and contrast effect in transmission electron microscopy are discussed. Special attention is given to metallurgical applications such as plastic deformation, fracture, precipitation, and phase transitions. Prereq: 4510-20.

5560 X-Ray Metallurgy (3) Application of x-ray diffraction theory and techniques to metallic systems. Powder and single crystal techniques; reciprocal lattice; analysis of scattered intensity; line profiles; orientation of single crystals; preferred orientation; phase analysis; order-disorder transformations.

5750 Corrosion (3) Analysis of corrosion processes in terms of polarization measurements and the Pourbaix diagram. Effects of shear stress and localized conditions contributing to pitting, crevice, and stress corrosion.

5840-50 Metallurgy of Deformation and Fracture (3, 3) Theoretical and engineering analysis of fracture, plastic deformation and techniques to metallic systems. Powder and single crystal techniques; reciprocal lattice; analysis of scattered intensity; line profiles; orientation of single crystals; preferred orientation; phase analysis; order-disorder transformations.

5900 Special Topics in Metallurgical Engineering (3) Analytical and experimental observations relating to metalurgical processes and physical metallurgy of welding, including power supplies, heat flow, residual stresses, solidification, and solid state reactions; for both simple and complex alloys. Current theories of cold cracking, hot cracking and porosity formation are discussed. Prereq: Physical metallurgy.

5910-20-30 Metallurgical Thermodynamics (3, 3, 3) Application of thermodynamic and physicochemical methods to metals and metalurgical reactions. Relation of theory and experiment to structural and solid solutions, and alloy systems.

6000 Doctoral Research and Dissertation (3-15) P/NP only. E

6110 Theoretical Metallurgy (3, 3, 3) Phases of solid state physics applicable to metallurgy; elasticity, introductory quantum theory, specific heats, electrical conductivity and thermal conductivity, magnetic properties, theory of alloy formation. Prereq: 4810 or Physics 3720; Mathematics 4580 and consent of instructor.

6160-70 Phase Transformations II and III (2, 3, 3) Continuation of 5150 with emphasis on more advanced theoretical formulations of nucleation and growth and experimental observations relating to martensitic transformations and shape memory phenomenon. Prereq: 5150.

6320-30 Solidification and Crystal Growth II and III (3, 3) Theoretical and experimental observations relating to microstructural and dynamic effects of incompletely liquid conductors, morphology, stability of steady state coupled heat and mass transfer processes, and crystal growth in solid, transient, multiphase solidification, composites, nonsteady state dendritic phenomena, some nucleation phenomena. Prereq: 5310.

6510-20 Advanced X-Ray Diffraction (3, 3) Generalized theory; crystal structure determination; thermal motion; lattice faults, diffuse scattering. Prereq: 5560.

6900 Special Topics in Metallurgical Engineering (3) Developments in the science and technology of metals and alloys. May be repeated. Maximum 9 hrs.

Polymer Engineering

4910 Applied Polymer Science (3) First course in the physical properties of polymers. Polymer structure, crystalline and glass transitions, physical properties of amorphous and crystalline polymers, crystallization kinetics and mechanical properties are discussed. Not for credit for Polymer Engineering majors.

4920 Polymer Processing (3) Rheological properties of polymer melts and solutions, viscometry, unit operations of fiber, plastics and rubber industries: dimensional analysis and scale-up, flow theories, dies, cooling, stretching, drawing and texturing; preparation of yarn; dyeing, weaving and knitting. Emphasis on qualitative aspects.

4940 Plastics Fabrication Operations (3) Lecture and laboratory course treating unit operations of the plastics industry. Types and mechanisms of operations of machinery used and the structure and properties of fabricated parts. Operations to include extrusion, coextrusion, injection molding including structural foam, thermoforming, blow molding, rotational molding.

5000 Thesis (1-15) P/NP only. E

5600 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 with Electromagnetic Radiation (3) Theory of scattering and diffraction of electromagnetic waves by matter, special application to experimental techniques applied to polymers. Wide angle x-ray scattering (WAXS), small angle light scattering (SALS). Interpretation in terms of polymer chain conformation, crystal structure, morphology and solution conformation. Prereq: Undergraduate physical science.


5210 Mechanics of Polymer Fluids and Solids (3) Equations of motion and application to polymer melts and glassy and crystalline polymer solids. Non-Newtonian fluid mechanics including viscometric flows and lubrication theory. Torsion, bending, and buckling behavior of solid polymers, foams, and composites. Rheological behavior of polymer melts and photoelastic stress analysis.


5310 Polymer Solution Properties and Characterization (3) Molecular weight determination, a modern approach to polymer characterization, x-ray diffraction and optical methods. Coreq: 5110 or consent of instructor. 2 labs.

5510 Laboratory Methods in Polymer Engineering I (1) Basic experimental procedures for polymer characterization and processing, orientation, melt flow and fracture. Prereq: 5120 or consent of instructor. 2 labs.

5512 Laboratory Methods in Polymer Engineering III (1) Basic experimental procedures for polymer characterization, polymer melt processing, mechanical testing of polymers. Prereq: 5410 or consent of instructor. 2 labs.

5513 Laboratory Methods in Polymer Engineering III (1) Basic experimental procedures for polymer characterization, polymer melt processing, mechanical testing of polymers. Prereq: 5410 or consent of instructor. 2 labs.

5516-20-30 Metallurgical Thermodynamics (3, 3) Application of thermodynamics and physicochemical methods to metals and metalurgical reactions. Relation of theory and experiment to structural and solution, and alloy systems.

6000 Doctoral Research and Dissertation (3-15) P/NP only. E

6110 Optical Properties of Polymers (3) Maxwell's equations and electromagnetic theory of light, optical properties of isotropic and anisotropic dielectrics including theory of birefringence, applications to anisotropic materials and films 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; levels of order, thermal motions, defects, order-disorder transitions and para-crystallinity. Precision and Weisenberg photography, single crystal and powder diffraction with applications to synthetic and biological macromolecules.

6210 Nonlinear Viscoelasticity (3) Tensor formulation of constitutive equations of viscoelastic materials subjected to large deformations. Integral, differential, and acceleration tensor formulations. Applications to polymer flow problems. Prereq: 5210 or equivalent. (Same as Engineering Science and Mechanics 6800.)

6220 Advanced Methods of Polymer Processing (3) Application of theories of rheological properties and structures formation to analysis of polymer processing operations. Prereq: 5219.
The Department of Civil Engineering offers a graduate program leading to the degree of Doctor of Philosophy 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 course work. The student must present a minimum of 45 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: The student must present a minimum of 45 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 II: The student must present a minimum of 48 quarter hours of approved advanced engineering design courses selected from a list provided by the student's committee.

Normally, the graduate program of study will be planned in consultation with the student's committee to suit the individual academic requirements.

ENVIRONMENTAL SCIENCE

For a major in Environmental Science, the bachelor's degree may be in fields other than engineering. In some cases prerequisite undergraduate courses may be indicated, and in general these must be taken before courses for graduate credit can be taken. Specifically, prerequisites include Mathematics through Calculus, Engineering Science and Mechanics 3110, Environmental Engineering 3120 and 3330.

The Department of Civil Engineering offers only a thesis program for work toward the Master of Science degree in Environmental Science.

The student must present a minimum of 45 quarter hours of approved graduate courses. The major shall include a minimum of 27 quarter hours of thesis and 18 quarter hours credit of approved environmental engineering course work. A minor may be selected in a program such as ecology or microbiology.

Normally, the student must complete a comprehensive examination administered by a faculty committee.

6. After completion of the dissertation, prior to graduation, each student must pass a final examination.
74 College of Engineering/Civil Engineering

Civil Engineering

4120 Concrete Design (3) Reinforced concrete contains fire floors and steel; footings, and retaining walls. Prereq: 3110. F


4240 Structural Design (3) Plate girders, composite steel and concrete beams, connections and details, design of typical structures. Lateral forces, dead and live loads. Prereq: 3230 and 4410. 2-3 hr. W, P

4290 Photographery (3) Methods of plotting maps from aerial photographs; stereoscopic plotting instruments; applications. Prereq: 2360 or Forestry 2390. F

4420 Analysis of Framed Structures (3) Maximum stresses due to moving loads; uses of influence lines; lateral forces due to earthquake and wind; analysis of portals, building frames and space frames. Coreq: 4140. W

4430 Construction Methods and Equipment (3) Fundamental operations in construction and selection and cost of equipment; production rates, balancing of equipment and productivity. Coreq: 4420. F

4510-20 Advanced Structural Design (3, 3) Plastic design in steel 4510; design of typical short span steel highway bridges in 4520. Prereq: 3230 for 4510; 4510 and 4110 for 4520. W, Sp

4530 Cost Comparison in Design and Construction (3) Cost of engineering and construction. Cost comparison of alternate designs with emphasis on applications to civil engineering problems. Prereq: 4140. F

4540 Computer Utilization (3) Computer use, economic justification, and extent of use by industry. Utilization of computers for solution of civil engineering problems. Prereq: 3320. F

4590 Stabilization of Soils (3) Mechanical stabilization of soils, geotechnical aspects of soil behavior, and blending; chemical stabilization of soils with admixtures; waterproofing and modifying soils with additives. Prereq: 3310. 2 hrs and 1 lab. W

4620 Airport Planning and Design I 3) Emphasis on airport master planning. Included for consideration on the air side are runway configuration, capacity, geometries and lighting; on the land side are terminal layout and design and ground access systems and parking. Prereq: 3600 and 3610. Sp

4640 Traffic Engineering (3) Characteristics of driv- ers, their roadway and their interrelationships; traffic studies; basic considerations of traffic circulation and control; elements of urban transportation planning studies. F

4660 Airport Planning and Design II (3) Integration and application of principles of airport master planning for purpose of site selection and design of an airport facility through a comprehensive team project; includes environmental evaluation of design. Prereq: 4620. 1 hr and 2 labs. Su

4710 Portland Cement Concrete Mix Design (3) Properties and tests of portland cement concrete, methods of concrete evaluation testing; use of concrete admixtures. Prereq: 3710. 2 hrs and 1 lab. F

4720 Asphalt and Bituminous Concrete (3) Properties and tests of asphalts and asphaltic mixes, mix design of structural and functional pavement, emphasis on use of asphalt in transportation construction projects. Prereq: 3710. 2 hrs and 1 lab. W

4731-32 Earthquake Resistant Structures I, II (4, 4) (Same as Architecture 4731-32.) Su

4800 Introduction to Civil Engineering Systems (3) Methods of modeling civil engineering systems and their specific application to problems of transportation, environment, water resources and materials. Prereq: Senior standing or consent of instructor. Prereq: Sp, Su

4850 Elementary Structural Matrix Methods (4) Introduction as Advocate in Building Science and Engineering Science 4850.) Su

4860 Structural Wood Design (3) Application of structural design principles to structural members of buildings, beams, columns, and diaphragm construction with plywood. Various types of fastenings and connections. Prereq: 3230. F

5000 Thesis (1-15) P/ NP only. E

5002 Non-Thesis Graduation Completion (3-15) Required for the nonthesis student who has 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 Statically Indeterminate Structures (3, 3) Deflections of beams and trusses; analysis by force methods and by slope-deflection in 5110; analysis by moment distribution and other displacement methods, secondary stresses in 5120. W, F

5140 Statically Indeterminate Structures (3) Analysis of complex planar and space frames. Prereq: 5110 and 5120. Sp

5150 Matrix Formulation of Structural Problems (3) Review of linear algebra. stability considerations; stiffness and flexibility analysis of plane trusses, general members and structures composed of general members. Prereq: 4540 or consent of instructor. F

5160 Analysis and Design of Plate Structures (3) Bending and buckling of plates; analysis and design of bridge and building floors and structural plate components. Prereq: 5110. F

5170 Introduction to Structural Dynamics (3) Analysis of forced and free vibrations, and transient response of structures having many degrees of freedom; vibrational behavior considered for structures: approximate design methods developed. Prereq: 5120, 5150. Sp

5180 Finite Element Structural Analysis (3) Application of finite element method to structural analysis; plane stress, plane 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: 5110. F

5240 Advanced Properties of Materials: Cement and Concrete (3) Permeability and durability; volume changes and creep; elastic and thermal properties of concrete; causes of failure. Prereq: 4710. W

5250 Advanced Properties of Materials: Bitumi- nous Substances and Mixes (3) Serviceability concepts; pavement failures and remedies; bituminous pavement maintenance techniques, other uses of asphalt products. Prereq: 4720. Sp

5270 Planning and Transportation (3) Preparation of transportation and elements of comprehensive development plans. Analysis of relationships between various transportation modes and between transportation and other community features. (Same as Planning 5270.) W

5310 Engineering Practice (3) Valuation and feasibil- ity studies; depreciation and useful life; engineering economics. F

5320-30 Engineering Practice Applied to Admi- nistration of Engineering Projects (3, 3) Engineering administration; planning, budgeting and financial and technical aspects of projects; cost estimates and methods of financing. W, Sp

5400 Construction Contract Law and Administra- tion (3) General introduction to construction contracts and construction related sales contracts. Emphasis on role of engineer in preparation, award, and administration of construction contracts. Case study method of instruction. Prereq: 4230 or consent of instructor.

5490-59 Construction Management I, II, III (3, 3, 3) Management and organization of heavy and building construction projects. Prereq: 4430 or consent of instructor. F; W; Sp

5490-70 Construction Estimating I, II, III (3, 3, 3) Project costs; estimating techniques; market cost conditions and feasibility of design as it applies to costs. Prereq: 4430 or consent of instructor. W; Sp

5550 Slope Stability and Retaining Structures (3) Stability of natural and cut slopes and embankments, lateral earth pressure theories. Design of rigid retaining structures, sheet pile walls and anchored bulkheads. Coreq: 4220

5560 Shear Stress and Strength Stain Behavior of Soil. Shear strength of fine grain soil from perspective of idealized, simple clay. Drained and undrained shear stress and strain behavior of real soils. Consolidation theory. Coreq: 4220

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: 3230, W

5730 Prestressed Concrete (3) Properties of pre- stressing materials and anchorage systems; methods of pretensioning of reinforcing steel 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: 4120. W

5805 Urban Systems: Engineering and Manage- ment II (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 Manage- ment II (3) Continuation of 5800. Management and engineering of urban streets, including lighting, cleaning and snow removal, water supply and waste-water drainage, solid waste, air pollution and regulations. Prereq: 5800. Sp


5820 Traffic Engineering—Operations (3) Fixed- and variable-detector systems; predictive 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 in the geometric design of highways. Prereq: 4600. Sp

5850 Functional Design of City Streets and Urban Freeways (3) Effect of urban systems on growth and development; classification and function of streets, design features, including cross section, intersections, utility considerations, parking, effect of mass transportation; channelization; marketing; lighting; freeway, frontage road, surface street system. Prereq: Consent of instructor. Su

5860 Urban Transportation Planning (3) Predictio of traffic demands and vehicular flows; land use planning; parking needs. Prereq: 5810. F

5870 Public Transit Planning (3) Person move- ments, rapid transit, public transit, rail transit, public transit; its various roles and how they fit community's need; user preferences; modal split models; total transit, passenger rail, non-urban impacts of public transit. Prereq: 4600 or graduate standing. Sp, A
of wind shear and diffusion from urban area sources. Prereq: 5725.

5900 Special Problems in Environmental Engineering (1-6, 1-6) 3 Problems and topics related to current developments in field of environments not included in other courses. May be repeated. Maximum 9 hrs. S/NC only. E

5910-20-30 Special Topics (1-6, 1-6, 1-6) Problems and topics related to current developments in field of environments not included in other courses. May be repeated. E

5990 Environmental Engineering Seminar (1) All phases of environmental engineering including reports on current research at The University of Tennessee, Knoxville. Course credit not applicable to graduate degree program. Prereq: Active graduate standing in environmental engineering. May be repeated. S/NC only. E

6510 Industrial Waste Unit Operations and Processes (3) Laboratory and pilot plant development of physical, chemical and biological variables for treatment of industrial wastes and residuals, utilization of variables in design. Preq: 5501, 5502, 5503, 5505, 3 hrs and 1 lab.

6520 Industrial Waste Management (3) Sources and characteristics of industrial wastes, recycling, waste reduction, energy recovery, resource recovery, and treatment options, ultimate disposal of residuals including thermal processes, land application, recovery, and encapsulation; design oriented. Field trips. Preq: 5501, 5502, 5503.

6530 Rate Processes in Environmental Pollution (3) Application of scientific principles concerning movement and fate of chemicals at interfaces of three geospheres of environment (air, water and earth solids). Development of intuitive sense to enhance problem solving. Preq: 5501, 5503 or consent of instructor.

6910-20-30 Special Topics in Environmental Engineering (3, 3, 3) Selected advanced problems of current interest in environmental engineering. Preq: 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:


Associate Professors:

J. D. Birdwell, Ph.D. Massachusetts Institute of Technology; D. W. Boulton, Ph.D. Vanderbilt; J. S. Lawler, Ph.D. Michigan State; D. Rosenberg, Ph.D. New York; J. W. Waller, Ph.D. Tennesseee.

MASTER OF SCIENCE PROGRAM

Graduate work leading to the Master of Science degree in Electrical Engineering may be completed during the third, fourth, or fifth year of full-time study, or the degree may be obtained in two or three years of study in the evening. Graduate assistantships are available for outstanding students, who may obtain the Master’s degree in one calendar year.

MASTER OF ENGINEERING PROGRAM

A graduate program leading to the Master of Engineering degree is available to qualified graduates of A.B.E.T.-accredited undergraduate curricula in electrical engineering or its equivalent.

A minimum of one-third of the program must be in engineering design, and one-third in one of, or a combination of, advanced math, computer sciences, basic sciences, or engineering sciences.

DEGREE REQUIREMENTS

Specific degree requirements which must be met 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 5650-60, 5720-30, or 5750-60 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, 4850, 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 coursework.

DOCTORAL PROGRAM

The Ph.D. degree with a major in Electrical Engineering may be pursued in the areas of circuit theory, computers, electrical, communication theory, electromagnetic theory, plasma engineering, power systems, solid-state electronics, and control systems. Specific departmental requirements for the Ph. D. degree include the following:

1. A Master of Science or Master of Engineering degree.

2. A minimum of 72 quarter hours of coursework beyond the B.S. degree excluding thesis, research, and dissertation credit.

a. A minimum of 36 quarter hours of work in electrical engineering at the 5000 and 6300 levels.

b. A minimum of 12 quarter hours of 6000-level course work. At least 3 quarter hours of this work must be in an area other than the student’s major area.

c. A minimum of 18 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.
3. A minimum of 36 quarter hours credit in doctoral dissertation.
4. One foreign language if the student's faculty committee finds that a reading knowledge of a foreign language is crucial to the student's research efforts.
5. Satisfactory performance on both a qualifying and comprehensive examination.

The qualifying examination is prepared by the electrical engineering faculty and consists of a 3-hour written examination in each of four areas. Areas (1) mathematics and transform methods, and (2) basic passive and active networks are required of all Ph.D. students. Areas (3) and (4) are usually chosen from two of the 12 graduate course divisions in the department and cover material from the student's doctoral committee before the student is reported as ready for admission to candidacy for the Ph.D. degree.
6. Participation in departmental seminars.
7. Many of the electrical engineering courses are strongly recommended for non-electrical engineering majors. Engineers working in industry are encouraged to participate in the department's graduate program.

Departmental graduate programs provide special opportunities for advanced study 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 networks and systems; Laplace transform method and classical differential equation methods for system analysis; complex frequency response, pole-zero concept and pole-zero zeros; applications to engineering problems. Prereq. 2000.
3050 Basic Field Theory (3) Forces between charges, electric and magnetic fields, Gauss's law and divergence, potential and line integrals, material bodies, polarization, magnetic circuits, Maxwell's equations, dynamic potentials. Prereq: Mathematics 2600.
3060 Propagation I (3) Propagation of waves in transmission lines and in other guiding systems. Impedance and reflectance analysis of wave, standing wave and traveling wave measurements. Introductions to impedance matching, transmission line filtering, microstrip circuit construction, graphical and computerized design methods. Prereq: 3050. 3 hrs including weekly lab. 
3080 AC Power (3) Magnetic circuits, iron cored coils; transformers, construction, calculation of performance from equivalent circuit, parameters for equivalent circuit, 1-phase and 3-phase connections, "per unit" notation, induction motors, constructional features, analysis of performance using equivalent circuits, 1-phase and 3-phase applications. Prereq: 3010, Physics 2310.
3090 Energy System Operation (3) Power system component modeling and system structure. Basic analysis techniques function of arithmetic, dispatch, transient stability, faults, and system protection. Prereq. 3080.
3110 Basic Electrical Engineering—Circuits and Fields (3) For non-electrical engineering majors. Prereq: Mathematics 2850, Physics 2310-30. 3 hrs including weekly lab.
3120 Basic Electrical Engineering—Electronics (3) For non-electrical engineering majors. Prereq: 3110. 3 hrs including weekly lab.
3130 Basic Electrical Engineering—Machinery (3) For non-electrical engineering majors. Prereq: 3110. 3 hrs including weekly lab.
3180 Logic Design of Digital Systems (3) Introduction to boolean algebra and design of combinational circuits. Presents the gate and flip-flop characteristics. Design of clocked and other digital systems containing memory. Introduction to microcomputer architecture and system components to include basic circuits and latch circuits. Design of chips and other systems. Prereq: 3010 and 3090. 3 hrs including weekly lab.
3190 Plasma I (3) Engineering applications of physical electronics, plasma effects and devices. Topics include electrostatic precipitators and plasma light sources, laser operation and applications (electro-optics), and MHD, controlled thermonuclear and plasma devices. Prereq: 3120, 3130, 3150. Coreq: 3190. 3 hrs including weekly lab.
3210 Basic Electronics I (3) Band theory fundamentals, theory and applications of p-n junctions; simple power supplies; theory of operation of field-effect transistors and applications in simple circuits. Coreq: 2000. 3 hrs including project laboratory.
3215 Basic Electronics II (3) Physical operation of bipolar transistors and vacuum tubes with applications in basic amplifiers. Integrated circuit fundamentals. Prereq: 3610. 3 hrs including project laboratory.
3216 Basic Electronics III (3) Frequency and transient response of open-loop transistor amplifiers. Fundamentals of integrated-circuit operational amplifiers and basic feedback configurations. Basic digital switching circuits. Prereq: 3820. 3 hrs including project laboratory.
4020 Direct Energy Conversion (3) Background physics; conversion devices including photovoltaic power source, thermoelectric generators and heat pumps, magnetohydrodynamics, fuel cells, related aspects of d.c.-a.c. inversion and energy storage. Prereq: 3080. 4 hrs including weekly lab.
4080 Microwave Circuits and Electronics (3) Scattered wave description of circuits, to include isolators and amplifiers, couplers and power dividers, circulator phase shifters, loading and interconnection of systems. Power generation and amplification by vacuum devices and by solid state (bulk and junction devices). Microwave switching, filtering and multiplexing. Prereq: 3060. 3 hrs including weekly lab.
4090 Propagation II (3) Metal tube, dielectric rod, and stripline waveguides. Waveguide resonators and other loading components. Design of structures utilizing microwave transmission and microwave integrated circuits. Prereq: 3060. 4 labs.
4410 Power System Components and Control (3) Modeling of transmission lines and cables; R-L-G calculations and power flow limitations. Control of real and reactive power flows in interconnected power systems; the PF and QV control problems. Prereq: 3090.
4430 Transmission, Distribution, and Protection (3) Studies in underground and d.c. transmission; consideration of over-voltages and insulation requirements; system protection against faults. Prereq: 3860, 3090.
4460 Lasers and Masers (3) Introduction of principles of laser and maser operation based on classical and quantum mechanics. Consideration of practical devices and applications.
4470 Plasma II (3) Magnetohydrodynamics. Prereq: 3190.
4480 Plasma III (3) Macroscopic plasma equations, particle orbits, interactions, oscillations and waves. Prereq: 3190.
4500 Electro-optics Detection and Instrumentation (3) Sensitivity, resolution (frequency response) and noise conceots and practical engineering data for both spatial recording media (e.g. photographic emulsions) and temporal detectors (e.g. photodiodes). The design of detectors is an area of specialization where the student may be involved in the design and testing of devices. Prereq: 3090, 3120, 3130, 3150, 3190. 3 hrs including weekly lab.
4550 Antennas and Propagation (3) Propagation channels, antennas, arrays and other simple antennas. Prereq: 3090, 3120, 3130, 3150. 3 hrs including weekly lab.
4570 Electro-Acoustics (3) Wave equation for sound, radiation from pistons, impedance of a piston, loudspeakers, half-space, sound systems, phonograph recording and reproduction, tape recording and re-
4600 Analog Signal Processing Circuits for Electronic Instrumentation (3) Operational amplifiers, instrumentation amplifiers and integrated circuits in signal processing. Active filters, amplifiers, attenuators, function generators, active rectifiers, and oscillators. Analysis of interconnection problems between transducers and signal-processors. Prereq: 3830. 3 hrs including project laboratory.


4620 Sequential Machine and Digital System Theory (3) Considers design aspects of pulse-mode, clock-mode, and level-mode sequential circuits. The memory and character of one- and two-dimensional iterative networks. Design of large scale digital systems using MSI and LSI technologies. Introduces principles of reliability and error detection in digital systems. Prereq: 3180. 3 hrs including biweekly lab.

4630 Digital System Organization and Design (3) Considers system organization of digital systems including minicomputer and microprocessor architectures and comparisons. Characteristics of ALU, control, memory systems, system buses, ROM, and PROM building blocks, and input-output systems are developed. Control unit organization to include control and state transition modes of operation, synchronous/asynchronous time sequencing and microprogramming of control functions. Prereq: 3180. 3 hrs including biweekly lab.

4660 Bioelectric Instrumentation (3) Nature and origin of bioelectric potentials, transducers, amplifier requirements, recording systems and noise problems. Considers system organization of bioelectric systems operating in biological systems. Biweekly lab. Prereq: 3180. 3 hrs including project laboratory.

4690 Communications Electronics (3) Receiver and transmitter design. Principles of linear and nonlinear circuits and systems. Use of SCR, triode, and JFET transistors for linear and nonlinear circuits. Two-port network analysis using active and passive components. Prereq: 3180. 3 hrs including project laboratory.


4740 Integrated Circuits (3) Processing and fabrication of active and passive components for monolithic circuits. Design techniques for linear and digital circuits. Prereq: 3830. 3720. 3 hrs including project laboratory.

4780 Synchronous Machines (3) Construction and application, analysis of performance from equivalent circuit models for round rotor and salient pole machines. Park's transformation to the 2-axis model and use in transient studies; sinusoidal and fundamental 2-axis equivalent to generalized theory of electrical machines. Prereq: 3090.

4790 Controllable Motor Drives (3) Constructional features and design parameters for usual variations of the d.c. motor; a.c. servomotor; stepping motor; development of transfer functions and examples of their application in control system. Prereq: 3090.

4800 Hardware-Software Interface in Minicomputer and Microprocessor Design (3) Introduces minicomputer and microprocessor interface design. Hardware-software interaction and trade-off. Programmable logic design techniques and integrated logic. Telecommunications are developed. Project oriented, contract course. Completion of two projects utilizing a minicomputer and one or the other microcomputer, are minimal course requirements. Prereq: 3180.

4810 Discrete-Data Systems (3) Introduction to analysis and design of discrete data control systems using frequency domain techniques, real-time digital filtering techniques; application of digital computers in closed-loop feedback systems. Prereq: 3720.

4820 Introduction to Pattern Recognition (3) Role of pattern recognition within framework of artificial intelligence. Topics dealing with the design of learning and adaptive machines. Typical applications of pattern recognition to real-world significance. Computer simulation of elementary pattern recognition problems. Prereq: Either 3100 and Computer Science 3450 or Computer Science 1510. (Same as Computer Science 4820.)

4830 Digital Image Processing (3) Principal methods for coding, storing, and processing images by means of digital computer algorithms for image operations. Prereq: 3100 and Computer Science 3150, or Statistics 3450 and Computer Science 1510. (Same as Computer Science 4830.)

4850 Small Computer Systems (3) Basic structure of small computer systems, input-output techniques, interrupt structures, peripheral devices, system software and assembly language programming. Course includes Biogenic 1410, Computer Science 1510 or 3150 or consent of instructor. (Same as Computer Science 4850.)

4910-20-30 Special Electrical Engineering Problem (3, 3, 3) Lectures and seminars in electric engineering involving library and experimental research.

5000 Thesis (1-15) P/NP only. E. Computer Science 1510 or 3150 or consent of instructor. (Same as Computer Science 4850.)

5050-50-60 Electrical Engineering Research (3, 3, 3) Research on electric engineering problems in field of special interest to student. Prereq: 3180. 3 hrs including project laboratory.


5120 Network Synthesis and Design (3) Frequency domain and time domain synthesis of network functions; realization methods. Use of network functions, works by R. L. and C elements; approximation problem and filter design; computer aided techniques. Prereq: 5070 or equivalent.


5175 Introduction to Logic Design (3) Combinational circuit and sequential network design. Digital modules and memory devices. Asynchronous and synchronous sequential circuits. Applications as in finite state machines, identification experiments on sequential machines. Biweekly lab. Prereq: Elementary linear algebra and calculus of several variables. (Same as Computer Science 5175.)


5220 Advanced Electrical Machinery Applications (3) Linear motors; pole amplitude modulation and other special techniques; variable frequency operation. Prereq: 5210.

5240-50-60 Control Systems Design I, II, III (3, 3, 3) Analysis and design of continuous and digital control systems using classical and modern techniques. Frequency of the state system and interlocking; stability analysis; system response analysis; design of estimator and observer, system stabilization. Emphasis on engineering aspects of control systems. Coreq: 5070 or equivalent.

5271 Modern Systems Theory I (3) Introduction to linear systems theory. State-space model, linear dynamical system, state transition map, matrix ex-
5420 Fault and Load Flow Studies (3) Analysis of power system under short and series fault conditions. Prereq: 5410 or consent of instructor. 5430 Power System Stability and Control (3) Analysis of power systems for steady-state and transient stability. Prereq: 5410. 5440 Distribution System (3) Electric power distribution with particular reference to utility systems. System growth and planning, operation and regulation. Prereq: 4410, 4420, 4430 or equivalent. 5460 Selected Topics in Power Systems (3) To meet special needs of students. Possible topics: power systems reliability, interconnected system theory, power plant operation, electrical transients in power systems, and power system relaying. Prereq: Consent of instructor. May be repeated with consent of department.

5510-20-30 Advanced Analog Electronics (3, 3) Physical operation of modern electronic devices with emphasis on transistors, vacuum tubes, field-effect devices such as JFETs, bipolar transistors, and MOSFETs. Small-signal equivalent circuits and noise model of active devices. Design of linear and wideband low-noise feedback amplifiers and radio-frequency amplifiers using discrete, monolithic and hybrid devices. Voltage and current feedback organizations, 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: Mathematics 4510 or 4710. Project laboratory included.

5540 Thick-Film Hybrid Microcircuits (3) Processing and design basic techniques for prototype production of hybrid thick-film integrated circuits; from circuit design through packaging; properties of thick-film pastes; cost-effective design techniques. Project oriented, includes biweekly laboratory.

5570-80-90 Advanced Electronic Switching Circuits (3, 3, 3) Switching circuits using active devices in discrete, monolithic, and hybrid configurations, clipping and clamping circuits, negative resistance circuits, comparators, time-base generators, sweep circuits, blocking oscillators, analog switches, logic families, registers and counters, analog-to-digital and digital-to-analog converters, and digital memory devices. Prereq: 4703 or consent of instructor. Project laboratory included.


5615-20 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 week per student. Coreq: Mathematics 4510 or 4710.


5660-60 Electronic Communication Systems (3, 3) Information transmission in communications systems; mathematical treatment of modulation and demodulation in analog and pulse-type systems. Bandwidth requirements, transmission performance, noise in all modern systems; emphasis on digital data systems. Prereq: 5710.

5670-60 Pattern Recognition (3, 3) (Same as Computer Science 5640-50).

5690 Artificial Intelligence (3) (Same as Computer Science 5640-50).

5710 Random Process Theory for Engineers (3) Probability and random variables as approached by set theory. Statistical averages and transformations of random variables. Random processes, stationarity, correlation functions and temporal analysis, power spectrum and spectral analysis as applied to response of systems to random signals.


5740 Digital Processing of Signals (3) Analysis of discrete signals; sampling theorem and its implications; frequency domain design of digital filters; quantization effects; processing of digital signals; discrete Fourier transform. Prereq: 4100 or equivalent.

5750 Radar Systems Analysis (3) Basic radar principles; signal propagation in ocean and land and mobile applications; pulse tracking radar. Antennas, transmitters, low-noise receivers, target characteristics, signal design, resolution and accuracy. Prereq: 5710.

5770 System Identification (3) Various identification techniques, computer-based, and hierarchical methods. Application in all areas of engineering and science. Prereq: Consent of instructor.

5800 Power Transmission Lines (3) New and un-conventional 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: 4410-20-30 or equivalent.

5810-20 Electromagnetic Fields (3, 3) Vector analysis, Maxwell's equations, special relativity, plane waves, reflections, waves in anisotropic media, guided waves, rectangular and cylindrical wave guides, radiation from current elements. Coreq: Mathematics 4510 or 4710.

5830 Linear Antennas and Antenna Arrays (3) Hertzian dipole, linear antennas, impedance loop antennas, receiving antennas, linear arrays. Prereq: 5840 or consent of instructor. Project laboratory included.

5840 Aperture Antennas (3) Huygens principle, equivalent currents, Fourier transform and optical transfer function. Horn, lens, and reflector antennas. Prereq: 5650.

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: 5820.

5860 Electromagnetic Wave Propagation (3) Wave propagation in isotropic and anisotropic media, transmitted power, stored energies, propagating and nonpropagating modes, orthogonality properties, and radiation conditions, sources. Prereq: 5820.

5870 Introductory Microwave Networks (3) Circuit equivalents for n-port, junctions, obstacles, loading and fillets. One way and two way devices, directivity and isolators, device parameters, measurement, reflection charts. Prereq: 5810. Coreq: 5820.

5930 Digital Image Processing (3) Theory and techniques of gray level and two dimensional sampling and interpolation, image representation, transformation, restoration, reconstruction, image description, scene analysis and scene matching. Prereq: 4830 or consent of instructor.

5940-50 Advanced Small Computer Systems (3, 3) Real-time applications, memory and CPU organization, interface software, and peripheral devices of digital and microcomputer systems. Prereq: 5900. Project-oriented study. Project-oriented written and oral reports, supervised by a faculty advisor. Prereq: 4850 or equivalent or consent of instructor. (Same as Computer Science 5940-50.)

6000 Doctoral Research and Dissertation (3-15) P/NP only. E.

6240-50-60 Advanced Systems Theory II, III, 3 (3, 3) Advanced topics in modern theory. Topics vary. 6240—Modern systems theory, control problem, information and control problem, hierarchical systems, reliability, control, 6250—Algebraic and geometric systems, theory, systems, theory defined on groups, 6260—Qualitative analysis of systems, nonlinear systems analysis, stability theory. Need not be taken in sequence. Prereq: 5271-81-91 or consent of instructor.

6270-80-90 Special Topics in Systems Methodology (3, 3) Advanced topics of current interest to system analysts and engineers. Discussion of new developments as found in current literature. Prereq: Consent of instructor.


6500-10 Electrical Conduction in Gases and Plasma Physics (3, 3) (Same as Physics 6500-10.)

6530 Special Topics in Image and Pattern Analysis (3) Discussion of recent developments in current literature. Prereq: 5870-80 (Computer Science 5840-50) and 5830 or consent of instructor.


6760 Coding Theory (3) Mathematical structure of algebraic and probabilistic codes. Coding metrics and bounds, linear codes, linear feedback shift registers, convolutional codes, burst-error correcting codes and decoding methods. Prereq: 5710 or consent of instructor.

6810 Advanced Topics in Electronic Instrumentation (3, 3) Selected advanced topics in electronic instrumentation based on particular interest of students. Fundamental physical processes in instrumentation transducers including thermo-electric, magneto-electric, electromagnetic and quantum-mechanical devices. Physical operation of modern digital, monolithic, and hybrid electronic structures and their application in signal processors. Resolution, sensitivity, noise, static, and dynamic considerations in signal processors used in modern


**Engineering Administration**

5002 Non-Thesis Graduation Completion (3-15)

Prerequisites: Before entering a program; the student will be advised as to any prerequisite courses, which constitute one or two areas of concentration under item 2. 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.

5900 Project in Engineering Administration (3)

Study and formal report of engineering administration topic, normally performed during last quarter of work toward degree. For M.S. in Engineering Administration candidates only. May be repeated. Maximum 3 credit to be applied toward degree. Must register for 5900 until project is complete. S/NC only.

**Engineering Science and Mechanics**

**MAJOR**

**DEGREES**

**Engineering Science**

M.S., Ph.D.

Professors:


Kansas State, P.E.; J. E. Stoneking, Ph.D. Illinois, P.E.; D. G. Thomas, Ph.D. Ohio State, P.E.

Associate Professors:


Assistant Professors:

W. J. Jones, Ph.D. Clemson; O. Soliman, Ph.D. Tennessee.

Graduate programs leading to the degrees of Master of Science and Doctor of Philosophy with a major in Engineering Science are available to graduates of recognized curricula in engineering, mathematics, or one of the physical or biological sciences. Program options include solid mechanics, fluid mechanics and biomedical engineering. In the biomechanical and engineering science option, interdisciplinary programs are arranged to meet individual needs or interests. Each applicant will be advised as to any prerequisite courses before entering a curriculum. The student 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 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 72 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.

3. 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 met by interdisciplinary study in engineering. The department's course offerings and research activities are also intended to meet the needs of students who seek preparation for employment in engineering areas requiring specialization in mechanics, or in related interdisciplinary studies such as biomechanics.

**THE MASTER'S PROGRAM**

Two M.S. 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</th>
<th>Credit</th>
<th>Plan I</th>
<th>Plan II</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. A minimum of 9 quarter hours credit for the Master's thesis. These shall be presented to the Graduate Studies Committee. The examination will be comprehensive to test weaknesses to guide the student's graduate course work and the thesis.

5. After successfully passing the comprehensive examination, the student must present the Ph.D. dissertation research proposal to the student's advisory committee and receive committee approval of the proposal before being admitted to candidacy for the Ph.D.

6. A final examination on the student's dissertation and related fields will be taken by the student after completion of the Ph.D. dissertation and course requirements.


3410 Introduction to Biomedical Engineering (4) Designed to introduce the facets and opportunities of biomedical engineering, and to provide basic terminology and background knowledge for further courses in the field. Subjects include anatomy, physiology, biomaterials, mathematical models of body systems. Coreq. Coreq. Mathematics 2840 or consent of instructor.

3420 Introduction to Clinical Engineering (3) Applications in clinical/hospital setting; description, analysis, and design of health care delivery systems; hospital organization and structure; clinical use of biomedical equipment; principles of safety engineering in the hospital and applicable codes, standards
and regulations. Prereq: 3410, Physics 2320, or consent of instructor.

3700 Dynamics (4) Kinematics of rigid bodies; mass moment of inertia; central forces; Cartesian tensors; stress, deformation, and flow in nonreacting and reacting systems. Prereq: 3110, Mathematics 2850.

3710 Intermediate Dynamics (3) Three-dimensional dynamics of particles and rigid bodies; dynamics of bodies with varying mass center; vector motion; LaGrange's equations. Prereq: 3700, Mathematics 2850.

4020 Computer-Aided Design (3) Use of computer graphics and analysis programs for design of selected systems, structures, and components. Evaluation of design alternatives. Prereq: 4810.

4520 Biomedical Fluid Mechanics (3) Discuss objectives, review foundations and present developments in biomedicine and fluid mechanics. Properties of human blood and blood vessels, determinants of cardiac performance, analysis and measurement of flow and pressure in arteries, nontraumatic study of circulatory system, mechanics of microcirculation. Applications to areas of hemodynamics, thrombosis, and flow in tubular systems. Prereq: 4110 or 4540 or a course in fluid mechanics or consent of instructor.

4530 Biomechanics (3) Discuss objectives, review foundations and present developments in areas of mechanical properties of living tissues, biomaterials and injury, prosthetic devices and biomechanical problems related to their impact. Prereq: 3311 or 4550 or consent of instructor.

4540 Fracture-Safe Design (3) A critical review of mechanical properties of materials that are indicative of fracture resistance, including transition temperature, R-curves, stress intensity factors, and J-integrals; the use of these properties in design. Prereq: 3310 and Metallurgical Engineering 2110 (Same as Metallurgical Engineering 4540). 3 hrs or 2 hrs and 1 lab.

4580 Principles of Nondestructive Testing (3) (Same as Physics 4580).

4610 Experimental Stress Analysis (3) Basic concepts; theory, techniques, and instrumentation of resistance strain gage; theory and techniques of brittle coating method; introduction to other stress analysis methods. Prereq: 3310, Electrical Engineering 2020 or 3110. 2 hrs and 3-3/4 lab.

4620 Dynamic Data Acquisition (4) Instrumentation of measuring systems for dynamic events and responses; signal conditioning; oscilloscopes; and digital tape recording; telemetry and data transmission; data processing. Prereq: 3311, 4710, Electrical Engineering 3120. 3 hrs and 1 lab.


4710 Fundamentals of Vibrations (3) Free and forced vibrations of damped and undamped lumped parameter systems; energy methods. Prereq: 2720, Mathematics 2840.


4810-20 Engineering Analysis (4, 3) Integration of fundamental physical laws and mathematical methods to solve general engineering problems, with emphasis on applications to realistic engineering problems. Prereq: 3110, 3311, and Mathematics 3150.

4850 Elementary Structural Matrix Methods (4) (Same as Architecture 4660 and Civil Engineering 4660).

4860 Special Engineering Science Topics (3) Problems related to recent developments and prac-
4150 Project Control with CPM and PERT (3) A study of project control by theory of critical path, emphasis on "critical" paths techniques, including resource allocation, time-cost trade-off algorithms, multi-project control, and computer programs. Prereq: 3430.

4160 Materials Handling (3) Analysis and planning for the overall problem of moving, packaging, and storing of manufactured products. Includes both static and dynamic conditions, as well as techniques for generating production schedules. Deterministic and probabilistic dispatching conditions. Prereq: 3520.

4200 Production Facilities Design (4) Materials handling, plant layout, service areas, inventory control applications, and operating procedures design. Prereqs: 3630, 3510-20, 4060, 4520.

4230 Scheduling Systems (3) Performance measures for job shop and flow shop scheduling, including both static and dynamic conditions, as well as techniques for generating production schedules. Deterministic and probabilistic dispatching conditions. Prereq: 3520.

4250 Work Measurement Applications (3) Application of learning curves, queueing theory, standard data methods and incentive systems to the design of industrial work situations.

4520 Engineering Economy (3) Methods and problems in selection or replacement of equipment. Decisions among engineering alternatives, involving both capital and operating costs, and rate of return on investment. Not available for graduate credit.

4530 Case Studies in Engineering Economy (3) Extension of basic engineering economy principles to actual problems faced by competitive firms and regulated industries. Case studies taken from literature, bibliography, or field trip. Prereq: 3430 and Computer Science 3150.

4540 Industrial Development (3) Factors other than mechanical or chemical which enter into successful establishment of manufacturing 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. Simulation as design tool in industrial systems. Prereq: 4520 and Computer Science 3150.

4600 Predetermined Time Systems (3) Work design and measurement using predetermined time system; methods time measurement, basic motion study, work factor. Theory and application. Prereq: 3430.

4610 Human Factors in Work Design II (3) Human characteristics which influence design of tools, equipment, and communications and response in human-machine systems. Prereq: 3600, 3630, or consent of instructor.

4630 Health Systems Engineering (3) Hospital management systems and means by which they may be improved through application of modern industrial engineering principles and techniques.

4700 Forecasting Methods in Industrial Engineering (3) Application of technological forecasting techniques to industrial engineering problems. Includes multiple regression, exponential smoothing, linear and polynomial regression models, autocorrelated time-series analysis, Delphi methods and other selected industrial forecasting methods. Prereq: 4060.

5000 Thesis (1-15) P/NP only. E

5002 Non-Thesis Graduation Completion (3-15) Requires for the non-thesis degree candidates that are registered during any quarter when such a student uses university facilities and/or faculty time before degree completion. 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 methods and design.

5210 Advanced Work Measurement (3) Characteristics of predetermined time systems, application to formula construction, and practice in application. Prereqs: 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.


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.


5600 Human Factors Engineering (3) Human characteristics which influence design of tools, equipment, environments, and products. Modeling of human aspects in product or system controller. Prereq: Consent of instructor.

5610 Human Factors Engineering (3) Human operator, performance characteristics, and environmental requirements. Formal description of human operators' safer characteristics in control based on human-computer models and models describing operator as information processor. Prereq: 5600.

5700 Optimization Methods in Industrial Engineering (3) Optimization methods required in design and analysis. Linear and nonlinear techniques required in 5710, 5720, and 5730. Classical optimization theory. N-dimensional geometry and calculus of variations, selected areas of operations re-
search. Prereq: Computer Science 3150 and matrix algebra.

5701 Operations Research Applications (3) Survey of operations research techniques with emphasis on application to industrial engineering problems. Prereq: Mathematics 2360 (or equivalent), Statistics 3450, computer programming. Available for credit only to students without a B.S. degree in industrial engineering.

5710 Linear, Quadratic and Separable Programming (3) Mathematical programming: linear programming, quadratic programming, and separable programming. Computer solutions to programming problems. Prereq: Computer Science 3150 and matrix algebra.

5720 Queuing Models and Simulation (3) Theory and application of queuing line models and simulation methods employed to evaluate complex queuing systems. Data analysis and hypothesis testing related to pertinent queuing line probability density functions. Prereq: 5700, 5360.

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 clinical, community, and health policy, and improvement of function and total health system. Prereq: 5420.


5900 Design Project (1-9) Industrial engineering topics to fulfill design project requirement in non-thesis program. Enrollment limited to industrial engineering majors. May be repeated. Maximum 9 hrs. S/NC only.

5910-20-30 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.


6910 Advanced Topics in Industrial Engineering (3) Will cover topics not covered in other graduate courses. A forum for advanced graduate students to study individually or in group as appropriate. Prereq: Graduate standing and consent of instructor. May be repeated with consent of department.

**Mechanical and Aerospace Engineering**

**MAJORS**

Aerospace Engineering  
Mechanical Engineering  
Civil Engineering

**DEGREES**

M.E., M.S., Ph.D.

**Course Requirements**

**Aerospace Engineering**

- D. R. Pitts (Head), Ph.D. Georgia Institute of Technology; J. F. Bailey (Emeritus), Ph.D. Denihi, P.E.; F. G. Collins*, Ph.D. California (Berkeley).

**Associate Professors**


**Assistant Professor**

- P. E. George, Ph.D. Purdue.

**GRADUATE STUDY PROGRAMS**

Graduate programs in Mechanical Engineering or Aerospace Engineering are available which lead to the degrees of Master of Science, Master of Engineering, and Doctor of Philosophy with concentrations in:  
- Aeronautics, Astronautics, and Space Engineering  
- Biomedical Engineering  
- Materials Science and Engineering  
- Mechanical Engineering  
- Aerospace Engineering

**Aerospace Engineering**

Courses in the Aerospace Engineering option are designed to prepare students for careers in aerospace engineering and related fields. The program emphasizes the application of analytical and computational methods to solve problems in aerospace systems. Students will develop a strong foundation in the fundamentals of aerodynamics, thermodynamics, materials, and structural analysis. The program also includes courses in flight dynamics, propulsion systems, and flight control systems. Students will have the opportunity to work on research projects and engage in independent studies. The program is accredited by the Accreditation Board for Engineering and Technology (ABET). Admission to the program requires completion of undergraduate coursework in mathematics, physics, and engineering fundamentals. النهائيات الدراسية للبرنامج

**Mechanical Engineering**

Courses in the Mechanical Engineering option are designed to prepare students for careers in mechanical engineering and related fields. The program emphasizes the application of analytical and computational methods to solve problems in mechanical systems. Students will develop a strong foundation in the fundamentals of mechanics, thermodynamics, materials, and structural analysis. The program also includes courses in manufacturing processes, design, and control systems. Students will have the opportunity to work on research projects and engage in independent studies. The program is accredited by the Accreditation Board for Engineering and Technology (ABET). Admission to the program requires completion of undergraduate coursework in mathematics, physics, and engineering fundamentals. النهائيات الدراسية للبرنامج

**Requirements for Admission**

- A minimum GPA of 3.0 on a 4.0 scale for all undergraduate coursework.
- Completion of the following prerequisite courses:  
  - Calculus (calculus, linear algebra, differential equations).
  - Thermodynamics.

**Program Options**

- **Master of Science Program**
  - Admission to the Master of Science program is granted to students who have demonstrated superior achievement in their engineering background.

**Qualification for Entry**

- A minimum GPA of 3.0 on a 4.0 scale for all undergraduate coursework.
- Completion of the following prerequisite courses:  
  - Calculus (calculus, linear algebra, differential equations).

**Graduation Requirements**

- A minimum of 36 quarter hours of coursework is required for the Master of Science degree.
- At least 18 quarter hours of the coursework must be completed at the University of Pennsylvania, with at least 9 quarter hours in graduate-level courses.

**Thesis Option**

Students may choose the thesis option, which requires the completion of a comprehensive written thesis. The thesis must be approved by the student's committee.

**Non-Thesis Option**

Students may choose the non-thesis option, which requires the completion of a comprehensive written final examination. The examination must be approved by the student's committee.

**Additional Requirements**

- Students must maintain a minimum GPA of 3.0 on a 4.0 scale for all coursework.
- Students must complete a minimum of 36 quarter hours of coursework.
- Students must complete a minimum of 9 quarter hours of graduate-level coursework.

**Financial Assistance**

The University of Pennsylvania offers a variety of financial assistance options to support graduate students, including teaching and research assistantships, fellowships, and loans.
and design characteristics including new technology development; selected direct conversion techniques.

4150 Energy Conversion Systems (3) Fossil fuel systems with emphasis on coal technology.

4160 Design of Energy Conversion Systems (3) Synthesis and design of system including economic and technical aspects. Participation in team design effort including formal presentations and design report.

4170 Turbo-Machinery (3) Basic principles of turbo-machinery; systematic methods or analysis, design, performance evaluation, and characteristics. Solution of coupled effect of fluid-mechanical bearing system.

4180 Energy Production and Utilization (3) Thermodynamics 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.

4420 Heat Transfer (3) Heat transfer by free and forced convection, heat transfer with phase changes, heat exchanger applications.

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, temperature, pressure, transducer rates, and physical properties. Planning, conducting, analyzing, and reporting experimental tests run according to test standards and other specifications.

4621 Manufacturing Processes (3) Comparison of machining methods, plastic production, metrology and fixture design, selection of manufacturing operations, redesign of product to reduce cost.

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) Design of complete manufacturing system for selected manufacturing techniques. Prereq: 4631 or 4612.

4651 Manufacturing Process Engineering I (3) Product specification: dimensional analysis of size and form, function, cost, and tolerance theory; tolerance analysis; and workpiece control for production to tolerance.

4652 Manufacturing Process Engineering II (3) Selection of materials in design process, emphasizing relationship between stress and strain analysis, material properties, environment, temperature, manufacturing technology and cost.

4656 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.

4710 Thermal Environmental Systems (3) Vapor compression and absorption cycles; heat pump systems; moist air properties; psychrometric processes. Design analysis 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 (2) Nature and availability of solar radiation; review of selected heat transfer topics pertinent to solar energy collection and use; design analysis of solar energy collectors and method of storage; selected applications.

4810 Internal Combustion Engines (3) Thermochemical phenomena in internal combustion and propulsion engines; combustion, detonation, equilibrium, dissociation. Analysis of internal combustion engines using ideal and real fluids.

4910-20 Selected Topics in Mechanical Engineering (3, 3) Problems related to developments and practice in mechanical engineering.

5000 Thesis (1-15) P/NP only. 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/C 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 heat transfer and fluid properties. Prereq: 5310 or equivalent.


5140 Phase Change Heat Transfer (3) Fundamental mechanisms, modeling and prediction of nucleate, transition and film boiling; critical heat flux; forced convection boiling and post dry-out heat transfer; two phase flow and pressure drop; condensation heat transfer. Prereq: 5120 or consent of instructor.

5210 Classical Thermodynamics (3) Macroscopic thermodynamics with emphasis on First and Second Law analyses, equilibrium criteria, and thermodynamics of phase relationships. Prereq: 3330.

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 for two dimensional and steady flows; viscous flows with emphasis on boundary-layer theory. Prereq: 3410.


5410-20-30 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.

5650-50-60 Advanced Strength of Materials (3, 3) Problems related to developments and practice in mechanical engineering.

5661 Dynamics of Mechanical Systems (3) Computational techniques derived from Lagrangian mechanics and Eigenvalue analysis for application to complex mechanical systems. Prereq: 4631 or consent of instructor.
5602 Computer Aided Mechanical Design (3) Application of matrices and computational techniques in the static and dynamic analysis and redesign of complex systems and structures under thermal and load conditions. Prereq: 5601 or consent of instructor.

5610-20-30 Experimental Stress Analysis (3, 3, 3) Theory of elasticity; experimental methods; photoelasticity; strain gages, lacquer coatings.

5640-50-60 Advanced Machine Design (3, 3, 3) Design of bearings, gears, shafting; lubrication.

5670-80 Dynamics of Machinery (3, 3) Kinematics and dynamics of fixed, moving, and rotating coordinate systems; linear and angular momentum; energy methods; variable mass; rigid body dynamics; Lagrangian methods. Prereq: 3610, 3910.

5690 Vibrations of Mechanical Systems (3) Free and forced vibration of single and multiple degree of freedom systems; linear and nonlinear. Prereq: 3630.

5710 Metal Machining (3) Analytical approach to machines of machining. Basic phenomena—plastic flow, fractures, friction and wear. Prereq: 3650, 3440, and Metallurgical Engineering 2110.

5800 Transfer Matrix Methods in Elastomechanics (3) Transfer matrix methods to static and dynamic lumped parameter elastic systems in mechanical engineering. Calculation of forced response of mechanical systems to harmonic excitations and rotating shafts having complex end conditions. Balancing of rotating shafts. Accuracy and numerical considerations. Graduate standing in engineering and consent of instructor.


5840-50-60 Turbomachinery Systems (3, 3, 3) Design and operation, and systems integration of turbomachinery components. Prereq: First year graduate standing and consent of instructor.

5870 Dynamic Modeling and Simulation (3) Modeling physical systems including mechanical, thermal, hydraulic, pneumatic and electromechanical systems. Techniques for experimenting on real-time systems. Analog and digital computer simulation techniques. Prereq: 3650, 4420, and Aerospace Engineering 3511.

5900 Selected Engineering Problems (3-9) Selected problems in mechanical engineering to fulfill requirement of Problems Program. Enrollment limited to students in Problems Program. Prereq: Consent of advisor. May be repeated. S/NC only.

5930 Seminars (1) All phases of mechanical engineering, including reports on current research at The University of Tennessee, Knoxville. May be repeated. S/NC only.

5990 Special Topics in Mechanical Engineering (1-3) May be repeated.

6000 Doctorial Research and Dissertation (3-15) P/NP only. 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 high-temperature systems; radiative characteristics of luminous flames and nonluminous gases; radiation by planetary atmosphere. Prereq: 5110-20-30; Mathematics 4550.

6420 Selected Topics in Thermodynamics (3) Comparison of macroscopic and microscopic approaches to equilibrium of pure substance; metastable states. Prereq: Consent of instructor.

6430 Selected Topics in Thermodynamics (3)
6910 Advanced Topics in Gasdynamics (3) Selection of topics based on particular interests of students: nonequilibrium transport phenomena, radiation gasdynamics, nonequilibrium gasdynamic flows, advanced kinetic theory, perturbation techniques. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

Nuclear Engineering

Majors: Nuclear Engineering M.S., M.E., Ph.D.

Professors: P. F. Pasqua (Head), Ph.D. Northwestern, P.E.; H. J. D. Dodds (Chairman), Ph.D. Physics, Ph.D. Georgia Institute of Technology; T. W. Kerlin, Ph.D. Tennessee; J. T. Mihalezo, Ph.D. Tennessee; B. Perez, Ph.D. Madrid (Spain); H. C. Roland, Ph.D. Tennessee; N. Stevens, Ph.D. Northwestern, P.E.

Associate Professors: E. M. Katz, Ph.D. Tennessee, P.E.; L. Miller, Ph.D. Texas A&M, P.E.; B. Upadhyaya, Ph.D. California.

The Department of Nuclear Engineering offers degrees leading to the Master of Science, Master of Engineering, and Doctor of Philosophy with specialization in nuclear dynamics, nuclear reliability and risk, radiation transport, thermal hydraulics, and core analysis.

MASTER OF SCIENCE PROGRAM

A graduate program leading to a degree of Master of Science is available to graduates of recognized undergraduate curricula in engineering and physics. Each applicant will be advised as to the necessary prerequisite courses before he/she enters the program.

The student must complete a program of study of 45 quarter hours which has been approved by the student's advisory committee and which includes the following:

1. A major consisting of a minimum of 18 quarter hours of graduate courses in nuclear engineering.
2. A minor of 9 quarter hours in mathematics, statistics or computer science.
3. A master's thesis which demonstrates research or design capabilities.
4. Final examination covering the thesis and graduate course work.

An alternate program is available for the Master of Science degree which involves engineering practice rather than a thesis. The student must complete a Program of study which includes the following:

1. Thirty-six quarter hours of course work similar to the requirements for the regular Master of Science program (see above).
2. Twenty-four quarter hours of Nuclear Engineering 5980. A student usually registers for 6 hours of Nuclear Engineering 5980 each quarter and investigates projects assigned by a member of the faculty. At the end of each quarter the student submits a written report and makes an oral presentation of the work.
3. Final examination covering graduate course work and practice school problems.

MASON OF ENGINEERING PROGRAM

A graduate program in Nuclear Engineering leading to the degree of Master of Engineering is available to those graduates with an accredited engineering degree or one which satisfies A.B.E.T. basic level criteria.

In addition to Graduate School requirements the following degree requirements must be met:

1. Thirty-six quarter hours of course work, 18 of which must be in graduate nuclear engineering.
2. A minimum of 9 hours of design project, thesis, or 24 hours of Nuclear Engineering Practice (5980). Documentary proof of significant engineering experience may be submitted in lieu of the design project, thesis or Nuclear Engineering Practice, but in this case 45 hours of course work are required.
3. Nine hours of seminar work submitted must be from out of department.
4. A minimum of one-third of the program must be in engineering design, and one-third in one of, or a combination of, advanced math, computer sciences, basic sciences, or engineering sciences.
5. A candidate must pass a final oral examination on all work presented for the degree.

THE DOCTORAL PROGRAM

Students in the field of nuclear engineering desiring to study for the degree of Doctor of Philosophy must have a Bachelor of Science or Master of Science degree from a recognized university, with a major in engineering or physics, and present at least a B average. All candidates are required to satisfactorily demonstrate general competence in a comprehensive examination in the areas of engineering science, mathematics, and physics. At the same time, all candidates will be required to demonstrate special competence in nuclear design.

Specific course requirements for the Ph.D. degree in Nuclear Engineering include:

1. A minimum of 72 quarter hours credit beyond the Bachelor's degree, exclusive of credit for the M.S. thesis or Nuclear Engineering Practice.
2. A minimum of 36 quarter hours of credit in doctoral research.
3. A minimum of 45 quarter hours in nuclear engineering courses numbered 5000 and above (or the equivalent), with at least 12 quarter hours of 6000-level courses. These are exclusive of thesis or dissertation credit.
4. A minimum of 18 quarter hours in mathematics, computer science, or statistics in courses beyond nuclear engineering undergraduate requirements. Must be numbered 4000 or above.
5. A minimum of 9 quarter hours in courses numbered 5000 or above from a department other than nuclear engineering. The choice depends on the student's overall program and should expand his/her knowledge in a given field.
6. A reading knowledge of one foreign language will be determined by the student's doctoral committee.

4110-20-30 Introduction to Nuclear Reactor Theory (3, 3, 3) Nuclear structure, radioactive decay laws; neutron interaction; fission process, chain-reaction systems; diffusion equation including multigroup diffusion theory, neutron moderation; reactivity coefficients; perturbation theory. Prereq: Physics 3720 or consent of instructor. F, W, Sp

4140 Thermonuclear Systems (3) Fusion reactions; properties of plasmas; plasma containment; plasma diagnostics; thermonuclear devices. Prereq: Physics 3730, Mathematics 4550 F

4210-20-30 Nuclear Engineering Laboratory (3, 3, 3) Radiation detection and counting instrumentation; counting statistics, half-life and decay schemes, gamma spectrometry, cross-section measurements, analog computation, diffusion properties of neutrons, critical loading experiments, control rod calibration, statistical weight, shielding, xenon poisoning, prompt critical reactor behavior, fission density and

5410 Nuclear Fuel Cycle Analysis (3) Alternative systems reliability as applied to nuclear systems. Prereq: 4110 or equivalent. F, W


4710 Energy Transport (4) Development of differential and integral energy conservation equations; conduction, convection, and radiation heat transfer; system optimization procedures; description of typical systems. Coreq: 4130. Sp

4720 Reactor Thermal Design (4) Hydrodynamics and heat transfer in boiling systems; boiling crises; fuel element thermal design, steam generator design. Prereq: 4710. W

4730 Nuclear Reactor Design (3) First order reactor design, integration with non-nuclear heat transfer and power conversion system, economic evaluation; optimization procedures, description of typical systems. Coreq: 4130. Sp

4810 Radiation Shielding (3) Types of radiation sources, gamma ray and neutron attenuation, biological effects of radiation, shielding design. Prereq: Physics 3730, Mathematics 4550. Sp

4820 Reactor Kinetics and Controls (3) Derivation of kinetic equations; basic kinetic parameters; transient response with feedback; control and protective systems. Prereq: 4110. F

4840 Nuclear Reactor Safety (3) Presentation of reactor safety concepts and criteria; credible accidents; fission product release and transport; containment systems; accident analysis; engineered safeguards. Prereq: 4120. W

4910 Nuclear Fuel Management (3) Discussion of problems associated with processing of nuclear materials: fuel cycle analysis, burnup calculation. Prereq: 4120. W

5000 Thesis (1-15) P/NC only. 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

5110-20-30 Transport Processes in Nuclear Engineering (3, 3, 3) Momentum and heat transport; development of conservation equations; elementary theory of turbulence; heat transfer and flow through conduits; conduction; radiation; reactor core thermal analysis. Prereq: 4720 or equivalent. Mathematics 4710, 4550. F, W, Sp

5210 System Dynamics (3) Transient analysis, Laplace transforms, frequent response, stability (linear and non-linear), state 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 neutron and non-neutron processes. Dynamics, stability, and control of zero power reactors and power reactor systems. Prereq: 5210, 4130 or equivalent. W


5410 Nuclear Fuel Cycle Analysis (3) Alternative fuel cycles, symbiotic reactor systems and appropriate reactor systems: resource utilization, potential growth rates and system design considerations. Impact of selecting alternative systems from technical and economical viewpoints. Prereq: 4130 or equivalent.

5420 Reprocessing and Waste Disposal (3) Basic processes related to solvent extraction of nuclear fuel isotopes. Reprocessing of light water reactor and advanced reactor fuels. Disposition of radionuclides: reprocessing, site selection and environmental effects. Prereq: 4130 or equivalent. F, W, Sp


5740 Reactor Shielding (3) Application of analytical solutions of Boltzmann transport equation to shield design problems. Spherical harmonics, moments methods, numerical solutions, adjoint calculations, and invariant imbedding cases studies. Prereq: 410. F


5810 Fundamentals of Fusion Physics and Engineering (3) Basic physics of fusion plasmas and description of fusion engineering problems. Plasma properties, collision processes, electromagnetics, confinement geometries; kinetic theory; fluid equations; plasma equilibrium, transport, and stability, plasma heating and cooling; confinement experiments; fusion reactor requirements; main reactor components; and fundamentals fusion engineering problem area. W

5820 Plasma Engineering (3) Integration of plasma physics models, fusion engineering design criteria, and fusion technology constraints into design of fusion plasma experiments and reactors. Requirements of fusion reactors; particle, momentum, and energy balance equations; burn dynamics; power balance; fuel cycles; heating and fueling requirements; plasma wall interaction; and simulation of various fusion reactor plasmas. Prereq: 5810. W

5830 Fusion Technology (3) Engineering problems associated with fusion reactor design: vacuum and magnetics systems; materials and irradiation; plasma heating, fueling, and impurity control; first wall, blanket, shield, and neutronics; electrical system design, maintenance, environment, and review of major reactor design studies. Prereq: 5820. Sp

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. Prereq: 6810. W

5980 Nuclear Engineering Practice (3-12) Experienced 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) P/NC only. E

6110-20-30 Selected Topics in Reactor Theory (3, 3, 3) Selected advanced topics in nuclear engineering. 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

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.

6510 Nuclear Reactor Noise Analysis (3) Modern system theoretical methods for evaluating reactor performance descriptors from operating data. Prereq: 4610 and Electrical Engineering 5740 or equivalent.

6710 Two-Phase Flow and Heat Transfer (3) Pool boiling and flow boiling; hydraulics of two-phase flow, boiling crises, two-phase instabilities. Prereq: 5130 or equivalent. Su

6810 Plasma Engineering II (3) Continuation of 5820. Detailed modeling of plasma breakdown, start up, burn dynamics, heating and fueling, plasma wall interactions, disruptions, current drive, and stability and control. Prereq: 5620. F

6820 Fusion Reactor Design (3) Basic plasma performance requirements for fusion power systems; engineering and technological constraints and requirements; integration of physics, engineering, and technological factors to determine fusion reactor parameters. Prereq: 6810. W

6830 Special Topics in Fusion Engineering (3) Selected advanced topics in plasma engineering and fusion reactor engineering and technology. Different subject matter each quarter. May be repeated with consent of department. Prereq: 6820. Sp
Non-Thesis Option:
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 with 18 hours at the 5000 and 6000-level. A minimum of 30 hours of 5000 and 6000 level courses is required in the program. Some majors may require 9 hours in one minor area. A written comprehensive examination is required.

CONSUMER STUDIES AND HOUSING:
PUBLIC POLICY

The Master of Science in Consumer Studies and Housing: Public Policy is offered through the Departments of Child and Family Studies (CFS) and Textiles, Merchandising, and Design (TMD). Students choose either consumer studies (CFS) or housing (TMD) as the base area. A minor area comprising 12 credit hours is required; these hours are to comprise a related sequence of courses which support the student’s program and may be drawn from any unit within the University. A minimum of 9 hours must be taken outside the College, and a minimum of 27 credit hours within the College. A minimum of 30 hours at the 5000-6000 level is required. Students must also take a 3-hour course in research methods or statistics. The thesis option requires 24 credit hours in the base area, including 9 hours of thesis. The non-thesis option requires 21 credit hours in the base area, including 6 hours of practicum.

DOCTORAL PROGRAM

The doctoral program in Home Economics includes three options of study: interdisciplinary, food science, and nutrition. The interdisciplinary option is available in all departments in the College.

The doctoral program requires:
1. A minimum of 54 quarter hours in courses beyond the Bachelor’s degree exclusive of credit hours for the Master’s thesis to include a minimum of 12 quarter hours of 6000-level courses.
2. Selection of an option and fulfillment of the requirements as directed by the major professor and approved committee.
3. The faculty committee for each doctoral student shall determine whether a reading knowledge of a foreign language is required.
4. Written comprehensive examination.
5. Doctoral research and dissertation:
   Nutrition, 36 hours; Food Science, 36 hours; Interdisciplinary option, minimum 36 hours, maximum 48 hours, may be included in the 96 hours presented for the degree.
6. Final oral examination.

Other Requirements:
Interdisciplinary option: The interdisciplinary option of the Doctor of Philosophy degree in Home Economics provides for advanced graduate study with an approach that focuses on the development, integration, and application of knowledge to innovative solutions of the multi-level problems of society. A student in the interdisciplinary doctoral program is in the relatively unique position of having a number of alternatives available which are developed as a function of the student’s creativity within the general framework:

- Individual and Family Behavior (base department of Child and Family Studies):
  - normal developmental processes in individuals and families
  - socialization through childhood, adolescence, and adulthood
  - behavior in diverse 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 (base department of Nutrition and Food Sciences):
  - physiological response to nutrient intake
  - improvement of nutritional status through informed community action
  - cultural, economic, and technological influences on food selection.

- Environmental Factors (base department of Textiles, Merchandising, and Design or Nutrition and Food Sciences):
  - design, space planning, housing, food service systems, clothing, and textiles as they relate to human needs
  - cultural, sociological, psychological, and economic change
  - technological developments
  - aesthetics in improving the quality of the environment.
Consumers' Economic and Social Well-being (base department of Child and Family Studies: Textiles, Merchandising, and Design; or Nutrition and Food Sciences):  
- relationship between family structure and decision-making processes in the use of human resources
- effects of social macro- and microeconomics and political development on consumption patterns and other behavior
- community programs to meet the socioeconomic needs of consumers

1. Home Economics 6110-20; prerequisite is 5210.
2. Twenty-four to 36 hours from two areas in the College of Home Economics.
3. Fifteen to 24 hours in collateral or supporting courses in other colleges in the University including courses to give sufficient competence in statistics and research methods needed for dissertation research.
4. Doctoral research and dissertation based on a problem within the interdisciplinary concentration.

Food science option:
- Twelve hours in research methods from Food Science 5510 or 5520 or Food Systems Administration 5210; 6 hours from Food Science 5810-20-30-40, 5610, Food Systems Administration 6110; and Zoology 5350 or equivalent.
- Twenty-four hours in 5000- and 6000-level courses in food science or in food systems administration.

Nursing option:
- Thirty hours of 5000 or 6000 courses in nutrition exclusive of research and Zoology 5350 or equivalent.
- 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.
- Minimum of 4 hours of credit in doctoral seminar.

APPLICATION FOR ADMISSION AND FINANCIAL AID
Requirements for admission to The Graduate School are on page 10 of this catalog. A completed Academic Common Market application and three Graduate School Rating Forms are required. These may be obtained at the Dean's Office, Jessie Harris Building, or written to:

- J. Strauss, Associate Dean for Graduate Studies and Research
- College of Home Economics
- The University of Tennessee
- Knoxville, Tennessee 37996-1900
- Phone: (615) 974-5251

Graduate Record Examination scores for the aptitude test including the quantitative, verbal, and analytical sections are required for application to all programs. Additionally, Interior Design majors require a portfolio.

DEPARTMENTS OF INSTRUCTION

Child and Family Studies

MAJORS
- Child and Family Studies
- Consumer Studies and Housing/Public Policy
- Home Economics

DEGREES
- M.S.
- Ph.D.

Professors:

Associate Professors:
- D. B. Eastwood, Ph.D. Tufts; J. Strauss (Associate Dean and Interim Head), Ph.D. Washington State; S. Twardos, Ph.D. Kansas.

Assistant Professors:
- J. Allen, Ph.D. Purdue; C. Buehler, Ph.D. Minnesota; A. Cox, M.S. Tennessee; G. Eastman, Ph.D. Cornell; J. Kidwell, Ph.D. Purdue; G. Peterson, Ph.D.; A. Brigham Young; K. G. Wodle (Assistant to the Dean), Ph.D. Tennessee.

4220 Conserving Time and Energy in the Home (3) Application of management principles to home-making activities; evaluation of equipment, work centers and work patterns in home and energy demands. Adaptations for the handicapped.

4260 Adult Development and Aging (3) Adult life in our society. Adjustment to internal and environmental changes through middle and aged years.
5170 Consumer Economics (3) Consumer func-
tions: consumer behavior, market segmen-
tation, consumer market research, govern-
ment action relating to consumers; factors
affecting prices of consumer goods.

5174 Public Consumption (3) Relationships be-
 tween consumers and public sector. Market system
factors from consumer perspective. Government venues and
expenditures in terms of their impacts on
consumers. Effects of consumer oriented public
programs. Prereq: 5170 or consent of instructor.

5180 Family Financial Consultation (3) Analysis of
family expenditure patterns, common financial diffi-
culties, avenues by which families are assisted. Field
experience with consumer consulting services. Prereq:
4210, 4830 or 5170. Sp.

5190 Standards in Consumer Protection (3) Pro-
duct and performance standards in consumer pro-
tection. Theoretical and operational questions relat-
ing to standards: analysis of costs and benefits to
consumers. Prereq: 4830, 5170 or consent of in-
structor.

5210 Theories of Child Development (3) Prereq:
4350 or equivalent. W

5220 Family Life Programs (3) School and com-
munity programs in family life; theory and eval-
uation; students concentrate on type best suited to
their experience and future professional orientation.
Prereq: 3 hrs child development, 3 hrs family rela-
tionships, 3 hrs sociology. 2 hrs and 1 lab.

5310 Theory and Research on Human Sexuality
(3) Cultural, social, and psychological dimensions of
human sexuality. Major contributions from anthropo-
logical, sociological, and psychological theory and re-
search. W

5410 Advanced Family Relationships (3) Prob-
lens in modern family life; individual adjustments,
group relationships. Prereq: 3515, 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 transac-
 tions in disordered family behavior. Prereq: 5410 or
 equivalent. W

5450 Conceptual Frameworks for the Family
(3) Theoretical perspectives for understanding families.
Exploration and applications of frameworks on theoreti-
cal and research levels. Historical to contempo-
rary topics. Prereq: 3 hrs family development, 3 hrs family
relationships, 3 hrs sociology. 2 hrs and 1 lab.

5510 Survey of Research in Child and Family Stud-
ies (3) Research literature; locating, abstracting,
reporting research studies. Prereq: 3515 or 4430 or
consent of instructor. Sp.

5520 Research Methods in Child and Family Stud-
ies (4) Research procedures in child and family be-
havior; basic methodology of behavioral sciences.
Recommended as prerequisite to beginning thesis
work in this area. Prereq: 9 hrs child and family stud-
ies. 3 lectures and 1 discussion.

5540 Learning in Preschool Programs (3) Descrip-
tion, analysis and evaluation of various preschool
models and programs. Prereq: 6 hrs in child and family
studies or preschool education. Sp

5550 Supervision in Preschool Programs (3) Gui-
dance of students working in nursery school and day
care programs. Preparation of systematic consumer mar-
keting for preschools. 3 semesters supervision, 1 ses-
tional seminar discussion, individual conferences, and various evalua-
tion techniques. Prereq: 5540. 3 hrs and 1 2-hr lab.

5610 Theories of Management in the Family En-
vironment (3) Fundamental management concepts,
development and application to current family situa-
tions.

5620 Nursery School Administration (3) Organiza-
tion and operating schools and play groups for pre-
school children. Housing, staff, schedules, pro-
grams, financing. Prereq: 4410 or equivalent.

5630 Seminar in Infant Development (3) Theory
and research relating to development during infancy.
Prereq: 3220.

5640 Teaching Child and Family Studies (5) Semi-
nar and practicum in techniques for teaching child
development and family relationships. Prereq: Con-
sent of instructor. S/N only.

5700 Current Programs and Trends in Child and
Family Studies (1-3) Trends in family living and im-
plications of recent developments and research relat-
ing to children and families. Prereq: Consent of in-
structor. May be repeated. Maximum 9 hrs.

5720 Consumer Protection (3) Regulatory agen-
cies, standards, information disclosure and other
consumer protection legislation. Assumptions in-
volved in these efforts and relative success of diffe-
rent strategies. Prereq: 5170, 5190, or consent of
instructor.

5800 Problems in Child, Family and Consumer
Studies (1-3) Advanced study of child development
and family variables in family planning programs. In-
ternship in planned parent-child programs and clinics.
May be repeated. Maximum 9 hrs.

5850 Children's Effects on Parents and Marriage
(3) Theory and research about how children change
parental roles and 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.

5910 Research Seminar (1-2) Required 1 hr for
M.S. students, 2 hrs for Ph.D. students. S/N only.
E

6110 Seminar in Child Development, Family Rela-
tionships and Consumer Studies (3) Issues and
changing concepts in field. Prereq: Two 5000-level
courses in family, child, and consumer studies. May
be repeated. Maximum 9 hrs.

6250 Advanced Topics (3) Individual study and
group discussion of current problems. Prereq: Con-
sent of instructor. May be repeated. Maximum 9 hrs.

6310 Individual and Family Development—Phy-
siological Determinants (3) Family members' phy-
siological potential, development, and status. Fam-
ily's contribution to members' physiological potential
for growth and development and to realization of hu-
man potential. Advanced topics. 4 hrs nutrition, 4 hrs
physiology, or equivalent. Sp.

6320 Individual and Family Development: Cogni-
tion (3) Processes through which a human individ-
ual learns to recognize their world. Cognitive processes
involved in development across life span, focus on
research findings of infant development. Prereq:
5210, 5530, 5630, or equivalent. W

6330 Individual and Family Development:
Socialization (3) Processes of socialization through-
out 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 con-
structing theoretical models based on research find-
ings. Prereq: 5410 or consent of instructor.

6540 Seminar in Programs for Infants and Pre-
school Children (3) Research related to programs
for infants and young children. Various program
models for education of infants and young children,
methods of working with parents, and student train-
ing programs. Prereq: 5210, 5540 or equivalent.

6510-20 Applied Behavior Analysis in Natural
Settings (3, 3) Individual supervision in application of
applied behavior analysis in natural settings. Prereq:
5420 or consent of instructor.

6710 Elements of Consumer Choice (3) Analysis
of consumer decision making, theory of consumer
choice. Impact of affluence on consumers, and con-
sideration of dynamic aspects of consumer behavior,
including roles of aspirations, expectations, uncer-
tainty and information. Prereq: 5170 or consent of
instructor.

6730 Urban Consumers (3) Focus on how consum-
ers function in an urban economy. Urban growth and
lifestyles, use of consumer oriented public resources,
relationship between consumers and local government. Prereq:
5170 or consent of instructor.

Home Economics

MAJOR

Home Economics

DEGREE

Ph.D.

5210 History and Philosophy of Home Eco-
nomics (3) Historical development of home economics;
survey of concepts and philosophy of component
disciplines and analysis of current programs; empha-
sis on projection of future developments.

6000 Doctoral Research and Dissertation (3-15)
Pr/NP only. E

6110-20 Theoretical Research in Human Resource
Development (3, 3) Interdisciplinary approach to de-
velopment and use of human resources in solution of
family and consumer problems. Prereq: 12 hrs of
5000-level courses representing 2 areas of home
economics. F; W

6310 Advanced Topics (3) Comprehensive indi-
vidual study and group discussion of individual and
family behavior, physiological development and well-
being, environmental factors, and economic and so-
cial well-being. Prereq: 6110. May be repeated.

6900 Seminar (1-3) May be repeated. S/N only.

Home Economics

Education

The graduate program in Home Economics Education is administered by the College of Education with home economics education being one of the five service areas within the Department of Vocational-Technical
Education. The department offers the M.S.,
Ed.S., and Ed.D., degree programs with a
concentration in home economics education.
Inquiries may be addressed to Home
Economics Education, Home Economics
Building. (See page 62 for staff, program
descriptions, and course offerings).

Nutrition and Food
Sciences

MAJORS

DEGREES

Food Science
M.S.
M.B.

Nutrition
M.S.
M.B.

Food Systems Administration
M.S.
M.B.

Home Economics
Ph.D.

Professors:
R. E. Beauchene, Ph.D. Kansas State; B. R. Carruth
(Head), Ph.D. Missouri; Ph.D. Tennessee.
J. T. Smith, Ph.D., Ph.D. Missouri.
T. H. Savage, Ph.D. Wisconsin.
J. T. Smith, Ph.D. Missouri.
A. M. Smith (Memphis), Ph.D. Tennessee.

Associate Professors:
P. E. Andrews (Assistant Dean), Ph.D. Ohio State;
G. W. Disney, Ph.D. Tennessee; Ph.D. California (Berkeley).
N. L. Marelle, Ph.D. Massachusetts; D. S. Sachan, Ph.D. Illinois;
M. L. Siegel, M.D., M.H.P. California.

Assistant Professors:
J. B. Bittle (Memphis), Ph.D. Tennessee.
M. D. Brooks (Memphis), M.S. Alabama.
R. M. Evans, M.A. Kentucky; R. Haughton, Ed.D.
Columbus; J. D. Skinner, Ph.D. Oregon State.

3130 Applied Organic Chemistry (4) Basic nu-
trients as organic chemicals. Prereq: Chemistry
1110-20, 20-30. Not for graduate credit for majors.

3140 Physiological Chemistry (4) Metabolism of
carbohydrates, lipids, and proteins. Role of vitamins.
and minerals in metabolism. Not for graduate credit to departmental majors. Prereq: 3130 or equivalent. Sp, Su.

4000 Origin of Food and Foodways (3) Food origin and development of traditional group foodways. Prereq: 8 hrs social science or humanities. F, Su.

4020 Introduction to Sensory Evaluation of Foods (3) Sensory evaluation methods. Prereq: 4010 or 4 hrs of food technology and science, Plant and Soil Science 3610 or equivalent. 2 hrs and 1 lab.

4040 Food in Contemporary Society (3) Consumers' options, responsibilities, and potential influence with respect to food supply. F, Su.

4050 Food Preservation (3) Application of basic principles and research findings to food preservation in home. Prereq: 2010 or 3160, 4 hrs microbiology and 3150 or equivalent recommended. 2 hrs and 1 lab.

4110 Introduction to Nutrition Research (3) Nutrition principles and laboratory experiences involving small animals. Prereq: 3160. 2 hrs and 1 lab. Sp.


4131 Clinical Experiences in Dietetics (1) Planned clinical experiences applying principles of nutrition in dietetics. Coreq: 4130. Open only to students in the coordinated undergraduate program in dietetics. Su.

4140 Nutrition in Disease II (3) Interdisciplinary lectures and discussions on the metabolic processes of normal and diseased tissues and the disorders resulting from modifications required. Prereq: 4130. Designed for senior students in the coordinated undergraduate program in dietetics. F.

4150 Community Nutrition (3) Nutrition problems and prevention, management, and/or treatment of individuals and groups. Prereq: 3160 or 3165. Sp.

4180 Environmental Effects on Nutrition (3) Effect of natural and synthetic food toxins, drugs both social and therapeutic, and extreme environmental conditions on nutrient availability, utilization, and requirements of humans. Prereq: 6 hrs natural science.

4190 Diet and Drug Therapy (3) Effect of drug therapy on absorption, utilization, and toxicity of drugs. Prereq: 3160 or consent of instructor. F.


4220 Food and Lodging Information Systems (3) Design of information systems for decision making in hotel-motel complex; computer application in hospitality industries. Prereq: 2130; College Science 1410; Economics 2130.

4240 Food Systems Personnel Development (3) Development of training programs and personnel management policies for food systems personnel. Prereq: Economics 3420 or Psychology 4460 or consent of instructor.

4250 Food Systems Managerial Cost Control (3) Cost analysis for food and beverages; use of financial statements for decision making in food service systems. Prereq: 3220.

4260 Food and Lodging Physical Plant Planning and Maintenance (4) Fundamentals of mechanical systems and building components of food and lodging physical plant; organization and principles of properties management. Prereq: 4210. 3 hrs and 1 lab.

5000 Thesis (1-15) P/NP only. 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 Food Texture (3) Classification of foods according to textural parameters; instrumentation in evaluation of textures. Prereq: 4010 or Food Technology 4920; Plant and Soil Science 3610 or equivalent; or consent of instructor. F.

5020 Food Sensory Testing Methods (3) Principles and application of sensory testing methods: analysis of sensory data. Prereq: 4010; Plant and Soil Science 3610 or equivalent; or consent of instructor. F.

5030 Advanced Experimental Food Science (3) Application of research methods to individual problems. Prereq: 5010-20 or consent of instructor. Sp.

5040 Food Behavior of the Individual (3) Development of and changes in choices of food and food habits of individual. Prereq: 4000, 3 hrs of nutrition, or consent of instructor. Sp or Su.

5050 Foodways in the United States (3) Current foodways of selected subcultures in United States and historical in cares for their development. Prereq: 4000, 3 hrs of nutrition, or consent of instructor. W, Sp.

5060-65 Advanced Food Science (3, 3) Biochemical and biophysical interactions in food. Prereq: 4010; 3160 or equivalent, or consent of instructor. W, Sp.

5070 Carbohydrates and Fats in Relation to Food Science (3) Physical and chemical characteristics of sugars, starches, and fats with emphasis on their application of methods; analysis of sensory data. Prereq: 4010; 3160-50 or equivalent.

5075 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; 3160-50 or equivalent.

5100 Advanced Physiological Chemistry (4) Biochemical and related metabolic functions of nutrients. Prereq: 3160 or equivalent. 3 hrs and 1 lab. F.

5105 Advanced Physiological Chemistry (3) Nutritional factors in relation to body fluids, gas transport, and endocrine function. Prereq: 3140. W.

5110 Community Nutrition (3) Nutrition problems and practices in community and field work. Prereq: 3160 and consent of instructor. 3 labs. F.

5115 Community Nutrition (3) Observations and participation in nutrition programs of local and state agencies. Prereq: 5110 and consent of instructor. 3 labs. W.

5120 Community Nutrition (3) Nutrition programs of state and federal agencies; preparation of material for nutrition education; supervised field work. Prereq: Consent of instructor. Sp.

5125 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: 5115 and consent of instructor. S/NC only. Sp.

5130 Mental Retardation or Other Developmental Disabilities 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.

5135 Nutrition in Mental Retardation and Developmental Disabilities (1-12) Interdisciplinary diagnosis and treatment of developmentally-handicapped child. Prerequisites: Nutrition, clinical experience and lectures at Child Development Center, Center for the Health Sciences, Memphis. Prereq: Consent of instructor. Sp.

5140 Experimental Methods in Nutrition (3) Use of small animals in experimental nutrition. Prereq: 3140-50-60, 3140. 2 hrs and 1 lab. F.


5160 Physiological Bases for Diets in Disease (3) Developments in dietary treatment of disease in which nutrition plays a major role. Prereq: 3160 or equivalent. Su.


5170 Survey Methods in Human Nutrition (3) Food consumption, food practices and nutritional status of population groups. Prereq: 5150-55. 2 hrs and 1 lab.

5175 World Food Supply and Human Nutrition (3) Food supplies and food practices related to human nutrition throughout world. Regional, national and international agencies concerned with food and nutrition problems. Prereq: 5150-55. Sp.

5180 Nutrition and Aging (3) Nutritional problems of aging individual, nutritional requirements, dietary intakes, and effect of nutrition on rate of biological aging. Prereq: Consent of instructor. W.

5210-20 Experimental Quality Food Study, (3, 3) Analysis of food production, holding environment, and service problems related to quality of food prepared, held, served in volume. Management resources. Prereq: 3210, 3220, or consent of instructor. F, Su.

5220 Methods of Food Systems Research (3) Research methods applicable to food systems administration. Prereq: 3210 or equivalent. W, A.

5240 Experimental Design of Food System Facilities (3) Environment in which food is prepared, held, and served in volume. Prereq: 4210.

5250 Food Systems Evaluation (3) Management resources in food systems. Standards for control. Prereq: Consent of instructor. F.


5270 Administration of Food Service Delivery Systems (3) Role and responsibilities of administrator in maintaining desired qualitative and quantitative standards in food service delivery system. Prereq: 3220 or consent of instructor. W, A.

5310 Clinical Training in Health Care Agencies (3) Instructional and supervisory techniques in clinical settings by nurses and dietitians for training of entry-level health care providers. Prereq: Nursing 4760 or consent of instructor. Sp.

5340 Foods and Nutrition: Physicochemical Principles (3) Thermodynamics; physicochemical properties of proteins, carbohydrates and lipids; chemistry of colloidal state; chemical kinetics; special aspects of enzymatic processes. Prereq: 3140 or equivalent. Sp, A.

5350-60 Research Techniques (3, 3) Human metabolic balance experiments. Analytical methods for assessment of food and biological materials. Prereq: 5140. 3 labs. A.

5380 Field Experience (3-9) Experience in food-related industry or agency under supervision of faculty member. Prereq: Consent of instructor.

5700 Current Programs and Trends (1-3) Recent advances in nutrition sciences and implications for professionals. Prereq: Consent of instructor. May be repeated.

5800 Problems in Nutrition and Food Sciences (1-3) Advanced study in nutrition and food sciences. Prereq: Consent of instructor. May be repeated.

5900 Seminar (1-3) Prereq: Consent of instructor. May be repeated. Maximum 3 hrs. S/NC only.

5910 Graduate Seminar in Public Health (1-2) (Same as Public Health 5900, Nursing 5900, Physical Education 5900, and Social Work 5900.) S/NC only.

6000 Doctoral Research and Dissertation (3-15) P/NP Only. E.

6010 Food Dispersions (3) Physical characteristics of solutions, colloidal dispersions, and suspensions in relation to treatments applied. Prereq: 5030.
**Textiles, Merchandising, and Design**

**MAJORS**

- **Textiles and Clothing**
  - Interior Design and Housing
  - Consumer Studies and Housing: Public Policy
- **Home Economics**

**DEGREES**

- M.S.
- Ph.D.

**Professors:**

- R. O. Blakemore, Ph.D. Florida State; J. O. Dejonge (Head), Ph.D. Iowa State; E. C. Gozaway, Ph.D. Manchester (England).

**Associate Professors:**


**Faculty Associate:**

- C. L. Vigo, Ph.D. Tulane.

**Assistant Professor:**

- C. E. Cox, Jr., Ph.D. Tennessee.

**Interior Design and Housing**

A student's course of study may include intensive training in interior design beyond an undergraduate program, behavioral design research, history and preservation of interior architecture and/or housing.

**ACQUISITIONS AND EXHIBITIONS**

Prospective graduate students pursuing a degree in advanced interior design should submit a portfolio of their undergraduate studio work to the department. This portfolio may include slides or original work.

**4320 Family Housing Problems (3)** Housing requirements of families. Reading and judging house plans; effective use of space; maintenance problems; housing regulations and restrictions; site selection and neighborhood development, financing procedures. Prereq: 6 hrs from Economics 2110-20-30.

**4450-51 Advanced Interior Design (6, 6)** Intensive interior design experiences: complex design problems utilizing systematic design methodology. Project types: multi-family housing, commercial and institutional environments, or complex working environments. History and critique from area professionals. Prereq: 3452 for 4450. Courses taken in sequence or consent of instructor.

**5000 Thesis (1-15)** P/NP only. 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 Design (3)** Intensive reading, discussion and critical evaluation of twentieth-century design concepts, persons, motivation, and creative components. 6 hrs lecture, 1 hr lab. F

**5050 Advanced Design Studio (4)** Strength, structural variability, and form potentials of design materials; 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. Prereq: Consent of instructor.

**5120 Historic Interior Design (3)** Research studies of historic design developments. Variable course content, emphasis on interior design, furniture and/or accessories for England, Scandinavia, Mediterranean area and/or America. May be repeated. Maximum 18 hrs.

**5210 Furniture Appreciation (3)** Aesthetic qualities of past and present styles. Significant structural and formal characteristics.

**5310 Interior Design (3)** Advanced problems in planning and design of interior space; applications of research information in making design decisions. Prereq: Consent of instructor.

**5410 Advanced Problems (3)** Individual development of techniques and appreciation. Prereq: 9 hrs related art or equivalent.

**5510 Environmental Factors in Interior Design (3)** Human factors and associated research techniques related to behavioral and environmental interior architecture and furnishings—derivation of design implications from anatomy, physiology, anthropometry, and behavioral sciences. Prereq: 6 hrs psychological science, and 6 hrs natural science or consent of instructor.

**5520 Environmental Factors in Interior Design (3)** Systematic design methodology as applied to 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 construction drawings and scale models. Prereq: Consent of instructor.

**5613 Housing Management (3)** Role and functions of housing management specialist in problems of private and public housing management. Prereq: 4320 or consent of instructor.

**5614 Housing Regulations and Controls (3)** Functional regulations and other control practices and mechanisms as determinants of nature, availability of housing in local communities by various user groups. Prereq: 4320 or consent of instructor.

**5615 Housing Programs and Policies (3)** Analysis of public and private programs and policies to promote realization of suitable 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: Consent of instructor. 1 hr and 2 labs.

**5630 Environmental Requirements for Family Work Centers (3)** Trend in planning work centers 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: 5510-20-30 or equivalent and consent of department head and instructor in charge of investigation. May be repeated. Maximum 9 hrs. E

**5820 Interior Design (1-3)** Advanced study in interior design. Hours and credit arranged. Prereq: Consent of department head and professor in charge of instruction. May be repeated. Maximum 9 hrs. F

**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. Maximum 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 sciences in housing research. Prereq: Consent of instructor.

**6210 Environmental Design Analysis (3)** Advanced methodology in psychology of environmental design, multidisciplinary research data and methods. Prereq: 5510-20-30.

**6420 Perspectives in Interior Design (3)** Historical influences related to contemporary concepts in interior design. Prereq: 5540, 6 hrs of graduate level art history, or consent of instructor.

**Textiles and Clothing**

**4210 Elementary Textile Microscopy (3)** Microscopic techniques as applied to the study of textiles, fibers and fabrics. Prereq: 4010. 1 hr and 2 labs. W, A

**4280 Design Analysis: Functional Apparel (3)** Systematic approach to apparel design integrating aesthetic, psychological, social and physiological aspects of apparel problems for special reference groups. Garment specifications translated for production. W

**4410 Apparel Production Management (3)** Management perspective of apparel production industry: production planning, process, and management of human resources. Plant tours and case studies on production problems. Field trips required S

**5000 Thesis (1-15)** P/NP only. 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 Textiles Testing and Methods of Research in Textiles (3)** Physical and chemical testing. Analysis of fibers and yarns. Prereq: 4210, 1 lab.

**5120 Advanced Problems in Textiles and Clothing (3)** Refresher course; new developments in textiles. Selecting fabrics, agencies aiding consumer, production of individual problems in textile field. 2 hrs and 1 lab.
5150 Principles of Design Analysis (3) Application of flat pattern theory to garment design incorporating relationships of fabric geometry, texture, hand, and surface ornamentation to design. Prereq: Consent of instructor. 1 hr and 2 labs. W

5160 Review of Literature (3) Intensive survey and evaluation of recent literature; implications for further research. F

5170 Social, Psychological and Economic Aspects of Clothing (3) Clothing as it relates to human behavior. Prereq: 6 hrs or equivalent from each of following areas: sociology, psychology, economics. W

5180 Advanced Textile Economics (3) Economic problems or problem areas of current importance in textile and apparel industries—production, consumption, and governmental policy. Prereq: 3420, 6 hrs economics or consent of instructor. W

5220 Historic Textiles (3) Development of textile industry in world; fibers used, design, and color. F

5240 Practicum (1-9) Off-campus experience with business, industry, governmental agencies and civic groups; preplanned; supervised. Prereq: Consent of major advisor and department head. May be repeated. Maximum 9 hrs. S/NC only.

5250-60-70 Problems in Textile Chemistry (4, 4, 4) Theoretical and experimental study of chemistry of textile fibers including polymerization, reactions, dyeing and finishing. 5250 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. 2 hrs and 2 labs.

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 Consumption (3) Analysis and evaluation of social science theories of consumer behavior in relation to textiles and apparel. Prereq: Child and Family Studies 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, 5160, 5250, or consent of instructor.

6170 Physical Performance Behavior of Textile Structures I (3) Fundamentals of yarns and fabric structures; relationship of structure to physical characteristics of textile materials. Prereq: 5120, or consent of instructor.

6180 Problems in Textiles and Clothing (1-3) May be repeated. Maximum 6 hrs.
Intercollegiate Programs

Aviation Systems

MAJOR: Aviation Systems

DEGREE: M.S.

Lead Professor: M. A. Wright, Ph.D. Wales.


Associate Professors: P. G. Collins, Ph.D. California (Berkeley); H. D. Kimberlin, M.S. Tennessee.

Assistant Professors: W. B. Baker, Jr., Ph.D. Tennessee; V. K. Smith, III, Ph.D. Texas; J. E. Lawler, Ph.D. Georgia Institute of Technology.

The University of Tennessee Graduate School 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 (Computer Science 3150 or equivalent), a background in statistics (Statistics 3450 or equivalent), a basic understanding of aerodynamic fundamentals, aircraft propulsion and performance (Aerospace Engineering 4110 and 4120 or equivalent), a background in accounting (Accounting 5010 or equivalent basic accounting courses), a basic knowledge of economics (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, Industrial Engineering 5700 and 5710; for the administration area, Economics 5030.
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, 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, Industrial Engineering 5700, 5710, and 5720; for the administration area, in Economics 5030, and Finance 5010-20.
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 in item 2.
5. Satisfactory completion of Aviation Systems 5100.
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.

5000 Thesis (1-15) P/NP only.

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. Prereq: Aerospace Engineering 5810.

5080 Collection and Distribution (3) Capabilities, technology, plans, programs 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.

Comparative and Experimental Medicine

MAJOR: Comparative and Experimental Medicine

DEGREES: M.S., Ph.D.

Joint Graduate Coordinating Committee

H. Kitchen (Chairperson); J. E. Fuhr; J. E. Lawler; R. L. Michel.

The Comparative and Experimental Medicine degree program (M.S. and Ph.D.) is a jointly administered graduate program intended to prepare students for teaching and/or research careers in the health sciences. This program emphasizes the comparative approach to the study of pathology, immunopathology, aberrant metabolism, oncology, and genetic disorders. The Ph.D. program is open to approved graduate students seeking training in this area.
and is especially useful for individuals with professional degrees. For the student with an undergraduate biological science background, the Comparative and Experimental Medicine program provides an unusual opportunity to study disease processes common in humans and animals from a multidisciplinary perspective. The scope of this interdisciplinary program, which pools faculty resources from both veterinary and human medicine, is broadened by faculty members representing animal science and numerous areas of the life sciences. The interdisciplinary training environment includes such diverse support as facilities and personnel at the Veterinary Teaching Hospital, the Oak Ridge National Laboratory, Knoxville Zoological Park, Hemophilic Clinic, Birth Defect Clinic, Aberrant Metabolism Laboratory, and Hematology and Oncology services.

For specific course listings please see College of Veterinary Medicine, page 31 and College of Medicine—Knoxville Unit, page 148 in this catalog.

ADMISSION REQUIREMENTS

General Requirements

Admission requirements of The Graduate School of UTK will apply. In addition, all applicants are required to furnish three letters of recommendation from individuals who are familiar with their scholastic or professional records.

Requirements for Admission to the Master of Science Degree Program

Applicants will be required to have a professional degree in one of the medical sciences (M.D., D.D.S., D.V.M.) or a baccalaureate degree with course work including organic, inorganic, mathematics through calculus, one year of physics, one year of basic biology plus an additional half-year of more advanced study in the field of biology including courses such as biochemistry, mammalian anatomy, histology, cell biology, or others that are appropriate for individuals aspiring to research careers in biomedical science.

Applicants for admission to the Master of Science degree program whose backgrounds include no formal training in the biomedical field beyond the baccalaureate degree will be required to present evidence of satisfactory performance on the Graduate Record Examination.

Requirements for Admission to the Doctor of Philosophy Degree Program

Applicants will generally be expected to have a Master's degree in one of the biological sciences or a professional degree in one of the medical sciences. Selected individuals having baccalaureate degrees with backgrounds in the physical and biological sciences may be admitted upon presenting evidence of satisfactory performance on the Graduate Record Examination.

Exceptions to the above requirements may be made at the discretion of the Admissions Committee if the minimal requirements of The Graduate School have been met. Applicants who are admitted to graduate programs but who are lacking in course requirements will be required to correct these deficiencies early in their graduate programs.

For additional information, see sections in this catalog on College of Veterinary Medicine and College of Medicine—Knoxville, or write to the Office of Research and Graduate Programs, P.O. Box 1071, Knoxville, TN 37901.

EcoLogy

MAJOR

Ecology

DEGREES

M.S., Ph.D.

D. L. Bunting, Chairman. Ph.D. Oklahoma State

The Graduate Program in Ecology offers Master of Science and Doctor of Philosophy degrees. This interdepartmental program provides advanced courses in contemporary ecology for students from undergraduate programs in basic and applied biology, social sciences, mathematics and engineering. Research opportunities in both fundamental and applied ecology are intended to prepare students for academic careers as well as professional positions in industry or government. The Environmental Sciences Division of the Oak Ridge National Laboratory, the National Park Service, and the Tennessee Valley Authority provide advisors and research facilities.

THE MASTER'S PROGRAM

The minimum 45 quarter hours of graduate credit shall include 16 hours of ecology courses (exclusive of thesis), Ecology 5210-20-30 or an approved equivalent and at least 8 additional hours in ecology courses numbered above 5100. 5 hours of thesis in Ecology 5000, and 18 additional hours in ecology or supporting courses. To insure an interdepartmental 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 19.

A minor in ecology is available.

THE DOCTORAL PROGRAM

The requirements for this degree are in general the same as those of The Graduate School. The doctoral program must include Ecology 5210-20-30 or an approved equivalent and a minimum of 9 quarter hours of courses numbered above 5100. A student cannot enroll for dissertation until the research proposal has been discussed and approved by the doctoral committee. A foreign language is required.

Faculty


5000 Thesis (1-15) P/NP only. E

5100 Special Problems in Ecology (1-3) Individual investigations in ecology. May be repeated with consent of instructor. Maximum 3 hrs.


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 of Plan-
ning and Environmental Engineering.
5320 Implementation of Environmental Policy (3)
Goals and problems of environmental legislation, especially National Environmental Policy Act; pur-
pose, preparation, and evaluation of environmental impact statements and similar multidisciplinary stu-
dies. Prereq: 5210 or 5310, or Environmental En-
gineering 4420.
5510 Environmental Toxicology (3) (Same as Biochemistry 5640.)
5640 Techniques in Environmental Toxicology (3) (Same as Biochemistry 5640.)
6000 Doctoral Research and Dissertation (3-15)
P/NP only, E
6100 Special Topics in Ecology (3) Seminars on advanced topics and recent developments in eco-
logy. 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 Toxi-
ology (1) (Same as Biochemistry 6431.) S/NC only.

Industrial and Organizational Psychology

MAJOR DEGREES
Industrial and Organizational Psychology
M.S., Ph.D.
Committee:
J. M. Larsen, Jr. (Chairperson); W. H. Calhoun;
H. D. Dewhurst; M. E. Gordon; R. T. Ladd;
J. W. Lawsmyr; M. C. Rust; J. E. A. Russell;
R. O’Brien; M. S. Wartman, Jr.
(For complete Faculty Listing, see Departments of Management and Psychology)
The Master’s and doctoral programs are offered jointly by the Department of Psychology and the Department of Management. They are designed to prepare students for personnel, managerial, and organizational research, for university teaching, and for consulting relationships with industry. The 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 should request forms and materials from both The Graduate School and the Chairperson, Industrial and Organizational Psychology Program, 413 StickleY Center for Management Studies, Knoxville, Tennessee 37996-0545.
Two separate applications must be completed: one application for admission to The Graduate School (apply for major in “Industrial and Organizational Psychology”) and one application for admission to the Industrial and Organizational Psychology program. Deadline: For fall entrance, all materials should be received by the Graduate Office no later than March 1 if financial assistantship consideration is desired. 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 each section of the aptitude portion and the Advanced Psychology portion of the GRE are required. Customarily, those students admitted to the program have performed at or above the 65-79th percentile on the aptitude tests. (This corresponds to a raw score of approximately 600 on each of the tests.) The GRE Psychology score will be used in making admission decisions, although special consideration will be given in the case of non-psychology majors.
Test scores on each section of the aptitude portion and the Advanced Psychology portion of the GRE are required. Customarily, those students admitted to the program have performed at or above the 65-79th percentile on the aptitude tests. (This corresponds to a raw score of approximately 600 on each of the tests.) The GRE Psychology score will be used in making admission decisions, although special consideration will be given in the case of non-psychology majors.
THE MASTER’S PROGRAM
I. Course Requirements (Currently under review and subject to change for Fall 1984 entrants)
A. Management or Psychology 5170-80-90.
B. Statistics 5050-60-70 and 3 hours of applied psychometrics.
C. Eighteen hours of additional course work to be selected from among the 5000-level course offerings in management and psychology [e.g., Management 5110, 5220, 5230].
D. Nine hours of Psychology or Management 5000 (Master’s Thesis).
II. Program Requirements
A. Completion of a comprehensive examination in general psychology within no more than two years of entry by attaining a score of 650 or the 90th percentile on the GRE Advanced Test in Psychology.
B. The Ph.D. program requirements described below in sections II A, 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 (Currently under review and subject to change for Fall 1984 entrants)
A. Minimum course requirements:
1. Management or Psychology 5170-80-90.
B. Minimum of five 6000-level seminars to be selected from Psychology or Management 6250-60-70, and Management or Psychology 6380*
C. 36 hours of Psychology or Management 6000.
D. 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, 5220, 5230.
4. For students who wish to pursue special research interests aside from their dissertation: Management 5220, 5260, Management or Psychology 6900.
5. 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 5170-80-90.
B. Completion of a comprehensive examination in general psychology within no more than two years of entry by attaining a score of 650 or the 90th percentile on the GRE Advanced Test in Psychology.
C. Completion of a comprehensive examination in scientific methodology before beginning the third year of study. This examination covers the following specific areas: statistics, psychometrics, experimental design.
D. Completion of a special comprehensive 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.
E. By the end of nine quarters a student is expected to choose a major advisor (Chairperson of 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.

Life Sciences

MAJOR DEGREES
Life Sciences
M.S., Ph.D.
Coordinating Council:
W. H. Calhoun (Chairperson); Animal Physiology;
H. G. Welch: Cellular and Molecular Biology;
J. M. Becker; Environmental Toxicology;
L. B. Bratfslad; Ethology; G. B. Burghardt; Plant
Physiology/Biochemistry; R. W. Hottot;
Reproductive and Developmental Biology;
J. A. MacCabe.
The programs leading to the M.S. and Ph.D.
degrees in Life Sciences are interdepartmental and intercollegiate programs which augment the programs of individual departments.
The graduate program in Life Sciences supports studies and research in the following concentrations: animal physiology, cellular and molecular biology, environmental toxicology, ethology, plant physiology/biochemistry, and reproductive**

**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 is required for the qualifications for pursuing a Ph.D. are required.
***See program handbook for definition of a B average.
training and research experience in areas of regulatory, reproductive function, gene regulation and cellular interactions in development.

5110-20-30 Cellular and Molecular Biology (3, 3, 3) Survey of cell structures and functions at molecular and supramolecular level. 5110—Cellular organization; cell metabolism; energy production and use; membrane structure and function; cellular communication. 5120—Flow of biological information; cell growth and replication; cellular motility; virus-cell interactions. 5130—Structure and function of specialized cells; muscle, nerve, germ cells, blood endocrine and immune systems; chemotaxis and phototaxis; differentiation, aging and cancer. Prereq: Consent of instructor.

### Management Science

**DEGREE**

<table>
<thead>
<tr>
<th>Major Area</th>
<th>Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management Science</td>
<td>M.S.</td>
</tr>
</tbody>
</table>

**Committee:**


### THE MASTER'S PROGRAM

The M.S. program in Management Science is designed as preparation for a career in the application of quantitative techniques for the solution of complex problems. The program's flexibility also makes it appropriate as preparation for doctoral study in Management Science.

Management Science 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 requires concentrated study in a supporting area. Supporting areas are available in other departments of the College of Business Administration (excluding statistics) as well as in computer science, public administration, ecology and other areas approved by the Management Science Committee.

Applications are encouraged from all majors, but mathematics background equivalent of the completion of at least two years of college calculus and proficiency in a computer language (e.g., Computer Science 3150) is required. The program is designed to be completed in one calendar year by full-time students. However, students may start the program in any quarter and may pursue an M.S. degree in Management Science on a part-time basis.

**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</td>
<td>(approved by advisor)</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>
<tr>
<td>Total</td>
<td>50</td>
</tr>
</tbody>
</table>

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. 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 p. 44.
Kenneth L. Penegar, Dean
Mary Jo Hoover, Associate Dean
Julia P. Hardin, Assistant Dean
N. Douglas Wells, Assistant Dean

The College of Law is, since 1981, conducted on the semester system. Information regarding admission, financial aid, academic policies, extracurricular activities, and student services is available in the College of Law Bulletin. Students interested in the college should obtain a copy of the Bulletin from the Admissions Office, The University of Tennessee, College of Law, 1505 West Cumberland Avenue, Knoxville, Tennessee 37996. Completed application should be received before February 1 of the year of expected admission.

The University of Tennessee College of Law commenced operation in 1890 and has continuously sought to provide high quality legal education in a university community. While the principal objective of the college is to prepare students for the private practice of law, its total mission is more broadly conceived. The college exposes students to the legal issues of our society enabling them to develop analytical skills in respect of decisional law and statutes, the ability to communicate effectively to others their knowledge of the law, an awareness of the historical growth of the law, a knowledgeable appreciation of the interrelationship of law and society, and the ability to use law as an implement of societal control and development. Students are thus equipped to serve their community not only as advocates and counselors, but as policy makers and active, responsible citizens.

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

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

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

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

THE COLLEGE OF LAW BUILDING

Since 1950 the college has occupied a building especially designed for teaching, study, and research in the law. In the spring of 1971 the college occupied the new wing begun in the fall of 1969. The new addition has doubled the available facilities. The library, the classrooms, and the offices are air-conditioned. Adequate classrooms, courtrooms, seminar rooms, a private office for each full-time faculty member, the well-equipped offices of the Legal Clinic, and a spacious, well-lighted Law Library are contained in this modern building. Stack space for more than 200,000 volumes will permit one of the largest law book collections in the South.

LEGAL CLINIC

The University of Tennessee Legal Clinic was established in 1947. Though the Legal Clinic provides legal assistance to indigent persons, it is designed primarily as a teaching device to correlate theory and practice. It introduces the student under faculty supervision to the law in practice through personal contact with clients and their problems. The Legal Clinic functions as a large law office in which the student gains experience in interviewing clients, writing legal letters, investigating and evaluating facts, preparing memoranda of law, preparing cases for trial or adjustment, and briefing cases. Classroom work supplements the handling of actual cases. The student is thus trained in the technique of law practice and the management of a law office. The ethical responsibilities of lawyers and their function as public servants are stressed. Under present rules of the Tennessee Supreme Court, students, under the direct supervision of the Legal Clinic staff, are certified to practice before all the courts of Tennessee.

THE LAW LIBRARY

The Law Library contains the official state reports of all states, the complete National Reporter system which covers all states and the federal courts, the Annotated Reports, standard sets of miscellaneous reports, the reports of the Canadian cases and of English cases from the yearbooks to date. In addition to these, there are adequate encyclopedias, digests and dictionaries, standard textbooks, law reviews, and current looseleaf services, totaling together more than 133,000 cataloged volumes. The library is under the supervision of a law librarian who is trained in law and library science. Law students also have the use of the collections in the University Main Library, which is located across the street from the Law Library, the Undergraduate Library a few blocks away, and other branch libraries.

Degree of Doctor of Jurisprudence

The degree of Doctor of Jurisprudence will be conferred upon candidates who complete, with the required average, six semesters of resident law study and who have 84 semester hours of credit, including all required courses. The required average is 2.0 and that average must be maintained on the work of all six semesters and also for the combined work of the grading periods in which the last 28 hours
of credit were earned. Averages are computed on weighted grades. Grades are on a numerical basis from 0.0 to 4.0. A grade of 0.9 or below is a failure.

Eligible law students may receive credit towards the J.D. degree for acceptable performance in up to three (3) upper-level courses taken in other departments at The University of Tennessee. Course selection and registration are subject to guidelines approved by the law faculty which include the requirement that any such course be acceptable for credit towards a graduate degree in the department offering the course.

Note: Students are advised to consult The Graduate School's degree requirements as stated in the front section of this catalog as well as the requirements for this college.

Dual J.D.-MBA Degree Program

The College of Business Administration and the College of Law offer a coordinated dual degree program leading to the conferral of both the Doctor of Jurisprudence and the Master of Business Administration degrees. A student pursuing the dual program is required to take two or more business courses per term, as well as required courses in the College of Law.

Admissions. Applicants for the J.D.-MBA program must make separate application to, and be independently accepted by, the College of Law for the J.D. degree and the Graduate School and College of Business Administration for the MBA degree, and by the Dual Degree Committee. Students who have been accepted by both colleges may commence studies in the dual program at the beginning of any term subsequent to matriculation in both colleges provided, however, that dual program studies must be started prior to entry into the last 28 semester hours required for the J.D. degree and the last 24 hours required for the MBA degree.

Curriculum. A dual degree candidate must satisfy the graduation requirements of both college. Dual degree students withdrawing from the dual degree program before completion of both degrees will not receive credit toward graduation from either college. Course selection and registration are subject to guidelines approved by the law faculty which include the requirement that any such course be acceptable for credit towards a graduate degree in the department offering the course. 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 College of Law course in which the student has earned a 2.3 grade or higher and a No Credit for any lower grade. Grades earned in courses of either college may be used on a regular graded basis for any appropriate purpose in the college offering the course. The official academic record of the student maintained by the Registrar of the University shall show the actual grade assigned by the instructor without conversion.

NON-LAW ELECTIVE COURSE CREDIT

Students enrolled in the J.D.-MBA degree program may not receive credit towards the J.D. degree for courses taken in other departments of the University except for those taken in conjunction with the joint program.

Satisfactory/No Credit Option

(1) Course Eligibility

Required courses may not be taken on a Satisfactory/No Credit (S/NC) basis except as specifically designated.

(2) Satisfactory/No Credit

a. Election to take courses on a Satisfactory/No Credit basis must be made at the time of registration and cannot be changed thereafter. Students who register for a course Satisfactory/No Credit when they are ineligible to do so will be required to change to regular grading when the error is discovered.

b. Credit will be given for a course taken on a Satisfactory/No Credit basis only in semesters in which the student completes (receives a grade in) at least ten hours on a regular graded basis.

c. Students electing the Satisfactory/No Credit basis must meet all requirements imposed on students taking the course on a regular grade basis, e.g., attendance, term paper, recitation, etc.

d. Examinations and other work of students electing a Satisfactory/No Credit basis shall not be graded separately or differently from that of other students.

e. No Satisfactory/No Credit (S/NC) grade shall be reflected in the cumulative average.

f. A student electing Satisfactory/No Credit who makes below 2.0 shall receive credit for the course, but the grade shall be recorded as S and will not be used in determining the grade average.

g. A student electing Satisfactory/No Credit who makes a grade above 2.0 on a law course and neither this grade nor the hours for the course will be used in computing the grade average or hours credit.

h. A maximum of two courses may be taken on a Satisfactory/No Credit basis excluding 8670 Legal Writing.

MAINTENANCE OF A SATISFACTORY RECORD

No student will be excluded from the College of Law for academic reasons prior to the completion of two semesters of academic study. A full-time student who fails to achieve an overall average of at least 2.0 upon completion (receipt of a grade for two semesters of academic study shall be excluded. Such exclusion shall occur regardless of whether the student has obtained permission to vary the first-year full course load.

MAXIMUM COURSE LOAD PER SEMESTER

The maximum course load for a law student is 18 hours in any one semester. During the summer term the maximum course load is 7 hours.

POLICY FOR GRADUATE STUDENTS TAKING LAW COURSES

Law courses are not available for graduate credit; however, a graduate student may be allowed to take up to 6 hours of law courses and receive credit toward a degree upon approval of the College of Law and the major chairperson. The student must register for the law course during regular registration and be eligible for the law courses, grades awarded will be converted to either Satisfactory or No Credit and will not be included in the computation of the student's grade average or class standing in the college where such grades are so converted. The College of Law will award a grade of Satisfactory for a graduate business course in which the student has earned a B grade or higher and a No Credit for any lower grade. The College of Business Administration will award a grade of Satisfactory for a College of Law course in which the student has earned a 2.3 grade or higher and a No Credit for any lower grade. Grades earned in courses of either college may be used on a regular graded basis for any appropriate purpose in the college offering the course. The official academic record of the student maintained by the Registrar of the University shall show the actual grade assigned by the instructor without conversion.

The faculty of the College of Law consists of the following professors and instructors:

Professors:


Associate Professors:


Distinguished professor.
8560 Legal Profession (2) Role of lawyer in society and ethical responsibilities implied in that role. Admission to the Bar, organized profession, solicitation, advertising, professionalism, conflicts of interest, decision to represent or withdraw as counsel; fiduciary relationship, advocacy and its limitations, fees.

8860 Income Tax I (4) What is income; whose income is it; when is it income; how is it taxed (capital gains and losses, maximum and minimum tax); deductions and credits; roles (corporate, estate, and trust).

8940 Civil Procedure II (3) Pleading, joinder of claims and parties; discovery, trials, verdicts, judgments and appeals; emphasis of Federal Rules of Civil Procedure.

PERСПЕCTIVE COURSE REQUIREMENT
One course among the following is required for graduation: American Legal History; Comparative Law; Criminal Law Theory; Environmental Law; International Law; Jurisprudence; Law and Economics; Law, Language, and Ethics; Legal Imagination; and Tax Theory.

WRITING REQUIREMENT
One seminar or upper-level course requiring a substantial legal research paper under faculty supervision is required for graduation. This requirement may also be satisfied by a directed research project approved by the Academic Standards Committee.

No single course may be taken to satisfy both the Perspective Course Requirement and the Writing Requirement. These additional required courses may be taken at any time during the second or third year.

Elective Courses
8015 Comparative Law (3) General introduction to civil law systems of France and Germany, focusing on legal institutions, methodology and the nature of obligations and commercial law.

8050 American Legal History (3) Historical development of law, legal institutions, legal profession, and legal education from colonial times to present. Historical relationship of legal system to society.

8055 Criminal Law Theory (3) Theoretical foundations of criminal law, including an examination of concepts of justice and morality and pertinent materials in physical and behavioral sciences.

8061 Criminal Procedure I (3) Police practices and rights of persons charged with crimes; arrest, search and seizure, identification, interrogation, entrapment, electronic eavesdropping, right to counsel, and trial by jury.

8062 Criminal Procedure II (3) Pre- and post-trial procedures in a criminal case: bail, preliminary hearing, grand jury, prosecutorial discretion, discovery, speedy trial, plea bargaining, and post-conviction relief.

8125 Admiralty (2) Admiralty courts and jurisdiction; death and injury to persons; special provisions concerning various maritime workers; carriage of goods by ships; principles governing collisions and liability.

8170 Trial Practice (3) Criminal and civil litigation, trial procedure, professional responsibility, fact investigation, witness preparation, discovery and presentation of evidence, selection, and introduction of judges, opening and closing arguments.


8230 Law and Current Problems (2-3)

8260 Bills and Notes (2) Negotiable instruments, negotiability, transfer, holders in due course; equities and defenses; liability of parties; discharge; letter-of-credit; Arts 3, 4, and 5 of Uniform Commercial Code.

8280 Conflict of Laws (3) Jurisdiction, foreign judgments, choice of law, constitutional limitations, renvoi, and classification.

8310 Constitutional Law II (3) Freedom of expression, association and religion. Fourteenth Amendment rights excluding rights of criminally accused, including discrimination as to race, sex, etc.; right to franchise and apportionment, concept of state action in matters of civil rights.


8360 Family Law (3) Survey of laws affecting formal and informal family relationships. Premarital disputes, antenuptial contracts, creation of common law and formal marriage, legal effects of marriage, support obligations within family, legal separation, annulment, divorce, alimony, property settlements, child custody, child support, adoption, abortion, and illegitimacy.

8420 Evidence (4) Rules regulating introduction and exclusion of oral, written, and demonstrative evidence, including relevance, hearsay and privilege, judicial notice, presumptions, burden of proof.

8460 Federal Courts (3) Jurisdiction of federal courts and conflicts between federal and state judicial systems, including jurisdiction. Law as the more general, federal questions, diversity, removal, jurisdictional amount, choice of state or federal law, habeas corpus, confirmation, enforcement, appellate jurisdiction, joinder of parties and claims.

8490 Environmental Law and Policy (3) Methods of public policy analysis, framework for understanding responses of legal system to environmental litigation. Clean Air Act, National Environmental Policy Act, and selected regulatory issues.

8500 Future Interests (3) Law of future interests, including reversions, remainders, possibilities of reverter and rights of entry, executory interests, construction of limitations, and rule against perpetuities.

8510 Government Contracts (2) Principles relating to government procurement, both federal and state; award, performance, and termination of contracts. Administrative determination of disputes arising under government contracts. Professor: 8200.

8525 International Business Transactions (3) Legal aspects of doing business abroad, acquisition and use of property within a foreign country, doing business abroad as a foreign corporation, engaging in business with a foreign country, expropriation or annulment of contracts or concessions.

8530 Public International Law (3) International agreements, organizations, recognition of states, nationality, territory, jurisdiction and immunities, claims, jurisdiction, force and war.

8535 Jurisprudence (3) Legal theories: natural law, legal positivism, social philosophy, analytical jurisprudence, sociological jurisprudence, legal realism, policy science approach.

8540 Labor Law (4) Evolution of labor relations laws, rights of self-organization, employer and union unfair labor practices; strikes; boycotts and picketing, collective bargaining; public employee labor relations; internal union affairs; individual rights versus labor relations; employment discrimination; federalism and preemption, unions and antitrust laws.

8580 Law, Language, and Ethics (3) Intermediate level jurisprudence-type course. Law as the mind's attempt to defend, direct, and administer human activity. Exploration of ethical values underlying formal legal reasoning and analysis. Analysis of judicial reasoning and legal concepts through methods of epistemology.

8585 Law and Economics (3) Relationship between
legal and economic thought, use of economic in legal decision making and role of legal criticism.

8570 International Law Seminar (2) Current interna-

8590 Legal Accounting (2) Accounting problems and techniques, use and understanding of account-
ing information.

8650 Copyright, Patent and Trademark (3) Protec-
tion for intellectual property under federal and state law; patents, trademarks and trade names, trade secret copyright, tax considerations, international aspects.

8655 Legal Imagination (3) Systematic study of literature and its application of accurate, fluent, and creative legal composition.

8670 Legal Writing (1) By arrangement. Completion of a potentially publishable Casenote or Comment or Perspective for the Tennessee Law Review or participation as a member of a faculty supervised moot court competition. S/N only.

8680 Legislation (3) Interpretation and drafting of statutes, legislative process, and legislative power. Judicial views on legislative process subjected to critical examination. Advantages and disadvantages of legislative process and applicable constitutional principles.

8690 Modern Land Use Law (2) Land use planning, nuisance, zoning, eminent domain.

8700 Local Government (3) Distribution of power between state and local governmental units; sources of authority for local change; local government units; creation of local governmental units and their functions and services; problems in financing of local services; influence of federal programs on local government finance and decision making.

8710 Natural Resources Law (3) Selected mate-
rials on natural resources: law, policy, economics, and psychology. Knox County Juvenile Court serves as a field site.

8720 Remedies (4) Remedies: damages, restitution, and equitable relief. Consideration of availability, limitations and measurement of various remedies. Comparative evaluation of remedies available in various situations.

8755 Selected Problems in Remedies (3) Course content varies. Topics: civil rights injunctions, remedies in complex litigation (class actions and or derable suits), problems in restitution. Prereq: 8750, or consent of instructor.

8760 Advanced Business Associations (2) Pre-
req: 8740.

8770 Products Liability (3) Negligence of manufac-
turer. Strict liability of manufacturer. Liability of retail-
er. Strict liability of manufacturer. Liability of retail-
ers. Comparative evaluation of remedies avail-
able in various situations. Current controversies problems arising in such areas as condominiums, cooperatives, housing subdivisions, and shopping centers.

Legal Clinic Courses

Student are eligible to enroll in clinical courses after the successful completion of their fourth semester in addition to meeting other specified prerequisites. Students must enroll in only one clinical course per semester and are limited to a total of two courses.

Clinical courses are 8746, 8756, 8775, 8785.

8746-56 Litigation and advocacy of greater com-
plexity. Completion of 8746—Supervised Fieldwork: law reform, complex litigation, legislative drafting and precedent protection. Prereq: 8746—Supervised Fieldwork: representation of criminal defen-
dants or state or federal appellate practice. Prereq: 8746 or 8756.

8750 Economic Development (4 or 5) Models and skills pertaining to representation of corporations and businesses. Nonbusiness organizations, counseling, document preparation, business plan-
ning and representation before various state and federal agencies. Supervised fieldwork: legal representation of community groups and small business ventures. Ethical issues during supervised fieldwork, selected problems of professional responsibility. Prereq: 8740 and 8862 (8862 may be taken concur-
rently with 8745 with consent of instructor).

NOTE: Students receiving credit for 8710 prior to taking an Introduction to Advocacy course (8746 or 8756) will receive 5 hours credit for taking the Introduction to Advocacy course. Students receiving credit for the Introduction to Advocacy course will receive 4 hours credit rather than 8 hours credit. Students enrolling in 8746 after completing 8746 or 8756 will receive 4 hours credit for 8756. Students enrolling in 8746 or 8756 after completing 8785 will receive 7 hours credit for the Introduction to Advocacy course.

Seminars

8240 Arbitration Seminar (2) Arbitration of labor agreements. Judicial process and role of arbitrators, nature of process, relationships to collective bar-
gaining, selected arbitration problems on various topics. Under construction. Prereq: 8715 and role of lawyers and arbitrators in the process.

8320 Constitutional Law Seminar (2) Current con-

8345 Criminal Law Seminar (2) Advanced prob-
lems in criminal law. Prereq: completion of 8720.

8400 Estate Planning Seminar (2) Problems of estate planning both inter vivos and testamentary. Advantages and disadvantages of various types of ownership. Law and practice of fiduciary administra-
tion, insurance, wills, future interests, trusts, cor-
porations, partnerships, and gifts as related to estate planning. Research on assigned topics. Drafting of estate plan for hypothetical fact situations. Prereq: 8905 and 8840.

8545 Juvenile Law Seminar (2) Unique history and philosophy of juvenile justice system. Jurisdic-
tion, judicial and extrajudicial functions of juvenile court, and various dispositional alternatives. Judicial op-
tions and materials from fields of history, sociology, and psychology. Prereq: 8720.

8735 Environmental Protection Seminar (2) Models and techniques, use and understanding of account-
ing, interviewing and counseling, management of personnel.

8785 Advanced Advocacy (4) Continuation of

8746-56. Litigation and advocacy of greater com-
plexity. Completion of 8746—Supervised Fieldwork: law reform, complex litigation, legislative drafting and precedent protection. Prereq: 8746—Supervised Fieldwork: representation of criminal defen-
dants or state or federal appellate practice. Prereq: 8746 or 8756.

8750 Economic Development (4 or 5) Models and skills pertaining to representation of corporations and businesses. Nonbusiness organizations, counseling, document preparation, business plan-
ning and representation before various state and federal agencies. Supervised fieldwork: legal representation of community groups and small business ventures. Ethical issues during supervised fieldwork, selected problems of professional responsibility. Prereq: 8740 and 8862 (8862 may be taken concur-
rently with 8745 with consent of instructor).

NOTE: Students receiving credit for 8710 prior to taking an Introduction to Advocacy course (8746 or 8756) will receive 5 hours credit for taking the Introduction to Advocacy course. Students receiving credit for the Introduction to Advocacy course will receive 4 hours credit rather than 8 hours credit. Students enrolling in 8746 after completing 8746 or 8756 will receive 4 hours credit for 8756. Students enrolling in 8746 or 8756 after completing 8785 will receive 7 hours credit for the Introduction to Advocacy course.

Seminars

8240 Arbitration Seminar (2) Arbitration of labor agreements. Judicial process and role of arbitrators, nature of process, relationships to collective bar-
gaining, selected arbitration problems on various topics. Under construction. Prereq: 8715 and role of lawyers and arbitrators in the process.

8320 Constitutional Law Seminar (2) Current con-

8345 Criminal Law Seminar (2) Advanced prob-
lems in criminal law. Prereq: completion of 8720.

8400 Estate Planning Seminar (2) Problems of estate planning both inter vivos and testamentary. Advantages and disadvantages of various types of ownership. Law and practice of fiduciary administra-
tion, insurance, wills, future interests, trusts, cor-
porations, partnerships, and gifts as related to estate planning. Research on assigned topics. Drafting of estate plan for hypothetical fact situations. Prereq: 8905 and 8840.

8545 Juvenile Law Seminar (2) Unique history and philosophy of juvenile justice system. Jurisdic-
tion, judicial and extrajudicial functions of juvenile court, and various dispositional alternatives. Judicial op-
tions and materials from fields of history, sociology, and psychology. Prereq: 8720.

8735 Environmental Protection Seminar (2) Models and techniques, use and understanding of account-
ing, interviewing and counseling, management of personnel.

8785 Advanced Advocacy (4) Continuation of
public and private efforts in defense of environment. Problems of proving environmental impact of selected projects, interpretation and evaluation of scientific data, use of expert witnesses. Special environmental concerns of region, e.g., TVA operations, strip mining, forest management, wildlife preserves. Prereq: 8490.

8910 Administrative Law Seminar (2) Principles of administrative law. Discretion, choice of adjudication or rulemaking to develop administrative policy, consistency in administrative action.

8930 Consumer Protection Seminar (2) Selected problems in consumer protection.

8935 Law and Medicine Seminar (2) Medical profession's involvement in judicial process: (1) medical malpractice and alternatives to fault-based liability; (2) responsibilities for disposition and care of dead bodies and legal principles governing organ transplantation; (3) expert medical proof and testimony; (4) medico-legal aspects of euthanasia; (5) more specific matters: legal import of medical profession's various canons of ethics.

8995 Land Acquisition & Development Seminar (2) Alternative business forms to prepare and present for seminar discussion. Major documents (notes, deeds, prospectus, etc.) necessary to accomplish acquisition or development of large pieces of raw land. Prereq: 8990.

Course Offerings Subject To Change

The necessity of adjustments to accommodate changing conditions may dictate modifications in the course offerings and other features of the program described above. Accordingly, the college reserves the right to make such variation in its program as circumstances may require. Prospective students who are interested in the precise course offerings at a given time or who desire other special information should make inquiry in advance.

It is necessary to offer some courses and seminars only on an every-other-year basis. Choice is based on subject matter and past patterns of student enrollment.
CONCERNED prior to embarking upon their study. 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.

DEPARTMENTS OF INSTRUCTION

ANTHROPOLOGY

MAJOR

DEGREES

MA., Ph.D.

Anthropology

Professors:

W. M. Bass (Head), Ph.D. Pennsylvania; C. H. Faulkner, Ph.D. Indiana; R. L. Janisz, Ph.D. Kansas; F. W. Parmalee, Ph.D. Texas A. & M.

Associate Professors:


Assistant Professors:

B. J. Howell, Ph.D. Kentucky; P. S. Willey, Ph.D. Tennessee.

Instructor:

M. A. Bass (part-time), Ph.D. Kansas State.

Research Assistant Professor:


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.

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 thesis. Thirty-six of these 45 hours must be in anthropology, 9 hours may be taken in closely related disciplines (at least two-thirds of the courses must be 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 one 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 committee 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 prereq: 2530. (Same as Religious Studies 3440.) F or Sp

3440 Religion of Primitive Peoples (3) Religions of nonliterate peoples. Place of religion in their social and cultural systems. Recommended prereq: 2530. A

3450 Community Studies in Complex Culture (3) Review of cross-cultural comparative urban and village communities and methodologies used in community studies. Recommended prereq: 2530. A

3530 Peoples and Cultures of Africa (3) Ethnographic survey of the aboriginal cultures of sub-Saharan Africa. Cultural diversity and human ecology in area perspective. Recommended prereq: 2530. F

3540 North American Indian (3) An ethnographic survey of cultures of Arctic, Southwest, Plains and Eastern Areas. Emphasis on cultural differences of peoples occupying these areas during precolonial period. Recommended prereq: 2530. Sp

3555 Cherokee Ethnohistory (3) Survey of sociopolitical aspects of internal affairs and external
tracts, responsibilities, and certification; agencies
Asian and African prehistory investigated in depth.

5620 Problems in Old World Archaeology (3)
Seminar to explore specific research problems in
prehistoric human skeletal populations. Demogra-
phy, vital statistics, pathology, nutrition, and mea-
sures of biological relationships as they relate to
population as adaptive unit. Prereq: 3900. F

5640 Quantitative Methods in Anthropology (3)
Application of quantitative methods to anthropologi-
cal data. Correlation and derivative procedures, dis-
tal analysis, discriminant analysis, and imple-
mntation of computer routines. Prereq: Statistics
2100 or equivalent. F

5470 The Healer in Cross-cultural Perspective (3)
Graduate seminar dealing with selected problems and aspects
of prehistoric human skeletal populations. Demogra-
phy, vital statistics, pathology, nutrition, and mea-
sures of biological relationships as they relate to
population as adaptive unit. Prereq: 3900. F

5950 Paleopathology (4) Identification and descrip-
tive analysis of pathological conditions affecting hu-
man skeleton. Roentgenological, histological, and gross visual examination of skeletal material. Prereq:
3900 and/or consent of instructor. Lecture and lab.

5960 Dermatoglyphics (3) Methods of dermatog-
lyphic analysis; genetics and population variation of
various dermatoglyphic elements; forensic applica-
tions; relationships to various genetic and chromo-
somal abnormalities. Prereq: Consent of instructor.

5880 Neanderthal Man and Human Evolution (3)
Morphology, behavior, and evolutionary relations-
ships of Neanderthals. Prereq: 4970 or consent of
instructor. W, A

5990 Human Variation (3) Nature of human biolo-
gical variation with emphasis on microevolutionary
processes responsible for establishing and maintain-
ing variation and relationship of variation to popula-
tion structure. Prereq: 3900 or consent of instructor.

6000 Doctoral Research and Dissertation (1-5)
P/NP only. E

6220 Seminar in Nutritional Anthropology (3)
Analytical review of major theoretical viewpoints in
nutritional anthropology. Prereq: 5220 and consent
of instructor.

6410-30 Seminar in Cultural Anthropology (3)
Seminar is offered each quarter primarily for doctoral candidates.

6610 Selected Topics in Archaeology (3) May be
repeated. Maximum 9 hrs.

6620 Problems in Old World Archaeology (3)
Selected topics and research problems in European,
Asian and African prehistory investigated in depth.
Prereq: Consent of Corr. May be repeated. Maximum 9 hrs. (Same as Classics 5620.)

5640 Archaeological Resource Management (3)
Theory and practice—public, conservation, contract,
and salvage/research archaeology. Legislation; con-
trols, responsibilities, and certification; agencies and policies; project design, administration, and logistics; standards of field work, analysis and publi-
cation; archaeology and public; conservation archaeology as career. May be repeated. Maximum 6 hrs. W

5660 Seminar in Prehistoric Lithic Technology (3)
Analytical review of technologies utilized in production of
prehistoric stone industries; raw materials employed; resultants implemented, morphology and function; and typological constructs utilized in a chronolog-
al evaluation. Prereq: Consent of instructor.

5670 Seminar on Aboriginal Lithic Resources (3)
Training and research in stone materials utilized by
prehistoric populations—properties, natural occur-
rence and geological context, relative abundance and quality extraction and distribution, processing
and ultimate forms and functions. Theory and imple-
mation of regional resource surveys, discrete re-
gions in terms of lithology and cultural homogeneity,
particularly East and Middle Tennessee. Input from professional geologists, and field research. Recom-

dended prereq: 5660.

5701 Problems in Folk Culture Studies (3) Topical
seminar dealing with selected problems and aspects of
traditional behavior in Euro-American culture. Prereq:
Consent of instructor. May be repeated. Maximum 6 hrs.

5900 Dental Anthropology (3) Dental anatomy,
theories of dental evolution, genetic and environ-
mental influences controlling dental morphology,
comparative primate dental morphology, dental trait
analyses, uses of dental records of skeletal aging, and
dental casting. Prereq: 3900. A

5910 Measurement of Man (3) Techniques of
measuring and describing skeletal material and hu-
man subject with emphasis upon practical applica-
tions to growth, nutrition and human engineering. Prereq: Consent of instructor. A

5920 Advanced Physical Anthropology (3) Inten-
sive investigation of theory and problems in physical
anthropology.

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 medicine. Prereq: 3900. Sp

5940 Skeletal Biology of Early Human Population
Practical and theoretical approaches to analysis of
prehistoric human skeletal populations. Demogra-
phy, vital statistics, pathology, nutrition, and mea-
sures of biological relationships as they relate to
population as adaptive unit. Prereq: 3900. F

DEGREE REQUIREMENTS FOR M.F.A.

1. Successful completion of 30 hours of study in the 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 first 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 5950 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,

Assistent Professors:
D. Habel, M.A. California (Davis); A. Nett, Ph.D. Pennsylvania; B. Lee, M.F.A. Yale; T. Saup, M.F.A. Wisconsin; G. W. Wells, M.F.A. Indiana.

The Art Department offers the degree of 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.
4. A portfolio to be evaluated by the faculty. Application forms and further information are available by writing to the Department of Art.

The Master of Fine Arts is the terminal degree in studio art. It is offered with concentrations in ceramics, graphics, glass, illustration, jewelry, fiber-fabrics, painting, printmaking, sculpture and watercolor. Inter-area concentrations are available with consent of the faculty.

Students 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.
3516 Typography (4) Theories and techniques 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

3794 Medieval Art (4) Byzantine and western art of Middle Ages; manuscript illumination, Romanesque pilgrimage church, Gothic cathedral. F

3795 Northern European Painting: 1550-1600 (4) From courtly art of late Middle Ages to Northern Renaissance: Jan van Eyck, Peter van der Heyden, Bosch, and Durer: early printmakers. A

3715 Early Italian Renaissance Art: 1300-1450 (4) Development and exploration of naturalism. Revival of antiquity and development of theories of perspective in Early Renaissance: Duccio, Giotto, Masaccio, Donatello, Botticelli. A

3716 The Art of Italy, 1475-1575 (4) Leonardo da Vinci, Michelangelo, Titian, Raphael, Pontormo and Giorgione. F

3725 Art of Southern Europe and New World, 1550-1750 (4) El Greco, Caravaggio, Zurbaran, Velazquez, Bnni and Goya. Artistic relations between Iberia and Latin America. Sp

3726 The Art of Northern Europe 1550-1675 (4) Concentrated study of Bruegel, Rubens, Rembrandt, Georges de La Tour, Vermeer, Poussin and Gainsborough. W

3735 History of Nineteenth-century Painting in Europe and America (4) Emphasis on France; Neoclassicism, Romanticism, Friedrich, Constable, Turner, Cezanne. W

3736 History of Twentieth-century Painting in Europe and America (4) Fauvism, Die Brucke, Cubism, De Stijl, Abstract expressionism, social commentary, and parallel in Europe; Pop, Op, Minimal, and Concept Art. F

3745 History of Modern Architecture in Europe and America (4) Survey of twentieth-century styles, Sullivan and skyscraper. Twentieth century: Viennese Modernists, the Bauhaus, Gropius, Van der Rohe, Le Corbusier (Laatempel to Kahn, Tange and Metabolism, Archigram, Souterrain, and Venturi. F, W

3746 History of Modern Sculpture in Europe and America (4) From 1900 to present: emphasis on Cubism, Constructivism, Expressionism, Assemblage, Pop, Primary Forms, Environments, and Earthworks. Sp

3765 History of North American Art (4) Survey of landscapes in painting, sculpture, and design from prehistory to 1900. F

3766 History of Twentieth-century American Art (4) Analysis of developments in architecture, painting, sculpture, and design from 1900 to present. F

3767 Nineteenth-century American Painting (4) From West and Copley to emergence of "The Eight." F

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

3811 Introduction to Museology (3) Concepts, practices and theories of the development of museums of art, archaeology, anthropology and science. (Same as Anthropology 3811.)

3935 Film Design (4) Theory and practice of film making, Prereq: 2935. F, W, Sp

4906 Special Topics (2-4) Open to graduate students only. Prereq: Determined by department. May be repeated. Maximum 16 hrs.

4915 Individual Problems (4) Prereq: Consent of instructor. May be repeated. Maximum 16 hrs.

4916 Special Topics in Drawing (4) Prereq: instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 16 hrs.

4917 Introduction to Archeology (4) Individualized pursuit of personal archeological research and studies. May be repeated. Maximum 16 hrs.

4926 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.

4927 Fabric: Advanced Projects (4) Prereq: 8 hrs. of 2920 or consent of instructor. May be repeated. Maximum 12 hrs.

4926 Special Topics in Printmaking (4) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 16 hrs.

4930 Special Topics in Ceramics (4) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 16 hrs.

4990 Special Topics in Ceramics (4) Student-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 16 hrs.

4855 Studies in Art History (2) Concentration in selected areas. Prereq: 16 hrs of art history and consent of instructor. May be repeated. Maximum 6 hrs.


5000 Thesis (1-15) P/NP only. 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 not be repeated. S/NC only. E

5011-21-31 Exhibition in Lieu of Thesis (3, 3, 3) S/N/C only. E

5101 Foreign Study (1-12) See page 103.

5102 Off-campus Study (1-12) See page 103.

5103 Independent Study (1-12) See page 103.

5115 Graduate Drawing I (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5125 Graduate Drawing II (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5215 Graduate Painting I (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5225 Graduate Painting II (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5255 Graduate Fiber and Fabrics I (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5275 Graduate Fiber and Fabrics II (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5315 Graduate Watercolor I (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5325 Graduate Watercolor II (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5415 Graduate Sculpture I (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5425 Graduate Sculpture II (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5515 Graduate Graphic Design/Illustration I (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5525 Graduate Graphic Design/Illustration II (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5615 Intaglio IV (4) Photographic, collage techniques, combine printing with other print media. May be repeated. Maximum 12 hrs. F, W, Sp


5617 Screen Printing (4) Traditional hand cut and photographic stencils; combine printing on paper and other surfaces. May be repeated. Maximum 12 hrs. F, W, Sp


5715 Glaze Calculation (4) Prereq: Senior or graduate standing and consent of instructor. W

5971 Kiln Construction (4) Prereq: Senior or graduate standing and consent of instructor. Sp

5000 Thesis (1-15) P/NP only. 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 not be repeated. S/N/C only. E

5011-21-31 Exhibition in Lieu of Thesis (3, 3, 3) S/N/C only. E

5101 Foreign Study (1-12) See page 103.

5102 Off-campus Study (1-12) See page 103.

5103 Independent Study (1-12) See page 103.

5115 Graduate Drawing I (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5125 Graduate Drawing II (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5215 Graduate Painting I (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5225 Graduate Painting II (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5255 Graduate Fiber and Fabrics I (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5275 Graduate Fiber and Fabrics II (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5315 Graduate Watercolor I (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5325 Graduate Watercolor II (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5415 Graduate Sculpture I (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5425 Graduate Sculpture II (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5515 Graduate Graphic Design/Illustration I (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5525 Graduate Graphic Design/Illustration II (2-6) May be repeated. Maximum 18 hrs. F, W, Sp

5615 Intaglio IV (4) Photographic, collage techniques, combine printing with other print media. May be repeated. Maximum 12 hrs. F, W, Sp


5617 Screen Printing (4) Traditional hand cut and photographic stencils; combine printing on paper and other surfaces. May be repeated. Maximum 12 hrs. F, W, Sp


Audiology and Speech Pathology

MAJORS

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

Professors:

H. L. Luper (Head), Ph.D., Ohio State; S. Adler, Ph.D., Ohio State; C. W. Asp, Ph.D., Ohio State; P. J. Carney, Ph.D., Iowa; D. M. Lipscomb, Ph.D., Washington; I. Nabelek, 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. Malse, M.Ed., Texas.

Assistant Professors:

A. O. Defendal, Ph.D., Washington; E. Hamby, Ph.D., Iowa; C. Ferrin, Ph.D., Tennessee.

THE MASTER'S PROGRAM

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

The intent of each major program is to provide the student with the scholarly and professional skills necessary for functioning as an independent professional clinician in any clinical environment. Within this broad coverage of speech pathology or audiology, it is possible for the student to specialize to some extent. For example, in the M.A. in Audiology program, a student may emphasize audiological assessment, aural habilitation-rehabilitation, medical or pediatric, or industrial audiometry. 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 pursuing a Ph.D. beyond the typical broad M.A. program should consult the department office or their advisor for list of suggested courses, practica and independent studies.

Students majoring in the two areas are expected to complete the academic requirements for clinical certification from the American Speech and Hearing Association, including the required number of clock hours of clinical practicum. An exception to this rule must be approved by the Department Curriculum Committee. Enrollment in clinical practica courses is required for all clinical practice experiences. If the undergraduate preparation does not include sufficient course work in speech pathology, audiology, psychology, and related fields, the student may be required to make up such deficiencies.

Students majoring in the 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 level and 5000 credit in the preparation of an acceptable thesis representing original independent work, and a final oral examination. At least two-thirds 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 must present a total of 48 quarter hours of approved graduate credit and pass a final written examination. A minimum of 32 quarter hours must be at the 5000 or 6000 level. The decision as to 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 research oriented, with primary emphasis upon developing the scientific and cognitive skills which allow individuals to identify and independently study important questions concerning the human act of oral and aural communication. Students will be expected to 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 committee advisor. Within the general Gradute 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 methodological vehicles 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 obtained in course 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.
4. A comprehensive examination to demonstrate a general knowledge of the basis of audiology, speech and language pathology, and speech and language pathology; and advanced knowledge of the specifics of the area of specialization.
5. Research and dissertation to give at least 36 hours of graduate credit (6000 level).
6. A final oral examination.

4040 Appraisal of Speech and Language Disorders (4) Diagnostic procedures for children and adults with speech and language problems including observation and practice with diagnostic tests. Pre: 3040, 3050, 3310, 4040, or consent of instructor. (Same as Special Education 3040.) F, S

4070 Free Association (4) Oral and written free association as process for diagnosing and treating communication disorders. Includes didactic self-analysis. W

4190 Speech Development of the Hearing Impaired (3) (Same as Special Education 4190.)

4200 Practicum in Speech Development of the Hearing Impaired (3) (Same as Special Education 4200.)

4210-20 Language Development of the Hearing Impaired I, II (3, 3) (Same as Special Education 4210-20.)

4250 Introduction to the Psychology and Education of the Hearing Impaired (3) (Same as Special Education 4250.)

4310 Stuttering (3) Nature and treatment. Review and integration of various theories. Pre: 3040 or consent of instructor. (Same as Special Education 4310.) F, Su

4320 Introduction to Clinical Practice in Speech Pathology (3) Pre: 3040, 3050, 3310, 4040, and consent of instructor. (Same as Special Education 4320.) S/NC only. E

College of Liberal Arts/Audiology and Speech Pathology 107
4330 Clinical Practice in Speech Pathology (1-6) Prereq: 4320 and consent of instructor. (Same as Special Education 4330) S/NC only. E

4340 Clinical Practice in Speech Pathology (1-6) Prereq: 4330 and consent of instructor. (Same as Special Education 4340). May be repeated. S/NC only. E


4450 Clinical Practice in Audiology (1-6) Prereq: 4470 and 4930. E

4460 Clinical Practice in Audiology (1-6) Prereq: 4450, 4720 and 4930. E

4470 Clinical Practice in Audiology (1-6) Prereq: 4450, 4720, 4930. May be repeated. Maximum 9 hrs. E

4520 Speech Pathology (3) Independent study of special problems in speech pathology. Prereq: Consent of instructor. E

4550 Problems in Speech Pathology (1-6) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

4560 Problems in Audiology (1-6) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E


4620 Birth Defect Syndromes and Language Retardation (3) Examination of research literature relevant to birth defects and language retardation including clinical, educational and sociological implications of such disorders. Prereq: 4610 or consent of instructor. Sp

4630 Practical Applications of Language Habilitation Techniques (3) Discussion and demonstration of various methods and procedures used in treating language retarded children. Prereq: 4610 or consent of instructor. W

4640 Parent Participation in Language Habilitation Programs (3) Nature of counseling and educational relationships with parents of exceptional children including emotional support for families, behavior management strategies, home training methods. Prereq: 4610 or consent of instructor. Sp

4650 Speech and Language of the Culturally Different Child (3) Discussion of speech and language differences between various groups, of various ethnic and class membership and from different geographic regions; their causes, and their effects upon educational programs. F, W, Su

4660 Topics in Language Retardation and its Habilitation (3) Lectures on selected topics by representatives of such fields as special education, early childhood education, educational psychology, genetics, and psychology. Prereq: 4610 or consent of instructor. Su

4720 Audiology II (4) Basic principles of clinical audiology; pure-tone, speech, masking and overview of special auditory tests. Prereq: 3710. (Same as Special Education 4720.) W, Su


4930 Aural Rehabilitation: Speechreading and Auditory Training (3) Rehabilitation of acoustically impaired by maximizing use of residual hearing and utilizing speechreading as receptive communicative process. Prereq: 4720. (Same as Special Education 4930.) F, W, Su

4940 Introduction to the Verbo-Tonal System (4) Prereq: 4910. Recommended prereq: 4930 and 3050. (Same as Special Education 4940.) F, W, Su

5000 Thesis (1-15) P/Non-credit only. 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 Advanced Clinical Practice in Audiology Study and Practice (1-6) Prereq: 4720 and 4930. May be repeated to a maximum of 12 hrs. (Same as Special Education 5040.) E

5041 Advanced Clinical Practice in Audiology: Off-Campus Sites (1-6) Prereq: Consent of instructor. E

5045 Practicum in Hearing Aid Orientation and Communication Counseling (1-6) Practical exposure to counseling hard of hearing and family members concerning use and expectations of hearing aids, suggestions for better use of communication skills. Prereq: 4720, 4930, and consent of instructor. May be repeated. Maximum 9 hrs. E

5050 Practicum in Verbo-Tonal Habilitation (1-6) Prereq: 4940, 5950, or consent of instructor. May be repeated. Maximum 9 hrs. E

5051 Practicum in Aural Rehabilitation (1-6) Prereq: 4720 and 4930. May be repeated. Maximum 9 hrs. E

5060 Neural Bases of Speech and Language (3) Structure and function of central and peripheral nervous systems with emphasis on their role in speech and language. Prereq: 3065. F, W

5070 Anatomy and Physiology of Hearing (3) Structure of human ear, pathology of hearing impairment, and psychoacoustics of audition. Prereq: 3710. F

5071 Electrophysiological Assessment of Auditory Function (2) Techniques for electrophysiological measurement of auditory sensitivity, sound transmission by ear, distortion in ear, and ear as an analytic mechanism. Prereq: 4720, 5070 or consent of instructor. Sp

5100 Comparative Anatomy of the Peripheral Auditory Structures (2) Tutorial laboratory course in comparative anatomy of temporal bone employing microscopic dissection techniques. Prereq: 5070 or consent of instructor. E

5110 Introduction to Research in Speech and Hearing (3) Analysis of research techniques, application of statistics, and completion of pilot research project. Prereq: Elementary statistics. F, W, Su

5117 Instrumentation in Audiology and Speech Pathology (3) Principles of instrumentation used in audiology and speech pathology. Prereq: 3010. W, Sp

5119 Laboratory in Instrumentation in Audiology and Speech Pathology (1) Laboratory assignment designed to familiarize student with instruments for measuring speech and hearing processes. Prereq: 5117. E

5200 Seminar on Stuttering (3) Current significant research in problem of stuttering. Prereq: 4310 or consent of instructor. W, Su

5201 Aphasia (3) Historical review of aphasia literature; theories of brain functioning, aphasic classification and terminology, tests and rationale for testing, etiology, therapy considerations and prognosis for recovery. Prereq: 5060 or equivalent or consent of instructor. W, Su

5220 Seminar: Articulation Disorders (3) Current significant research in therapy and management of articulation disorders. Prereq: Undergraduate course in articulation disorders or consent of instructor. F, Sp

5230 Seminar: Voice Disorders (3) Current significant research in theory and management of voice disorders. Prereq: 4400 or consent of instructor. W, Su

5230-30-40 Advanced Clinical Practice in Speech and Language Disorders (1-6, 1-6, 1-6) Prereq: 4340 or equivalent and consent of instructor. S/NC only. May be repeated. Maximum 9 hrs. S/NC only. E

5330-60-70 Advanced Clinical Practice in Speech-Language Pathology: Off-Campus Sites (1-6, 1-6, 1-6) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs each. S/NC only. E

5351 Advanced Clinical Practice in Speech-Language Pathology: Public Schools (1-6) May be repeated. Maximum 9 hrs. F, W, Sp

5380 Cerebral Palsy (3) Neurological foundations and speech and language training. Prereq: 5060. (Same as Special Education 5380.) F

5381 Adult Dysarthria (3) Neuromotor organization for speech production, types of adult dysarthria and associated neuromuscular symptomatology, diagnosis and management of adult dysarthric speakers. Prereq: 5060. Su

5390 Cleft Palate (3) Etiology, diagnosis and clinical management of cleft palate speakers. Emphasis on speech. Prereq: 3310. (Same as Special Education 5390.) W, Su


5450 Sound Measurement and Audiometer Calibration (1-3) Procedures concerning use and expectations of hearing conservation procedures in military and industrial audiometry, noise and audiologist in industry. Prereq: Basic Acoustics or consent of instructor. W

5451 Noise and Audiology (3) Audiologist's role in noise-related activity: clinical, legal and consulting applications. Prereq: 5450 or consent of instructor. E

5460 Advanced Audiology (3) Theory and practice of advanced pure tone and speech audiometry; instrumentation and interpretation of audiometric findings with differential diagnosis. Prereq: 4720. F

5470 Impedance Measurement in Audiology (2) Theoretical considerations behind emergence of impedance measurement in clinical measurement of hearing. Practical experience in using several impedance measuring devices. Prereq: 4720 and 5070. W

5490 Practicum in Hearing Conservation (1-6) Supervised on-site experience in hearing conservation programs at industrial settings. Prereq: 5040. May be repeated. Maximum 6 hrs. E

5500 Seminar in Audiology (1-6) Significant research in various areas of audiology. Prereq: Consent of instructor. May be repeated. Maximum 16 hrs. F, Sp

5503 Special Auditory Tests (3) Theoretical and practical considerations of auditory procedures used for differentiating between cochlear vs. retrocochlear auditory lesions, identifying central auditory lesions and nonorganic hearing loss. Prereq: 5460 S

5565 Special Problems in Audiology (1-6) Prereq: 4720 or equivalent and consent of instructor. E

5570 Seminar in Speech Pathology (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

5570 Management and Supervision for Speech-Language-Hearing Professionals (3) Management
systems, accountability, performance appraisal and clinical supervision. For audiologists and speech language pathologists interested in private practice, supervisory or administrative positions. Su.

5600 Independent Study in Audiology (1-6) Special problems in audiology; 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 habitual and evocative behaviors, counseling and research activities. Consent of instructor. May be repeated. Maximum 9 hrs. E

5651 Seminar in Language Differences (3) Significant research relevant to language difference of culturally different children. Prereq: 4650. Su.

5730 Hearing Disorders (3) Advanced study of auditory disorders commonly encountered in medical environment. Etiology, pathology and epi-statistical considerations of procedures to evaluate hearing of infants and small children. Prereq: 4720 or equivalent. W.

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. W.

5750 Educational Audiology (3) Advanced case management of special challenges faced by audiologists; follow-up; educational alternatives, teacher and parent counseling, social adjustment, classroom acoustics and state and federal guidelines. Prereq: 5040 and 5440. W, Su.

5790 Seminar in Psycholinguistic Concepts in Speech Pathology (3) Psycholinguistic concepts and information theory in studying the normal acquisition of language and certain disorders of language. Prereq: Consent of instructor. (Same as Psychology 5790.) Sp.


6000 Doctoral Research and Dissertation (3-15) P/NP only. 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 non-speech stimuli. Prereq: 6010. W.

6029 Psychoacoustics Laboratory (2) Must be taken concurrently with 6020. W.


6069 Laboratory in Applied Anatomy & Physiology of Speech Mechanism (2) Must be taken concurrently with 6060. Sp.

6070 Experimental Techniques in Cochlear Physiology and Neurophysiology (3) Prereq: 5070 or equivalent. W, A.

6080 Seminar in Speech Science (3) Advanced study of experimental areas such as speech physiology, articulatory analysis, recognition, perception and intelligibility of speech, communication theory, and psycholinguistic measurement of speech and language. Topics vary from quarter to quarter. Prereq: 6010 or consent of instructor. May be repeated. Maximum 9 hrs. Sp, W, A.

6090 Seminar in Hearing Science (3) Advanced study of perception of non-speech acoustic signal; detectability, pitch, loudness, differential threshold, adaptation, and fatigue. Prereq: 6020 or consent of instructor. May be repeated. Maximum 9 hrs. W, A.
Petitioning for Master's degree: Students who have passed the comprehensive examination in the Ph.D. program and have completed at least 45 hours of approved coursework for graduate credit, at least two-thirds of which must be at or above the 5000 level, may petition the department for award of a Master's degree. The additional requirements for such a degree shall be:

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

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

5100-20 Cellular and Comparative Biochemistry (4, 4) Electroyte behavior; chemistry and structure of proteins; enzyme behavior and biological function; catabolism and energy capture, synthetic metabolism; nucleic acid function, protein synthesis and biochemical genetics; regulation of biological processes. Must be taken in sequence. Prereq: Chemistry 3211-21-31, 3219-29-39, and 1 course from Biology 1210-20-30 or Botany 1110-20. 3 lectures and discussion. F, W.

5119 Cellular and Comparative Biochemistry Laboratory (2) Basic biochemical procedures of general interest in molecular and cellular biology. Prereq or coreq: 4110. F, W.

4210-20 Introduction to Physical Biochemistry (3, 3) 4210—Introduction to thermodynamics; phase stability and phase change; chemical potential; osmotic pressure; activity and the Debye-Huckel model; electrochemistry; membrane permeability; 4220—Elements of statistical mechanics, diffusion, collision theory; chemical kinetics and transition state theory, higher order kinetics; specialized kinetics of enzymatic processes; some biopolymer considerations. Prereq: Mathematics 1840-50-60, Chemistry 3211-21-31 and 3219-29-39, and an introductory course in molecular and cellular biology. 3 credit hours. F, W.

4230 Introduction to Physical Biochemistry (3) Physical characterization of macromolecules; polarized light, absorption and fluorescence, sedimentation and transport hydrodynamics; electrophoretic mobility; light scattering, and x-ray crystallography of proteins and nucleic acids. Prereq: 4220 or Chemistry 3430, or equivalent. Sp

5000 Thesis (1-15) P/NP only. E

5300 Graduate Research Participation (3-9) May be repeated. Maximum 12 hrs.

5310 Experimental Techniques (3) Laboratory course in modern experimental methodology and instrumentation. Intended primarily for departmental graduate students. Prereq: Consent of instructor.

5320-30 Experimental Techniques (3, 3) Laboratory rotations. Student works in laboratory of faculty member on clearly defined project. Written proposal and oral report required. Intended primarily for departmental graduate students. Prereq: 5310. W, Sp

5450 Special Topics (1-3) Registration only by prior arrangement with department. May be repeated.

5510-20-30 Advanced Biochemistry (3, 3, 3) Topics in biochemistry and molecular biology. Prior knowledge of important biological and biochemical structures, metabolic pathways, and fundamentals in gene expression. Lecture material, original literature and review articles. Experimental approaches to current problems in biochemistry and molecular biology. Desirable for those interested in biological sciences. Must be taken in sequence. Prereq: 4110-20 or equivalent, or consent of department. F, W, Sp

5610 Environmental Toxicology (3) Basic concepts in toxicology, interactions at subcellular level: cellular, organ, organismal, population, and environmental levels, legal aspects. Major emphasis on biochemical toxicology, Prereq: 4110-20. Chemistry 3211-21-31, or consent of instructor. (Same as Ecology 6510.) W

5640 Techniques in Environmental Toxicology (3) Survey of experimental techniques for assessment of presence, toxicity, and impacts of pollutants in global ecosystem. Laboratory exercises focus on analytical, biochemical, and bioassay methods employed in toxicological studies. Prereq: Chemistry 2140-49 or 3211-21-31, 2919-29-39. (Same as Ecology 5640.) Sp

6000 Doctoral Research and Dissertation (3-15) P/NP only. E

6100 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

6110 Advanced Topics in Biochemical and Biophysical Methods (1-3) Application of modern confocal and biophysical techniques and instrumentation to biological macromolecules and membrane systems. Static and time-resolved fluorescence spectroscopy, calorimetry, magnetic resonances, x-ray crystallography, gene cloning, hybridoma technology, electron microscopy and other. Prereq: 5510-20-30 and 4230.

6120 Advanced Topics in Mechanisms of Enzyme Catalysis (1-3) Kinetics, functional groups, specificity and rate accelerations, enzyme-substrate complex, conformational transitions, and the Debye-Huckel model. Structure and regulation of catalytic rate constants; rapid mixing techniques; relaxation methods; rate determining processes; group transfer reactions; oximation and reductions; eliminations, isomerizations and rearrangements and reactions that make and break carbon-carbon bonds. Prereq: 5510-20-30 and 4220.


6140 Advanced Topics in Membrane Structure and Function (1-3) Structural organization of biological membrane components, dynamic properties as studied biochemically and biophysically, selected topics of membrane functions related to structural organization. Prereq: 5510-20-30. F

6150 Advance Topics in Metabolic Regulation (1-3) Current literature. Regulation of enzymatic activity by metabolites or hormones; regulation due to ligand interactions; increased activity; inhibition; receptor interactions, internalization, degradation and recycling. Prereq: 5510-20-30.


6410 Current Topics in Biochemistry (1) Seminars and lectures dealing with current advances in field of chemical biology. May be repeated with consent of department. Prereq: 5510-20-30. F

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 reviews of research problems and methods in environmental toxicology; behavioral toxicology; biochemical and physical 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

6440 Current Topics in Regulation of Protein Function (1) Covalent modifications of proteins by phosphorylation-dephosphorylation, allosteric interactions, etc. Prereq: 5510-20-30. May be repeated. Maximum 9 hrs. 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 stage of graduate studies. Topic title posted in advance. May be repeated. Maximum 9 hrs.

## Biology

4150 Scientific Illustration (3) Introduction to design and production of graphs, charts for scientific illustration; planning of poster presentations and displays. No graphics background required. Prereq: Advanced standing in a science curriculum; consent of instructor.

## Botany

### MAJOR

### DEGREES

**Botany**

**MAJOR**

**DEGREES**

M.S., Ph.D.

**Professors:**

R. W. Helton (Head), Ph.D. Michigan;

E. C. Cleasby, Ph.D. Duke; K. DeSelm, Ph.D. Ohio State; A. M. Evans, Ph.D. Michigan;

W. R. Herrsolf, Ph.D. Columbia; W. W. Jones, Ph.D. Texas; J. F. McCormick, Ph.D. Emory;

H. H. Norris (Emeritus), Ph.D. Ohio State; R. H. Pinter, Ph.D. Columbia; J. A. Sharp (Emirateur), Ph.D. Ohio State; H. H. Shugart, Ph.D. Georgia; L. W. Lame, Ph.D. Texas.

**Associate Professors:**

C. C. Amundson, Ph.D. Colorado; J. D. Caponetti, Ph.D. Harvard; A. S. Heilmann, Ph.D. Ohio State; R. H. Hanks, Ph.D. Miami (Ohio); L. G. Hickok, Ph.D. Massachusetts; K. W. Hughes, Ph.D. Utah; B. Mullin, Ph.D. North Carolina State; O. J. Schwarz, Ph.D. North Carolina State; W. O. Smith, Ph.D. Duke.

**Assistant Professors:**

E. E. Schilling, Ph.D. Indiana; D. K. Smith, Ph.D. Tennessee; B. E. Wofford, Ph.D. Tennessee.

The Department of Botany offers the Master of Science and Doctor of Philosophy degrees with concentrations in anatomy, choreology, cytoLOGY, cytogenetics, ecology, genetics, lichenology, morphology, mycology, photobiology, physiology, phyology, phytology, and taxonomy.

**Requirements for admission:** In addition to the general Graduate School requirements (see page 11) the botany department also stipulates three 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 allied biological sciences, 18 quarter hours; (3) physical sciences; general inorganic chemistry, 12 quarter hours organic chemistry and physics highly recommended; (4) college mathematics, 9 quarter hours.

**General degree requirements** are given on pages 19-22. 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 candidate's field of study.

**Alumni Distinguished Service Professor**

E. E. Schilling
to the instruction of courses. 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 problem. Must be completed before enrollment in Botany 6000.
2. Demonstrated reading proficiency in one modern foreign language or in the use of computers for data analysis. Proficiency in a foreign language may be demonstrated by satisfactory performance on an examination or an A or B in French 3030 or German 3030 (can also be applied to the doctoral program).

Proficiency in computer use may be demonstrated by satisfactory completion with a grade of A or B in the following computer science course or their equivalent: Computer Science 1510 or 1610, Computer Science 2710, and Computer Science 4310 or 4850.
3. Satisfactory completion of 2 credit hours at the 6000 level.
5. Presentation of a thirty-minute departmental seminar.
B. 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. 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 problem. Must be completed before enrollment in Botany 6000.
2. Satisfactory performance on a written and oral comprehensive examination.
3. Presentation of oral 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 3030 or German 3030.
5. Satisfactory completion of 9 credit hours at the 6000 level (excluding dissertation).
7. Presentation of a one-hour departmental seminar near the end of the doctoral program.

*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 student's faculty committee.

**3010-20 Plants in Evolution (4, 4) Monera to angiospermae; emphasis on evolutionary relationships, morphology and development. Prereq: 6 hrs. in biological sciences. F, W

**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

3031-32 Field Botany (4, 4) Emphasis on fall and winter flora respectively. Prereq: 3030. Need not be taken in sequence. F, W

**3050 Socioeconomic Impact of Plants (3) Significance of plants in origin and development of human cultures, evolution of cultivated plants, and role of plants in present civilizations. Occasional field trips. Sp, Su

3070 Genetics and Society (3) An introduction to genetics, biochemistry and evolution. Prerequisites: recommended prerequisite 3010-20 or equivalent. F

**3080 Biology and Human Affairs (3) Basic biological principles involved in preservation of environments in which human cultures may survive. F

**3210 Introductory Plant Physiology (4) Organismal physiology of plants; water relations, mineral nutrition, morphogenesis, elements of metabolic processes, effects of age, light, natural rhythms, temperature and other environmental factors. Lecture and lab. Prereq: 1 yr general chemistry and 1 yr biological science. F, Sp, Su

4017 Field Mycology (3) Field experience on identification of higher fungi. Frequent field trips, field recognition of species and habitats, laboratory sessions. Prereq: 6 hrs botany. Recommended prerequisite: 3010-20 or equivalent. Su, A

4021 Field Bryology (3) Field experience on identification of mosses and liverworts. Frequent field trips, field recognition of species and habitats, laboratory sessions. Prereq: 6 hrs of botany. Recommended prerequisite: 3010-20 or equivalent. Su, A

4022 Field Lichenology (3) Field experience on identification of lichens. Frequent field trips, field recognition of species and habitats; laboratory sessions. Prereq: 6 hrs botany. Recommended prerequisite: 3010-20 or equivalent.

4023 Field Agrostology (3) Field experience on identification of grasses. Frequent field trips, field recognition of species and habitats; laboratory sessions. Prereq: 6 hrs botany. Recommended prerequisite: 3010-20 or equivalent. Su, A

4030 Mechanisms of Plant Speciation (3) 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

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 prerequisite: 3010-20 or equivalent. Su, A

4050 Synantherology (3) Field experience on identification of composites. Frequent field trips, field recognition of species and habitats; laboratory sessions. Prereq: 6 hrs botany. Recommended prerequisite: 3010-20 or equivalent.


4061 Field Physiology (3) Field experience on identification of fresh water algae. Frequent field trips, field recognition of species and habitats; laboratory sessions. Prereq: 6 hrs botany. Recommended prerequisite: 3010-20 or equivalent.

4075 Botanical Photography (3) Photography of natural history subjects and achievement of technical and aesthetic skills and knowledge to produce illustrations for class, seminar or public lecture. Landscape, habitat, close-up and small object photography, in color, using 35 mm format. Limited shared equipment available on personal or facility basis. Prereq: 3010-20 or equivalent.

4080 Field Pteridology (3) Field experience on identification of ferns and fern allies. Frequent field trips, field recognition of species and habitats, laboratory sessions. Prereq: 6 hrs of botany. Recommended prerequisite: 3010-20 or equivalent.


4240 Paleobotany (4) (Same as Geology 4240.)

4310 Plant Ecology (4) Interactions between individuals, species, communities and their environments. Observations on structure and function of the living universe. Prerequisites: 3010-20, 4017, 5011 or 4017. Recommended prerequisite: 3010-20 or equivalent.

4830 Field Measurements in Plant Ecology (3) Practice in use of field and laboratory instruments for measurement of environmental factors, plant functions, and population dynamics. Data collection, analysis, and interpretation of data. Visits to highly instrumented field sites. Prereq: 3030 or equivalent.

5000 Thesis (1-15) P/NP only. 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 at least 9 credit hours in residence. May be repeated. S/NC only. E

5003-04 Non-Thesis Research (3) Library, field, or laboratory research under supervision of staff members. Not for thesis candidates. E

5011 Mycology (4) Intensive survey of fungi, including all major classes, utilizing lecture, laboratory and field information. Occasional field trips. Prereq: 3010-32, 4017, or 5021. E

5021 Bryology (4) Taxonomy, phytology, ecology, physiology, and developmental morphology of bryophytes with emphasis on field studies and current research. Prereq: 3020. 1 hr and 3 labs. W, A

5022 Lichenology (4) Taxonomy, phytology, ecology, economics and uses of lichens with emphasis on distribution and studies. Prereq: 3030 or equivalent. E

5031 Vascular Plant Taxonomy (4) Family characteristics of vascular plants, including principles of phytology and classification, based primarily on plants of local flora. Prereq: 3030 or equivalent. 2 hrs and 2 labs. Sp, A

5061 Phycology (4) Intensive comparative study of major divisions of algae, both freshwater and marine. Taxonomical, ecological, morphological, developmental and phylogenetic aspects. Field and laboratory studies, identification and classification; introduction to experimental algae. Prereq: 3010 or consent of instructor. 2 hrs and 2 labs. F, A

5065 Phytoplankton Ecology (4) Interaction between environment and phytoplankton. Nutrient uptake, primary production, competition, ecological theory applied to phytoplankton communities, and physiological adaptations by populations to environment. Prereq: 3010 or consent of instructor. F, A

5070 Principles of Biological Illustration (3) Principles and application of photography, including photomicrography and photomacrography, drawing
5800 Pteridology (4) Evolutionary study of lower vascular plants: morphology, cytology, ecology, life cycles and classification. Biochemical studies and recognition of local species. Prereq: 3200-30 or consent of instructor. 2 hrs and 2 labs or field trips. F, A, E

5090 Morphology and Evolution of Basidio- cetes (4) Structure and function of somatic and sexual life stages as applied to evolution in group. Cultures and specimens in laboratory. Prereq: 3010 or equivalent. F, A

5120 Agrostology (4) Collection, identification, classification, and phygogy of tribes of grasses. Prereq: 3050 or consent of instructor. 2 hrs and 2 labs, F, A

5150 Advanced Morphology of Flowering Plants (4) Vegetative and reproductive organography: recognition of instructor. 2 hrs and 2 labs or field trips. F, A

5160 Biosystematics (4) Major experimental methods used in systematics and application to specific types of systematic problems. Cytotaxonomy, numeracy, and chemotaxonomy. Prereq: Consent of instructor. W

5210 Advanced Plant Physiology I (3) Plant cell metabolism: carbon, nitrogen and sulfur assimilation, respiration and biosynthesis of specialized plant products such as tannins, alkaloids and pigments. Prereq. Chemistry 3231. F

5220 Advanced Plant Physiology II (3) Photophy- siology, response of plants to light: photochemistry, phototropism, and photophyton mediated responses. Water and solute uptake, loss, and movement; translocation and fundamentals of mineral nutrition. Prereq: 5210 or Biochemistry 4120 and plant or cell physiology course. Recommended prereq: 1 yr of physics. W

5235 Advanced Plant Physiology III (3) Growth and differentiation of plants at molecular, cellular and organismic levels. Hormonal regulation of development; macromolecular interpretation of differentiation dormancy, germination, flowering and senescence. Prereq: 5210 or Biochemistry 4120 and a plant cell physiology course. Recommended prereq: 5220. Sp

5290 Quaternary Problems (4) (Same as Geology 5290) 5290-30 Special Problems in Botany (1-6, 1-6)

5300 Plant Geography (4) Distribution of ecosystems with emphasis on American types. Vegetation, climatic and historical aspects. Prereq: 4310. 2 hrs each and 2 labs. Sp, A

5530 Analysis of Plant Communities (4) Plants as species and ecosystems components considered from standpoint of genealogy, ordination, and ecosystem function. Prereq: 4310. 2 hrs and 2 periods (field trips) Sp

5360 Marine Ecology (3) Relationships of marine organisms to environment and their interactions with each other. Trophic relationships in neritic, coastal and estuarine ecosystems; succession; deep-sea ecology; stability. Prereq: One previous ecology course. W

5440 Seminar in Botany (1) Readings and discus- sion of current and selected topics in botanical research. May be repeated. Maximum 12 hrs. S/NC only. F, W, Sp


5780 Plant Cytology (4) Intensive consideration of cellular organization, structure and function, with emphasis on correlation where possible of ultra- structure, biochemistry and function of subcellular organelles. Principles and applications of various analytical and electron microscopic techniques; cell fractionation and isolation of subcellular com- ponents; differentiation and analytical centrifugation; photomicrography and microcinematography. In- tended for graduate students in the biological sciences. 2 hrs and 2 labs. Sp, A

5810 Cytogenetics (4) Chromosome structure and behavior during mitotic and meiotic divisions in relation to structural changes, genetic controls, hybrid- ization, speciation, and polyplody. Laboratory emphasis on normal and aberrant meiotic systems and somatic chromosome forms from plants and animals. Prereq: Biology 3110 and at least 6 additional hrs in biological sciences. Sp, A

5820-21-22-23-24 Methods and Instrumentation in Laboratory Investigation (1, 1, 1,1,1) Experimental apparatus and techniques in laboratory Investigation (1, 1, 1, 1) Course in plant physiology. Physiology 3211-21-31 or equivalent, Physics 2210-20-30 or equivalent. S/NC only.

5830 The Field Research Project (4) Conceptualization, planning, and implementing field re- search. Criteria for choosing instruments, sampling methods, and locations for study of populations, communities, and ecosystem. Field practice. De- velopment and critique of formal research proposal like those required by granting and contracting agen- cies. Prereq: 4310, 5390 or Zoology 5490. Summer, Sp

5850-51-52-53-54 Methods and Instrumentation in Field Investigations (1, 1, 1, 1, 1) Intensive field work using appropriate methods and instrumenta- tion. Topics vary according to needs of students. May be repeated with consent of instructor. S/NC only.

5870 Experimental Plant Genetics (4) Genetics of plants stressing molecular aspects and including mechanisms of gene action, controlling elements, transformation, cytoplasmic inheritance, and adapta- tion. Prereq. Biology 3110 and Chemistry 3231. 3 hrs and 1 lab. W, A

5910-20 Developmental Plant Morphology (3, 1) Developmental morphology of flowering plants. Data from aspect of phenomena of morphogenesis-correlations, polarity, symmetry, determination, regeneration, tissue mix- tures, abnormal growth, environmental and genetics factors. Prereq: 3010 or 4120, and 3210 or 5210 for 5910; 5910 for 5920, 2 hrs and 1 lab for 5910; 1 lab for 5920. F, Sp

6000 Doctoral Research and Dissertation (3-15) P/NP only. E

6100 Advanced Topics in Morphology of Vascular Plants (2-4) Needs of students determine content. Topics selected from broad categories of experimental anatomy, morphology, and morphogenesis. Prereq: 3010-20 or 4120, 5910-20 or consent of instructor. May be repeated with consent of department. Sp, A

6200 Advanced Topics in Cryptogamic Botany (2- 4) Advanced studies and current research in experimental phycology, mycology, bryology, palynology, or developmental morphology of cryptogams. May be repeated with consent of department. Sp

6310 Advanced Topics in Cytology and Cell Biology (2-6) Repeated with consent of instructors. Criteria of students determine topics, such as actions of chemicals on actively dividing cells, current ultrastructural re- search in selected cytoplasmic organelles and cellu- lar systems, experimental cytology, cellular control of nucleic acid biosynthesis. Prereq: 5780; Biology 6310; Biochemistry 4110-20. May be repeated with consent of department.

6320 Ecosystems of the World (3) Classification and characterization of world's regional ecosystems. Interrelations of climate topography, soils, vegetation, and fauna. Prereq: 5340. F, A

6420 Advanced Topics in Genetics (2-4) Literature survey of selected topics from all areas of genetics. Prereq: Biology 3110; Biochemistry 4110-20 May be repeated with consent of department.

6520 Seminar in the History of Botany (2) F, A

6820 Advanced Topics in Plant Physiology (2-4) Requirements of student determine content, includ- ing growth and growth hormones, minor element nut- rition; photoperiodism; radiation effects. Prereq: 5210; 1 yr college physics. May be repeated with consent of department.

6830 Advanced Topics in Ecology (2-4) Needs of student determine content, including community analysis; biogeography; bioclimatology: geneo- and paleoecology; radiation; and system ecology. Prereq. 4310, 5340, 5350. May be repeated with consent of department.

6930 Advanced Topics in Systematic Botany (2- 4) Needs of student determine content, such as mor- phology and evolution of flowering plants, algae, and fungi; biometric methods (systematic literature and code of nomen- clature); experimental taxonomy; current research in systematics; systems of classification. Seminars or lectures and labs depending on student. Prereq: 3000-30, 5910. May be repeated with consent of department. Sp, A

Chemistry

MAJOR

DEGREES

M.S., Ph.D.

Professors:
G. M. Martin (Head), Ph.D. D. Carolina State, J. F. Bloom, Ph.D. Massachusetts, M. J. Sepaniak, Ph.D. Illinois; J. L. Magid, Ph.D. Wisconsin, J. R. Peterson, Ph.D. California (Berkeley); G. K. Schweitzer, Ph.D. Illinois; A. A. Shirley (Emeritus), Ph.D. Iowa State; T. W. Smith (Emeritus), Ph.D. Ohio State; W. A. Van Hook, Ph.D. Johns Hopkins; E. L. Wetney, Ph.D. Concord, Ph.D. Williams, Ph.D. London; J. H. Wood (Emeritus), Ph.D. North Carolina.

Associate Professors:
J. R. Adcock, Ph.D. Dallas; A. W. F. Glenn (Emeritus), Ph.D. Cornell; J. F. Kintzle, Ph.D. Akron; J. D. Kovac, Ph.D. Yale; C. A. Lewis (Emeritus), Ph.D. California (Los Angeles); L. J. Magid, Ph.D. Tennessee, F. M. Schell, Ph.D. Indiana; C. Woods, Ph.D. North Carolina State.

Assistent Professors:
S. D. Alexandrow, Ph.D. California (Berkeley). M. J. Sepaniak, Ph.D. Iowa State.

Students majoring in Chemistry for the Master's or doctoral degree are required to present as a prerequisite one year each of general, analytical, organic and physical chemistry with a satisfactory record. Students lacking any of these prerequisites must be admitted with appropriate deficiencies which must be removed before graduate credit. For students minoring in Chemistry, the
prerequisite is two years of chemistry including quantitative analysis.

THE MASTER'S PROGRAM

The department offers specialization in several areas for the M.S. degree: analytical chemistry, environmental chemistry, energy, inorganic chemistry, organic chemistry, polymer science, and physical chemistry.

The program leading to the M.S. degree with specialization in polymer science is conducted jointly with the Department of Chemical, Metallurgical, and Polymer Engineering, which offers a degree with similar specialization.

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

1. Research and a thesis to give to 9 to 18 hours of additional graduate course work (5110-20-29-30, 5250-60-70, 5410-20-30) for organic, 5110-20-29-30-35; (4) for physical, 5350-40; 5420-30-50-50; (5) for theoretical, 5340-50, 5420-30-50-50; Physics 5210.

2. For specialization in environment or energy, a six-month internship in a governmental or industrial laboratory; 39 hours of additional graduate course work including 6 hours at the 6000 level and the following:

a. 5511, 5521, 5531.

b. For emphasis in environment, 5220, 5250-60-70, 5610-20-30, 5710-20-30, 5810, Mechanical Engineering 4180, plus other courses from areas of chemistry, environmental engineering, meteorology, microbiology, health physics, ecology, or related science, statistics, and industrial health; (2) for energy, 5410, 5610-20-30, a chemistry sequence (5110-20-30-35 or 5250-60-70 or 5420-30 or 5710-20-30, 5810), Mechanical Engineering 4180, plus other courses from areas of chemical, physical, and applied chemistry, an examination on the basic principles of mechanics, electricity, and magnetism; 5420-30-50, 5110-20 or 5710-20, 6730 or 6810, Mathematics 4500, 4610, 4710, Physics 4610-20-30, 5110-20-30, 5210, 5610-20-30.

c. For specialization in polymer science, 5510-20-30, 5531, 5410-40-50, 5160 or 5170, Polymer Engineering 4910; 30 hours of additional graduate course work, including at least 6 hours at the 6000 level and at least 12 hours of chemistry courses; participation in the Polymer Seminar Program during the entire period of graduate study.

Graduate students may be used for undesignated course work in this requirement upon approval of the student's faculty committee.

All course selections must be approved by the appropriate departmental committee.

4. 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, physical chemistry, polymer science, and theoretical chemistry.

The program in chemical physics is conducted jointly with the Physics Department which offers a similar degree.

A program leading to the Ph.D. degree with specialization in polymer science is conducted jointly with the Department of Chemical, Metallurgical, and Polymer Engineering, which offers a degree with similar specialization.

For the Ph.D. degree in Chemistry, the satisfactory completion of the following is required:

1. Research and a dissertation to give at least 36 hours of graduate credit (6000).

2. Participation in seminar (5911-21-31) during the entire period of graduate study.

3. Course and specialization requirements:

a. 5110-70.

b. Two of the following (except for polymer science):

5111, 5521, 5531.

4. For specialization in analytical, inorganic, organic, physical, or theoretical chemistry, 39 hours of additional graduate course work including at least 6 hours at the 6000 level and one of the following groups:

(1) for analytical, 5250-60-70, (2) for inorganic, 5420-30-40, (3) for organic, 5110-20-29-30-35; (4) for physical, 5340-50, 5410-20-30-50, (5) for theoretical, 5340-50, 5410-20-30-50; Physics 5210.

d. For specialization in environment or energy, a six-month internship in a governmental or industrial laboratory; 39 hours of additional graduate course work including 6 hours at the 6000 level and the following:

(1) for analytical, 5250-60-70, Ecology 5310, and Environmental Engineering 4030.

(2) for emphasis in environment, 5220, 5250-60-70, 5420-30-30 or 5420-30 or 5710-20-30, 5810, and Mechanical Engineering 4180.

(3) for other specializations, one of the following sequences: 5110-20-29-30, 5250-60-70, 5340-50, 5410-20-30.

All course selections must be approved by the appropriate departmental committee.

4. A comprehensive advanced examination in the field of specialization.

5. Demonstration of a reading knowledge of one of the following languages: French, German, Russian, or an approved alternate.

6. A final oral examination.

**3211-21-31 Organic Chemistry (3, 3, 3)**

Compounds of carbon and their reactions, reaction mechanisms, spectroscopic and other physical properties. Must be taken in sequence. Prereq: 1 yr of general Chemistry. Corresponding lecture (3211-21-31) is a coreq for students not having credit for the laboratory.

**3219-29-39 Organic Chemistry Laboratory (1, 1)**

Experiments on topics discussed in 3211-21-31. Corresponding lecture (3219-29-39) is a coreq for students not having credit for the lecture.

**3410-20-30 Physical Chemistry (3, 3, 3)**


**3429-39 Physical Chemistry Laboratory (1, 1)**


**3511-21-31 Principles of Organic Chemistry (3, 3, 3)**


**3529-39 Organic Chemistry Laboratory (1, 1)**

Experiments on topics discussed in 3221-31. Similar to 3229-39 except designed for students who have need for operating knowledge of various spectroscopic and chromatographic techniques. Corresponding lecture (3221-31 or 3231-31) is coreq for students not having credit for the lecture.

**3810 Radioactivity and Its Application (3)**

Radioactive materials in tracer and therapeutic applications. Radioactive decay, detection apparatus and techniques, 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.

**4110 Physical Chemistry (3)**


**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, phase equilibria 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 analysis (including polarography, coulometry, potentiometry, and voltammetry); magnetic resonance methods; mass spectrometry, X-ray absorption and fluorescence techniques. Prereq: Analytical Chemistry. Recom: 4240 or 4420.

**4229 Advanced Analytical Chemistry Laboratory (1)**


**4420 Physical Inorganic Chemistry (3)**

Theoretical concepts leading to an understanding of inorganic chemistry. Quantum theory of the atom, principles of molecular structure, and elementary nuclear chemistry. Prereq: 3410-20-30, 4110. W.

**4430 Intermediate Inorganic Chemistry (3)**

Application of the quantum concept to inorganic elements, their chemical states, and their reactions. Prereq: 4420. Sp.

**4510 Organic Qualitative Analysis (3)**

Identification of pure organic compounds and mixtures. Recommended for entering graduate students who have had one year of organic chemistry. Prereq: 3219-29-39 or 3219, 3529-39 as a coreq. Formerly 3429-39.

**4550 Organic Reaction Mechanisms (3)**

Prereq: 1 yr of organic chemistry.

*Not for graduate credit for chemistry majors.*
4370 Readings in Medieval Latin (3) A
5410-20 The Latin Epic: Lucaninus, Vergil (3, 3) A; A
5510-20 Roman Comedy: Plautus (3, 3) 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 Greece and later cultures. (Same as Religious Studies 3210.)

3220 Greek Mythology in the Classical Period (3) A Study of use of myth in literature, history, religion, philosophy, and art of Classical Age of Greece, and change of attitude toward myth from earlier periods. Familiarity with basic Greek myths is assumed. Readings, lectures, slides, and discussion. (Same as Religious Studies 3220.)

3230 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. Readings, lectures, slides, and discussion. (Same as Religious Studies 3230.)

3320 Art and Archaeology of Archais and Classical Greece (3) Survey of development of Greek architecture, sculpture, and painting from 650 B.C. to death of Alexander. Illustrated lectures.

3330 Art and Archaeology of Hellenistic Greece and Rome (3) Hellenistic Greek, Etruscan, and Roman sculpture, painting, and architecture with attention to city planning. Illustrated lectures.

3340 Cities of the Greek and Roman World (3) Archaeological survey and Roman cities from 3000 B.C. to 500 A.D. with emphasis on development of city planning and quality of life. Such cities as Mycenae, Athens, Priene, Alexandria, Rome, and Lepcis Magna will be studied. F

3350 Shrines and Sanctuaries of the Greek and Roman World (3) Survey of major shrines and sanctuaries of Greek and Roman world with emphasis on archaeological remains. Such sites as Olympia, Epidauros, Paeumum, Cumaee, Paestum, and Baalbek will be considered. Readings in selected classical authors will add to understanding of place of great shrines and sanctuaries in Greek and Roman life.

4220 Seminar in Classical Studies (3) Special problems in literatures and other arts of Greece and Rome. May be repeated with consent of department.

4510 Selected Readings in Latin Literature in Transition (3) Content varies, may be repeated with consent of department.

4610 Studies in Classical Archaeology (3) Variable content course offering subject matter not taught in existing course, or concentrating on one aspect of existing survey. Prereq. According to topic. May be repeated. Maximum 9 hrs. A

5820 Problems in Old World Archaeology (3) (Same as Anthropology 5620.)

Computer Science

MAJOR DEGREE

Computer Science

M.S.

Professors:

T. Feigen (Head), Ph.D. Texas (Aerospace Engineering); F. Donaldson, Ph.D. Texas; R. Gonzalez, Ph.D. Florida (Electrical Engineering); R. T. Gregory, Ph.D. Illinois (Mathematics); L. E. Hall, Ph.D. Missouri (Electrical Engineering); G. R. Sherman, Ph.D. Purdue

* "UT Space Institute.

(Chair of Computer Center); M. G. Thompson, Ph.D. Duke.

Associate Professors:


Assistant Professors:

J. R. B. Cockett, Ph.D. Leeds (United Kingdom); R. W. Heiler, Ph.D. Southern Methodist; M. Z. Leech, Ph.D. Florida State; D. L. Matuszek, Ph.D. Texas; M. R. O'Kane, Ph.D. West Virginia; D. L. Perry, Ph.D. Ohio State; D. W. Straight, Ph.D. Texas.

Instructors:

W. Gunn, M.S. Tennessee; J. W. Mayo, M.S. Tennessee.

BACKGROUND REQUIREMENTS TO M.S. PROGRAM

Upon admission to the graduate program in Computer Science, students will need to develop (if they have not already done so) the following background:

1. 2610 and 3520 or equivalent courses in advanced programming and assembler language programming. NOTE: The department currently offers a 7-hour Immigration Course (5100/5109) that covers the material in these courses. The Immigration Course is taught once a year, in the fall quarter; it assumes the student has had at least one quarter of substantial programming, and the course is intended to help students entering the program from other disciplines meet some of the background requirements rapidly.

2. 2215 and 3215 or equivalent courses in introductory numerical algorithms.

3. 315S or an equivalent course in mathematical maturity equivalent to that of a student who has completed the calculus sequence through one year of multivariable calculus and matrix algebra.

THE MASTER'S PROGRAM

All students must receive departmental credit for or exhibit proficiency in the following courses:

1. Computer Science 4510, 4550, 5100 and 5109.

2. Electrical Engineering/Computer Science 5175 and 5940.

3. One of the three courses Computer Science 4710, 4730, or 4225. The student may then select either Plan A or Plan B. Plan A: Thesis Option

1. Complete 45 hours of course work at the 4000 level or above, including at least 33 hours at the 5000 level (no more than 9 hours of which may be thesis hours), but excluding 5100 and 5109.

2. Complete at least 9 additional hours of thesis credit, Computer Science 5500.

3. Pass an oral examination by a committee of at least three faculty members.

Plan B: Non-Thesis Option

1. Complete 45 hours of course work at the 4000 level or above, including at least 33 hours at the 5000 level, but excluding 5100 and 5109.

2. Pass written and oral comprehensive examinations. Under either plan, a student wishing to count a course from another department towards the graduate degree must have prior written approval from the computer science graduate committee.

3150 Introduction to Numerical Algorithms and

(Continued from next page)
Programming (3) Roots of equations, systems of linear equations, least-squares data fitting, numerical integration, numerical methods for ordinary differential equations. Introduction to programming in FORTRAN. 3150 and 3155 may not both be taken for credit. Students with a knowledge of FORTRAN should take 3155. Prereq: 1510 or 1610 or consent of instructor. (Same as Mathematics 3150.) E

3155 Introduction to Numerical Algorithms (3) Roots of equations, systems of linear equations, least-squares data fitting, numerical integration, numerical methods for ordinary differential equations. 3150 and 3155 may not both be taken for credit. Students with a knowledge of FORTRAN should take 3155. Prereq: 1510 or 1610 or consent of instructor. (Same as Mathematics 3155.) E


4500 Number Systems for Digital Computers (3) Floating-point number representation, mixed-radix number representation, multiple-modulus residue number representation, finite -segment p-adic number representations, errors in floating-point computation, finite fields and exact computation using digital computers. Prereq: 4101. E


4225 Numerical Solutions to Equations and Numerical Approximations (3) (Same as Mathematics 4225.) F, W

4235 Numerical Methods for Ordinary Differential Equations (3) (Same as Mathematics 4235.) W, Sp

4245 Numerical Linear Algebra (3) (Same as Mathematics 4245.) F, Sp

4310 Statistical Data Processing (3) FORTRAN language and statistical packages. SPSS and SAS programs for standard statistical analyses; frequency distributions, percentiles, data transformations, and regression, analysis of variance. Not for credit for computer science majors. Prereq: Statistics 2100 or equivalent. F, Sp

4330 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. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

4470 Programming Languages (4) Comparison and analysis of programming languages, design, features and implementation. Processors, operations, sequence control, data control, and storage management. Detailed discussion and programming experience in LISP and either SNOBOL, APL, or SIPOCAL. Prereq: 4515 W

4510 Data Structures and Non-Numeric Programming (3) Data structures and algorithms for their manipulation. Arrays and orthogonal lists; stacks, queues, lists, trees, dynamic storage allocation; organization of files, programming languages for information structures. Prereq: 4520 and 4510.

4550 Systems Programming (3) Computer organization and advanced programming. Machine language and design of computers, representation of information, instruction sets, program systems, input-output systems, interpreters, macro assemblers. Prereq: 3520 or equivalent. E

4570 Introduction to Database Management Systems (3) Hierarchical, network and relational models; logical and physical views of data. Data definition and data manipulation languages. Data independence, integrity, and consistency issues; data model selection, data definition, data manipulation, data security and recovery, database design. Prereq: 3520 or equivalent. E

4590 Advanced Systems Programming (3) Multi-tasking, overlays, advanced I/O techniques, high-level language macros, interrupt handling, teleprocessing facilities, virtual systems (all in a high-level language), and OS utilities. Prereq: 4510 and 4550.

4610 Operating Systems—Concepts and Facilities (3) Detailed examination of major operating systems. Memory, processor, device and data management. Interrupts, machine-level input/output, loaders and relocation, device characteristics, data set organizations, SPOOLing. Prereq: 4510 and 4550. Students may not receive credit for both 4610 and 5670. F

4620 Operating Systems—Case Studies (3) Alternatives in operating system design, dynamic reaping, queuing, segmentation, time sharing, timing, slicing, protection, concurrency, real-time systems. Examples from different operating systems analyzed as appropriate. Prereq: 4510 or equivalent or consent of instructor. W

4660 Principles of Compiler Design (3) Techniques of compiler design, scanning and parsing of languages, Lexical analysis, regular and context-free grammars. Prereq: 4510. F


4750 Interactive Computer Graphics (3) Point plotting, vector generation, 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 Geographical Sciences 4820.)

4820 Introduction to Pattern Recognition (3) (Same as Electrical Engineering 4820.) W

4830 Digital Image Processing (3) (Same as Electrical Engineering 4830.) Prereq: 4510.

4850 Small Computer Systems (3) (Same as Electrical Engineering 4850.) E

4910 Analysis and Management of Computer Installations (3) Analysis and design of computer systems, implementation, justification, personnel in systems; perspective on systems. Prereq: 3520 or equivalent. W

4980 Special Topics in Computer Science (1-4) Credit determined at registration. Prereq: Recommendation of Computer Science staff. May be repeated with consent of department. Maximum 9 hrs.

5000 Thesis (1-5) F/P/NP only. E

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


5050 Computer Modeling and Simulation of Physical Systems (3) Techniques for computer modeling and simulation. Inputs, driving functions, error recovery, optimization, and error recovery. Computer simulation of various physical systems. Models to represent spatial relationships. Prereq: 3510 or 3155, and 3520 and/or Statistics 5420.

5100 Immigration to Computer Science (5) Designed for graduate students with limited computer science background who wish to enter computer science major or minor program. Advanced programming techniques; control of input-output devices; machine organization and assembly languages programming; introduction to data structures and algorithm analysis. Prereq: One course in programming.

5109 Immigration to Computer Science Practicum (1) Design and implementation of medium to large-scale computer programs. Coreq: 5100.

5175 Introduction to Logic Design (3) (Same as Electrical Engineering 5175.)

5210 Artificial Intelligence (3) Simulation of intelligent processes by computer. Techniques of representation, search, and manipulation for various areas; problem solving, game playing, pattern perception, theorem proving, semantic information processing. Computer simulation of AI problems. 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 record, automatic history taking, and hospital administration. Prereq: 4510. Sp


5430 Advanced Compiler Design (3) Design and implementation of compilers, affix and two-level grammars, compiler-compilers, incremental compilation, run-time organization, data flow analysis, optimization, and error recovery. Prereq: 4660.

5455 Finite Difference Methods for Partial Differential Equations (3) (Same as Mathematics 5455.) F

5465 Finite Element Methods (3) (Same as Mathematics 5465.) E

5475 Advanced Topics in Numerical Partial Differential Equations (3) (Same as Mathematics 5475.) Sp

5570 Database Management Systems (3) Data model theory, comparison of several existing data base systems, implementation technology, selection and evaluation techniques, integrity, security, authorization and protection, hardware architectures, and future trends in DBMS area. Prereq: 4980. W

5655-65-75 Numerical Mathematics (3, 3, 3) (Same as Mathematics 5655-65-75.) F, W, Sp

5670-80 Advanced Operating Systems (3, 3) Theory and analysis of operating systems. Synchronization and deadlock problems. Analyzing of operating systems using mathematical models and simulations, hardware and software monitors. Comparison of good heuristic scheduling algorithms with best possible performance. Operating systems and the design of virtual memory systems. Analysis of page swapping and placement strategies. Prereq: 4610 or equivalent or consent of instructor. F, W

5710 Finite Automata Theory (3) Finite-state sequential machines. Minimization, experiments, composition, regular sets and regular expressions. Nondeterministic, incompletely specified and linear automata. Prereq: 4710 A

5730 Computability and Computational Complexity (3) Computability and decidability; Turing

5745 Advanced Topics in Numerical Partial Differential Equations (3) (Same as Mathematics 5475.) Sp

5780 Advanced Operating Systems (3, 3) Theory and analysis of operating systems. Synchronization and deadlock problems. Analyzing of operating systems using mathematical models and simulations, hardware and software monitors. Comparison of good heuristic scheduling algorithms with best possible performance. Operating systems and the design of virtual memory systems. Analysis of page swapping and placement strategies. Prereq: 4610 or equivalent or consent of instructor. F, W
5775 Combinatorial Algorithms (3) Algorithms for and total recursive functions. Time and space
4531-32-33 Advanced Chinese (4, 4, 4) Consent of instructor. Chinese, Sanskrit, or Arabic and consent of in-
structor.

5790 Computer Architecture (3) Elements, major components, storage components and tradeoffs, size, speed, virtual storage, cache storage, Proces-
sor organization, instruction set organization, stack machines, pipeline, overlap and vector processors. Operating system considerations. Prereq: 5670 or
5940.

5810 Information Organization and Retrieval (3) Organization, storage, searching and retrieval of in-
formation. Development of IR systems from off-line to modern on-line operations. Information analysis and
dictionary construction and operations. Search and matching procedures; retrieval process. In-
formation dissemination systems. Data base retrieval systems. Prereq: 4590. F, W

5840-50 Pattern Recognition (3, 3) Formulation of pattern recognition problem. Role of pattern recogni-
tion within framework of artificial intelligence. Vector representation of signals. Feature extraction, Deter-
mination and statistical pattern classification algorithms. Syntactic pattern recognition. Examples of practical applications. Computer solution of simpli-
fied pattern recognition problems. Prereq: 3150, Sta-
tistics 3450 and Mathematics 4050 or equivalent.

5889 Data Security (3) Need for security and methods for achieving it: encryption, machine architecture, hardware and software implementa-
tions, historical and current approaches. Case studies in fraud and misuse. Prereq: 3520 or consent of in-
structor.

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). F, W

5970 Independent Study in Computer Science (1-
3) Consent of instructor. May be repeated. Maximum 9 hrs.

Cultural Studies

Asian Studies

3670 Islamic Literature in English Translation (4) Survey from origins to modern period of major Isla-
mic literatures, especially Arabic, Persian and Tur-

4010-20-30 Readings in Asian Literature (4, 4, 4) Prereq: Mastery of intermediate level of Japanese, Chinese, Sanskrit, or Arabic and consent of in-
structor.

4012 Selected Topics in Asian Studies (4) Content varies. Maximum 12 hrs. Prereq: Consent of in-
structor. Must be taken in sequence.

4531-32-33 Advanced Japanese (4, 4, 4) Reading in original and translation paid particular attention to

4631-32-33 Advanced Japanese (4, 4, 4) Reading in original and translation paid particular attention to

4640 Special Topics in English Linguistics (3) (Same as English 4460.)

4471-81 English as a Second or Foreign Lan-
guage (3, 3) (Same as English 4471-81.)

Women's Studies

4000 Topics in Women's Studies (4) (Same as Afro-American Studies 4830.)

5110 Psychology of Women (3) (Same as Educa-
tional and Counseling Psychology 5110.)

Economics

See College of Business Administration.

English

MAJOR

DEGREES

English

M.A., MACT, Ph.D.

Professors:

J. B. Trachen (Head), Ph.D. Princeton; E. W. Bratton
(associate Head), Ph.D. Illinois; R. M. Kelly (Director of Graduate Studies), Ph.D. Duke; P. G. Adams,
Ph.D. Texas; R. Y. Drake, Jr., Ph.D. Yale; A. R. Ensor, Ph.D. Indiana; J. H. Fisher, Ph.D. Pennsylvania;
B. J. J. Loggett, Ph.D. Florida; R. B. Miller, Ph.D. Brown; A. R. Penn, Ph.D. Denver; C. D. Orlando;
J. E. Reese (Chancellor), Ph.D. Kentucky; N. J. Sanders, Ph.D. Shakespeare Institute; Stratford-upon-Avon; D. Schneider, Ph.D. Northwestern; S. C. Crummel, Ph.D. North Carolina; B. T. Stewart, Ph.D. Northwestern; R. Walker, M.A.


Associate Professors:

J. M. Armitage, Ph.D. Duke; L. H. Burghardt, Ph.D. Chicago; D. A. Carroll, Ph.D. North Carolina;
D. R. Lov, Ph.D. Missouri; B. K. Dumas, Ph.D. Arkansas; D. F. Goslee, Ph.D. Yale; N. M. Goselee,
Ph.D. Yale; J. E. Gill, Ph.D. North Carolina; T. J. A. Heffernar, Ph.D. Cambridge; M. A. Lofaro,
Ph.D. Maryland; D. J. Maland, Ph.D. Michigan; M. L. Phyne, Ph.D. California (Santa Cruz); M. P. Richards, Ph.D. Wisconsin; F. K. Robinson, Ph.D. Texas.

Assistant Professors:


Visiting Lecturer:

W. Dykeman, B.A. Northwestern.

Detailed information about the Master's and doctoral programs, and about individual graduate courses, may be obtained by writing the Director of Graduate Studies of English, McClung Tower. For admission forms, write to The Graduate School.

THE MASTER'S PROGRAM

The departmental requirements for the M.A. degree in English include (1) thesis and 36 quarter hours of courses in the Department of English of 45 quarter hours without a thesis, (2) evidence of proficiency in one foreign
language, and (3) a final examination. The courses should include 12 hours at the 6000 level, 12-21 hours of additional courses at the 5000-6000 level, and 12 hours at any level for graduate credit, including the 3000-4000 level. The M.A. with Writing Option is intended for those students who plan to do free-lance.
writing. Specialize in teaching writing courses at the college level, or work as professional writers in business or industry. Students who go on to complete the Ph.D. may also find the M.A. with Writing Option helpful when they are seeking teaching positions.

1. A minimum of 36 quarter hours beyond the B.A. degree.
   a. 12 hours at the 6000 level.
   b. 12 additional hours at the 5000-6000 level.
   (A student may take only three hours of 5103 Independent Study toward the degree.)
   c. 12 hours for graduate credit at any level, including the 3000-4000 level.

2. A student must take at least 15 hours in writing and 15 hours in literature, the remaining 6 to be selected from any English course at the proper level. Of the courses in writing, at least 9 hours must be taken at the 5000 level.

3. Students in the M.A. with Writing Option program may choose one of the following writing projects:
   a. A thesis, using research to analyze some aspect of writing or rhetorical theory, for which 9 hours credit is given. The nature and length of each project will be determined by the Director of Graduate Studies after consulting with the student and his/her project director.

4. A creative project, for which 9 quarter hours credit is given. A collection of poems or short stories, a short novel, a play, or a creative work of non-fiction prose would be acceptable. The nature and length of each project will be determined by the Director of Graduate Studies after consulting with the student and his/her project director.

5. A final examination. A candidate presenting a thesis or creative project must pass a one-hour oral examination, consisting of questions covering the general history and interpretation of English and American literature, not merely the courses which he/she has taken. A reading list of primary works designed to help the M.A. with Writing Option program to complete the examination is available in the Office of the Director of Graduate Studies in English.

6. Evidence of proficiency in one foreign language, to be fulfilled in one of the following ways:
   a. The completion of a second year of language at college level with a grade of C or better.
   b. The completion of French 3020 or German 3020 at UTK with a grade of B or better.
   c. The passing of the regular Ph.D. language examination as currently administered at UTK.

For the degree of Master of Arts in College Teaching (MACT) the requirements include (1) 45 quarter hours of course in English, arranged as for the non-thesis M.A., (2) 2 hours in a special course designed for MACT students, (3) 3 hours of a tutorial in the teaching of freshman composition, (4) a thesis or 9 additional quarter hours of 5000- and 6000-level courses in English, (5) evidence of proficiency in one foreign language, (6) a final examination, and (7) a program of supervised teaching approved by the department.

THE DOCTORAL PROGRAM

The departmental requirement for the Ph.D. in English is completion of a minimum of three academic years of resident graduate study. This includes a balanced program of at least 72 quarter hours 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) Rapid review of English grammar structure, semantics, and oral and written drill. Required during the first quarter of residence of all foreign students (graduates, undergraduates and transfer students) who are not expected from the nature of English to require study in the field of English language and literature.

*1211 Written and Oral English for Foreign Students (6) Emphasis on the advanced English grammar and conversational skills. 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 during the first year. Students registered for this course are permitted to register for only 2 other courses.

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.


3135 Tennyson and His Successors (3) Includes such poetry as that by the Pre-Raphaelites, humorists, and Decadents.

3136 Browning, Arnold, and Hopkins (3)

3150 Melville (3)

3210-20 English Literature and Culture of the Nineteenth Century (3, 3, 3) Survey of literature dealing with leading movements in politics, science, religion, and art. 3210—1800 to 1835. 3220—1835 to 1900.

3411-12-20-30 Modern Drama (3, 3, 3, 3) 3411—Continental to 1830. 3412—Continental since 1830. 3420—British. 3430—American.

3510 Sixteenth-century Prose and Poetry (3) Medieval to 1616. Prereq: consent of instructor.

3520 Elizabethan Drama (3) Marlowe, Jonson, and others.

3525 Restoration and Seventeenth-century Poetry (3) Emphasis on Dryden and Pope.

3540 Restoration and Eighteenth-century Drama (3) Dryden through Sheridan.

3560 Restoration and Eighteenth-century Prose (3) Defoe, Addison, Steele, Swift, and others.

3670 The Age of Johnson (3)

3710 Literature of the English Bible (3) Types of Old Testament literature, including Wisdom literature. A

3711 Literature of the English Bible (3) Old Testament literature and types of New Testament literature. A

3721 Introduction to Folklore (3) Essential terms and concepts in modern folklore-folk life studies. Emphasis on North American materials; folk tale, folk song, myth, legend, proverbs, riddles, superstitions, dance, games, and architecture.

3722-30 Comparative Literature (3, 3) 3910—Ancient. 3920—Medieval and Renaissance. 3930—Modern. A

3840 The Novel of the Contemporary Western World (3) Hemingway, Faulkner, 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 dramatic romances.

4024-43 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 Topics in Literary Theory and Criticism (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.

4047 Special Topics in Literature: Major Authors (3) Content varies. Studies in major British and American writers. May be repeated with consent of department. Maximum 6 hrs.

4050-60-70 American Novel (3, 3, 3) 4050—From earliest sentimential 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. A

4120 Advanced Technical Writing (3) For students planning careers in business, industry, education, and government who need technical writing skills. Definitions, process descriptions, sets of instruction, descriptions of mechanisms, recommendation reports, abstracts, proposals, and technical reports. Prereq: Junior standing in the student's major or consent of instructor.

4150 Professional Writing (3) Articles, theses, and dissertations in which data are marshaled and analyzed. Abstracts, variety and documentation styles, proper usage of visuals, guidelines and procedures for manuscript submission, and process of editorial review. Prereq: 4140 or consent of instructor.

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)
4256 Writing Science Fiction and Fantasy (3) Survey of general development and basic texts of Science Fiction, Speculative Fiction and Fantasy. Examination of writing science fiction in accordance with techniques learned 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.

4310-20-30-40 The British Novel (3, 3, 3, 3) To 1914—De Wolfe to J. A. Seaton; J. A. Seaton to Thackeray; 4330—George Elliot to Galsworthy. 4340—James Joyce to present.

4440 Sociolinguistics (3) Exploration of language patterns in terms of correlations between them and their social context. Examination of effects of language upon culture, and vice versa. Prereq: 3330 or consent of instructor. (Same as Linguistics 4440.)

4450 Dialectology (3) Theories and methodologies of dialect research, fieldwork, and analysis. Prereq: 3340 or consent of instructor.

4455 Varieties of English (3) Theories, methodologies, and findings of English and American dialectology. Exploration of emphasis on cultural pluralism. Prereq: 3330 or consent of instructor.

4460 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) Applications in teaching and learning of English as a second or foreign language. Phonological and grammatical structure of present-day English. Analysis of differences (phonological, grammatical, and lexical) between English and another language. Prereq: Second year of a foreign language. 4481—Materials and methods of language teaching, with emphasis on preparation of materials and structured teaching situations. Theory of testing language competence and performance, with emphasis on construction of tests. Team teaching with an experienced member of the staff. Prereq: 4471. (Same as Linguistics 4471-81) W; Sp

4510-20-30 Black Literature (3, 3, 3) Trends and developments.

4563 Southern Literature through the Nineteenth Century (3) Southern writing from colonial period to end of nineteenth century, including frontier humorists and local color writers. A

4565 Southern Literature in the Twentieth Century (3) Major works of the major southern writers, their North American variants. Prereq: 4731—Study of native American ballad and folk tale; 4741—The folk narrative; functions, categories, and patterns of storytelling.

4850 Milton (3) Emphasis on major poems. A

4860 Seventeenth-century Prose and Poetry (3) Bacon and Donne to Marvell. A

4930-40 Chaucer (3, 3) 1390—The Canterbury Tales. 4940—Troilus and Criseyde and early poems.

5000 Thesis (1-15) P/NP only. 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

5101 Foreign Study (1-12) See page 103.

5102 Off-campus Study (1-12) See page 103.
two-thirds of the total hours in the graduate program must be at or above the 5000 level, and must include 5100 (at each offering during residency), 5150, 5160 and 6 quarter hours at the 6000 level. In no case may more than 9 hours be taken as residence in the graduate program, and no more than 9 hours may be thesis courses. A final examination is required in both programs.

**THE DOCTORAL PROGRAM**

The doctorate is a research degree and is granted only to those persons who have demonstrated proficiency in writing 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, 5720, and (at each offering during residency) 5100. A minimum of 15 hours of 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.

Comprehensive examinations required for admission to candidacy shall include written comprehensive, written examinations on two special fields, and an oral examination on the student's program, the special fields, and the dissertation proposal. Also required is a final oral examination that shall be conducted by a student's faculty committee in accordance with other aspects of the program as determined by the student's doctoral committee.

**3410 Intermediate Economic Geography (4)** Concepts, theories, and practices in location planning. Locational patterns in agriculture, manufacturing, and service activities.

**3430 Urban Geography (4)** Concepts and theories concerning development and significance of systems of cities and internal morphology of cities. For W

**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. For W

**3490 Geography of Resources (4)** Study of factors related to variations in resource availability from place to place, with particular emphasis upon energy and metallic resources. For Sp

**3520 Climatology (4)** General circulation system leading to world pattern of climates. Climatic change and modification; interrelationship of climate and human activity. For W or Sp

**3530 The Land-Surface System and Man (4)** Nature and regional variations in relationships among surface waters. In vegetation and cultural surface materials. Humans as evaluators and agents of change. F, Su

**3610 Political Geography (4)** Importance of geographic factors in understanding political relationships within and among nations; spatial limitations of political decision-making processes; geography of administrative units.

**3960 Cultural Geography (4)** Basic concepts of culture; methods and techniques of cultural geography; world patterns of cultural phenomena.

**3790 Geography of Middle America (4)** Covers Mexico, Central America, and the West Indies.

**3800 Geography of South America (4)**

**3870 Geography of Asia (4)** A survey of the physical, cultural and economic characteristics of the countries of Asia, excluding the Soviet Union.

**3910 Regional Geography of United States and Canada (4)** Major physical, economic, and social distributions within the United States and Canada, and their implications to the student's degree work.

**3920 Geography of the American South (4)** Geographical appraisal of southeastern United States, including physical environment and human resources. Origin and development of contemporary economic and cultural traits of the area.

**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.

**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. Emphasis on point pattern analysis and analysis of areal units. Prereq: Mathematics 3000 or consent of instructor.

**4210 Problems in Geographic Method (4)** Examples of problems and approach in geographic analysis and synthesis. Emphasis on character of geographic data, generalizations, classification, regionalization, and questions of scale.

**4240 Historical Geography of the United States (4)** Survey of changing human geography of 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.)

**4560 Geography of Soils (4)** Soils as physical systems and their relationship to environment. Investigation of specific cases of the role of soil in management of environmental systems.

**4710 Cartographic Design and Production (4)** Principles and practices of design, construction, and reproduction of maps. Recommended prereq: 3700, 2 hrs and 2 labs.

**4720 Data Mapping (4)** Automated techniques of representing surfaces, using geographic information systems. Recommended: 3700 and knowledge of a computer language.

**4730 Advanced Cartography (4)** Map production from design through color proofs. Prereq: 3700, 4710, and written consent of instructor.

**4740 Remote Sensing: Types and Applications (4)** Basic principles and uses of aerial photography and other remote sensing techniques. Emphasis upon virtue of various types of imagery for geographic interpretation and simple mapping. Prereq: Consent of instructor. F or Sp

**4750 Interactive Computer Graphics (3)** (Same as Computer Science 4750.)

**4799 Practicum in Cartography/Remote Sensing (2-6)** Prereq: Written consent of instructor required prior to registration. May be repeated. Maximum 6 hrs. E

**5000 Thesis (1-15)** P/NP only. E

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

**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/N/C only. W, Sp

**5101 Foreign Study (1-12)** See page 103. Prereq: Written consent of instructor prior to registration. E

**5102 Off-Campus Study (1-12)** See page 103. Prereq: Written consent of instructor prior to registration. E

**5150 Introduction to Geographical Research (3)** Aims of geographical research; survey of printed source materials; practice in effective presentation of research findings.

**5160 Research Design and Field Problems (4-6)** Development of research problems, preparation of appropriate study designs, and practical field application. Su

**5170 Geographic Concept and Method (3)** Traditional and modern thought regarding nature, scope, problems, and methods of geography.

**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. Prereq: Written consent of instructor prior to registration. 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. A

**5260 Advanced Cultural Geography (3)** Geographical analysis of rural settlement in Eastern United States, New England, Tidewater East, and Upland South, and specific application to Southern Appalachians. Includes field work and final paper. Prereq: 3660 or consent of instructor. A

**5310 Topics in Regional Geography of the United States (3)** Intensive analysis of problems and trends in one or more regions of the United States, excluding American South. 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. E

**5410 Advanced Topics in Economic Geography (3)** Examination of trends, problems, and methods in modern economic geography. Prereq: 3410 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 social 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: 3560 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. May be repeated with consent of instructor. E

**5650 Advanced Political Geography (3)** Geographical consequences of public decisions, emphasis on understanding how administrative and political processes affect public land management, spatial distribution of public goods, and urban morphology. Prereq: 3610 or consent of instructor.

**5710 Seminar in Geography (3)**

**5720 Topics in Quantitative Geography (3)** Multivariate techniques especially applied to problems in geography; research problems utilizing appropriate computer packages; usefulness of geographic research techniques developed by other disciplines. Prereq: 4100 or consent of instructor. Sp

**5740 Advanced Topics in Remote Sensing (3)** Applied research using remote sensing and aerial
photographic imagery for interpretation and mapping of geographic data. Prereq: 4740 or consent of instructor.

5790 Topics in Cartography (3) Trends, concepts, problems, and methods in cartography. Prereq: 4730, or consent of instructor. May be repeated with consent of instructor. Maximum 9 hrs. A

5799 Advanced Practicum in Cartography: Remote Sensing (2-4) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

5915 Regional Geomorphology (4) (Same as Geology 5915.)

6000 Doctoral Research and Dissertation (2-15) P/NP only, 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, 3) A

6710-20 Seminar in Physical Geography (3, 3) A

NOTE: Registration in 6000-level courses may be repeated with consent of department.

DEGREES

The department requires a minimum of 45 quarter hours for a Master's degree and a minimum of 84 quarter hours for a Doctoral degree. The courses must be taken during four years after the first-year graduates in geology. Employs entire time a college undergraduate in an appropriate foreign language.

THE DOCTORAL PROGRAM

Specific course program and thesis topic determined by candidate's faculty committee.

1. Program must be determined by the faculty committee. Requirements include a minimum of 84 quarter 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 taken as an approved or field period. A Master's degree is recommended.

2. Comprehensive 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 determined 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.

*3180 Mineralogy (4) Introduction to crystallography and study of minerals. Laboratory includes hand specimen, physical, and x-ray methods of identification. Prereq: 1410, Chemistry 3110-20 or equivalent. 3 hrs and 1 lab. A

*3210-20 Invertebrate Paleontology (4, 4) Systematic review of important Metazoa invertebrate fossil groups. 3210—Porifera to Annelida, including cnidarians, echinoderms, and brachiopods. 3220—Mollusca: foraminifera, gastropods, and bivalves. 3250—Phylum Chordata, including arthropods and echinoderms. May be taken separately or in sequence. Prereq: 3260; Biology 1210-20 or consent of instructor. 3 hrs and 1 lab or field period.

*3260 Paleobiology (4) Introduction to principles and materials of paleontology as applied to interpretation of earth history. Prereq: 1420. 3 hrs and 1 lab or field period.

*3270 Geological History of Land Organisms (4) Geological 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. Prereq: 3180, Coreq: 3190, 3 hrs and 1 lab. A

*3330 Geology of East Tennessee (4) Lectures and field excursions. Prereq: 12 hrs of geology and consent of instructor. 12 hrs and 1 lab or field period.

*3360 Stratigraphy-Sedimentation (4) Introductory study of stratigraphic principles and practices and of sedimentary processes and interpretation of depositional environments. Prereq: 1420 and 3180, 3 hrs and 1 lab or field period. A

*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 see...
of study. Field techniques demonstrated, practiced, and applied to solution of geologic problems. Prereq: 12 hrs geology and consent of instructor.

4460 Geologic Photography, Photogrammetry and Remote Sensing (4) Terrestrial, airborne, and satellite geologic remote sensing, photographic principles and practice, geometry of terrestrial and aerial photography, principles of nonphotographic remote sensing systems. 4510 Principles of Geomorphology (4) Gradational process acting on earth's surface and landforms produced. Prereq: 1410-20-30 or equivalent. (Same as Geography 4510). 3 hrs and 1 lab.

4550 Optical Mineralogy (4) Identification of mineral and determination of crystal-chemical parameters using petrographic microscope. 4610 Principles of Geochemistry (4) Application of chemical principles to geologic problems. Emphasis on crystal chemistry and relation between basic atomic structure and distribution and behavior of elements in the earth's crust. Prereq: Chemistry 1110-20 or equivalent. Recommended: 3310.

4690 Principles of Meteorology (4) Application of meteorological principles to fossil deposits and lacustrine sediments; identification of rocks, their composition, and their origin. Prereq: 4650 and 4110 or consent of instructor. 2 hrs and 2 labs.

4740 Petroleum Geology (4) Environmental geology, petroleum exploration and discovery. Geologic context of petroleum occurrence. Prereq: 3360 or equivalent. 3 hrs and 1 lab or field period.

4750 Geophysics (4) Seismic methods of exploration; geophysical principles and practice; geometry of terrestrial and aerial photography; satellite geologic remote sensing, photographic principles and practice. Prereq: 3570. 3 hrs and 1 seminar or lab.

4760 Principles of Geomorphology (4) Advanced photogrammetric techniques to obtain geological measurements from aerial photographs. Practice in photo interpretation of imagery covering selected geologic features. Prereq: Consent of instructor.

4790 Principles of Geology (4) Subdivision of geologic time, principles of geologic classification, principles of sedimentary processes, environmental stratigraphic approach to problems using geologic principles. Prereq: Consent of instructor. 2 2-hr labs.

4800 Special Problems in Geology (1-4) Prereq: Consent of instructor. May be repeated. Maximum 4 hrs.

5000 Thesis (1-15) P/NP only. E

5050 Geochronometry of Ore Deposits (3) Study of ore deposits based on experimental, empirical, and theoretical geochemical considerations. Prereq: 4500 and 4110 or consent of instructor. 2 hrs and 2 labs.

5069 Experimental Geochemistry Laboratory (1-3) Independent study of problem in geochemistry using lab techniques. Prereq: Consent of instructor.

5210 Special Problems in Geology (1-4) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

5290 Quaternary Problems (3) Quaternary terrace deposits and lacustrine sediments; identification of rocks, their composition, and their origin. Prereq: 3360 or equivalent. 3 hrs and 1 lab or field period.

5300 Principles of Petrology (4) Application of physical and chemical properties and behavior of solids to problems involving the behavior of minerals and rocks. Prereq: 3370. 3 hrs and 1 seminar or lab.

5360 Analytical Techniques in Geology (1) Survey of methods currently used in the solution of geological problems. Prereq: Consent of instructor. 2 2-hr labs.

5470 Plate Tectonics and Orogeny (4) Geophysical and geologic elements of orogenic belts, with recent and ancient examples. Prereq: 3370. 3 hrs and 1 seminar or lab.

5520 Igneous Petrology (4) Genesis and emplacement of igneous rocks, metasomatism, and the role of igneous rocks in the crust. Prereq: 3310 and 4550. 2 hrs and 2 labs.


5540 Terrigenous Clay Sedimentary Petrology (4) Field and microscopic analysis of terrigenous clay rock types, role of transport and depositional processes in affecting sediment texture and composition. Prereq: 3360 or equivalent. 3 hrs and 1 lab.

5610 X-Ray Diffraction Analysis (1) Application of x-ray diffraction procedures in identifying crystalline substances. Prereq: 3370. 3 hrs and 1 lab.

5615 Aqueous Geochemistry (4) Introduction to aqueous geochemistry, including kinetic and equilibrium aspects of chemical thermodynamics related to geologic processes. Prereq: 3360 and 4550. 2 hrs and 2 lab/field/seminar periods.

5650 Biostatistics (3) Application of methodologies to a stratigraphic study, codification of stratigraphic nomenclature and recommended practice Prereq: 3560 and 3860. 1 hr and 1 2-hr seminar.

5720 Paleontological Nomenclature and Techniques (4) Classification of biologic nomenclature as it relates to paleontology; basic techniques in preparation and illustration of paleontologic materials and manuscript preparation for publication. 3 hrs and 1 lab.

5760 Paleontology (4) Fossil invertebrates. 5820 Stratified and Stratiform Sulfide Deposits (4) Classification, distribution, characteristics and genesis of mineral deposits related to magmatic processes. Magmatic segregation deposits of ultramafic-mafic association and porphyry Cu-Mo deposits. Prereq: 4110 or consent of instructor. 2 hrs and 2 lab/field/lab/field periods.

5840 Ore Petrology (4) Ore mineral assemblages based on state-of-the-art microscopy. Identification of ore minerals and interpretation of textures and structures of ore deposits. 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 trips. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

5860 Carbonate Sedimentology (4) Environments of deposition and modern and ancient carbonates. Prereq: 4130 or consent of instructor. Recommended: 4500. 3 hrs and 1 lab.

5915 Seminar in Paleontology (3) A five-year survey of selected problems. Prereq: Knowledge of introductory crystallography; consent of instructor. 2 hrs and 2 lab or seminar.

6110 Atomic Absorption Analysis (1) Application of atomic absorption spectrophotometry to chemical analysis of bulk geological samples: minerals, rocks, and ores. Prereq: 5610 or consent of instructor. 1 lab.

6115 Electron Microprobe Analysis (2) Theory and application of microprobe analysis; determination of chemical composition of solids such as minerals. Prereq: 5610 or consent of instructor. 2 lab.

6162 X-Ray Diffraction Analysis (1) Application of x-ray diffraction procedures in identifying crystalline substances. Prereq: 5610 or consent of instructor. 1 lab.

6171 X-Ray Fluorescence Analysis (1) Application of x-ray fluorescence to chemical analysis of bulk geological samples: minerals, rocks, and ores. Prereq: 5610 or consent of instructor. 1 lab.

6200 Doctoral Research and Dissertation (3-15) P/NP only. E

"6110 Seminar in Stratigraphic Geology (3) "6210 Seminar in Paleontology (3) "
Students must show a fluent command of German, both oral and written, and a knowledge of two foreign languages, French and another language, such as Italian, Latin or Russian, appropriate to the field of research. A 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, 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 Translation (3, 3, 3, 3) No foreign language credit. No change in credit hours after add deadline. Students opting for 4 hrs credit will be expected to present an appropriate amount of extra work above that required for 3 hrs. F, W, Sp.

4110-20-30 Studies in Classical and Modern Writers (3, 3, 3) Content varies. Prereq: 9 hrs of 3000 courses (exclusive of 3010-20-30, or courses in English translation) or equivalent. Su.

4140-50 Selected Topics in German Literature from 1750 to the Present (3, 3) Prereq: 9 hrs of 3000 courses (exclusive of 3010-20-30, or courses in English translation) or equivalent.

4160 Studies in German Authors (3) Life and works of a single outstanding German literary figure. Content varies. Prereq: 9 hrs of 3000 courses (exclusive of 3010-20-30, or courses in English translation) or equivalent.

4170 Theatrical German (1-3) Performance in one or more German plays. Prereq: Intermediate German or equivalent, consent of instructor. May be repeated with consent of department.

4210-20-30 Studies in German Literary Types (3, 3, 3) 4210—Lyric poetry. 4220—Drama. 4230—Narrative prose. Prereq: 9 hrs of 3000 courses (exclusive of 3010-20-30, or courses in English translation) or equivalent.

4250 Introduction to Descriptive Linguistics (3) (Same as French, Russian, Spanish, and Linguistics 4250.) F.

4260 Introduction to Historical and Comparative Linguistics (3) Linguistic change, protolanguages. Phonological and morphological change. Cultural, historical, sociological influences upon the development of language and its change. Lexicography. All these topics copiously illustrated by selected examples from the various Germanic languages. 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 French, Russian, Spanish, and Linguistics 4260.) W.

4270 Introduction to Germanic Linguistics (3) Phonetics and phonemics of German. Grammar and vocabulary of descriptive point of view. Dialects of German. Other Germanic languages.

4310-20 History of German Language (3, 3)

4630 German Civilization (3) Preq: Intermediate German or equivalent.

4810-20-30 Advanced Conversation and Composition (3, 3, 3) Prereq: 3810-20-30 or equivalent or consent of department. F; W; Sp.

5000 Thesis (1-19) P/NP only. E.

5100 German Phonetics and Advanced Grammar (3) Advanced work in phonetics, pronunciation, and selected topics in German grammar. For teachers and prospective teachers. Prereq: Consent of instructor.

5140-50 Selected Topics in German Literature (3, 3, 3, 3, 3, 3) F; W; Sp.

5410-20-30 Medieval German Language and Literature (3, 3, 3) 5410—Introduction to Middle High German; 5420-32—Readings in Medieval German Literature. F; W; Sp.

5500 Studies in German Literature (3) Content varies. May be repeated. Maximum 9 hrs. Su.

5510 German Humanism and the Reformation (3)

5520 German Baroque Literature (3)

5530 The Enlightenment and the Rococo (3)

5540 German Classicism (3)

5550 Goethe's Faust (3)

5560 German Romanticism (3)

5570 German Realism and Naturalism (3)

5580 Modern German Literature (1899-1945) (3)

5590 Modern German Literature (1945-Present) (3)

5600 German Literary Theory and Criticism (3) W.

5610-30-40-50-60 Directed Readings in German Language and Literature (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.

5720 Readings in Old Norse Prose (3) Intensive readings of Old Norse prose works. Icelandic saga as literary genre.

5730 Readings in Old Norse Poetry (3) Intensive reading of Eddic poems as a literary genre and re- pository of ancient Germanic customs, legends, and mythology.

6000 Doctoral Research and Dissertation (3-15) P/NP only. E.

6100 Gothic (3) Phonology, morphology, and syntax of Gothic language. Relationship to Indo-European languages and other Germanic languages. Readings from Gothic Bible.

Russian

303 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. Prerequisite: 2 years of some foreign language in college or consent of department. Undergraduate credit only. No credit for students having completed 1yr of Elementary Russian.

321 Nineteenth-century Russian Literature in English Translation (3-4) Realism and the novel; selections from works of Pushkin, etc.

322 Works of Leo Tolstoy in English Translation (3-4) War and Peace, Anna Karenina, and other works.

321 Works of F. M. Dostoevsky in English Translation (3-4) Crime and Punishment, Brothers Karamazov and other works.

3230 Twentieth-century Russian Literature in English Translation (3-4) Russian modernism and literature under the soviets.

3240 The Russian Drama in English Translation (3-4) Selections from works of Fonvizin, Griboedov, Pushkin, Gogol, Ostrovsky, Turgenev, Chekhov, and others.

3250 The Works of Ivan Turgenev and Anton Chekhov in English Translation (3-4)

3260 Russian Folklore in English Translation (3-4)

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. No knowledge of Russian required. (Same as Philosophy 3270 and Religious Studies 3270.)

4010 Selected Topics in Russian and East European Studies (3) Interdisciplinary seminar on selected topic using comparative approach.

4110-20-30 Studies in Major Russian Writers (3, 3, 3) Content varies. Pushkin, Lermontov, Gogol, Turgenev, Tolstoy, Dostoevsky, Chekhov and others. Prerequisite: 3 hrs of 3000 courses (exclusive of 3010-20-30, 3210-20-30-40-50-60-70) or equivalent. May be repeated.

4250 Introduction to Descriptive Linguistics (3) (Same as French, Spanish, Linguistics, and German 4250.1)

4260 Introduction to Historical and Comparative Linguistics (3) (Same as French, German, Spanish, and Linguistics 4260.) W

4271 Introduction to Slavic Linguistics (3) (Same as Linguistics 4271.)

Greek

See Classics

History

MAJOR

DEGREES

M.A., Ph.D.

History

Professors

J. Morrow (Acting Head), Ph.D. Pennsylvania; P. H. Beiger, Ph.D. Vanderbilt; E. V. Chmielawski, Ph.D. Harvard; R. E. Duncan, Ph.D. California (Berkeley), L. P. Gievi, Ph.D.

Harvard: A. G. Haas, Ph.D. Chicago; Y. P. Hao, Ph.D. Harvard; R. W. Hawkins (Emeritus), Ph.D. California (Berkeley); C. O. Jackson, Ph.D. Emory; M. M. Klein, Ph.D. Columbia, R. G. Landen, Ph.D. Princeton.

Associate Professors: S. D. Becker, Ph.D. Case-Western Reserve; J. D. Bing, Ph.D. Indiana; J. Bohaleld, Ph.D. Harvard; J. R. Finger, Ph.D. Washington; C. W. Johnson, Ph.D. Michigan; P. A. Marc, Ph.D. Harvard; M. J. McDonald, Ph.D. Pennsylvania; J. Muldowny, Ph.D. Yale; P. J. Pinckney, Ph.D. Vanderbilt; E. S. W. Emory; J. G. Utley, Ph.D. Illinois; W. B. Wheeler, Ph.D. Virginia.


THE MASTER'S PROGRAM

Plan I: Course requirements include History 5240 and 5270; one M.A. reading course; at least 6 additional hours 5300 or above of which 3 hours must be 6300 or above. Total hours, including thesis-45.

Plan II: History 5240, and 5270; two M.A. reading courses; 12 additional hours 5300 or above; at least 2 of which must be 6300 or above. Total hours-45.

M.A. IN HISTORY WITH A CONCENTRATION IN HISTORIC PRESERVATION

The option in historic preservation is a non-thesis program. Students will be examined in two fields: historic preservation, and either American history to 1815 or American history since 1815. A student is required to take two M.A. readings courses: 5215 or 5216 and 5225.

Total hours 47, 26 outside the History department and 21 within.

THE DOCTORAL PROGRAM

1. Admission: (a) Acceptable scores on the Graduate Record Examination (General Aptitude and History Achievement). (b) Students successfully completing the M.A. degree at The University of Tennessee must be recommended by the Department of History.

(c) Students from other institutions should have an M.A. degree and must be reviewed and approved by the Graduate and Undergraduate Awards and Review Committee after their first year of work at The University of Tennessee.

2. Residence and Course Work: Beyond the Bachelor's degree a minimum of 75 credit hours in course work is required, of which not less than 45 must be in courses that are numbered over 5000. Not less than 6 quarters of the required 9 quarters of residence work shall be under the supervision of the staff of The University of Tennessee.

3. Language Requirements: Candidates must possess a reading knowledge of one foreign language and such additional languages as may be determined by the student's committee. Under normal circumstances, 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 petition, the committee may accept in place of a language a B or better performance in appropriate statistical courses and History 5290.

The foreign language requirements may be satisfied in one of two ways:

(a) By examination. When the student is ready to take a language examination he/she should consult with an advisor. The appropriate forms and the time for the examination may be obtained from the Graduate School.

(b) By course work. Upon consultation with the advisor, a student may elect to complete an appropriate 3010-20-30 sequence in a language department (or an intermediate sequence in a language in which no 3010-20-30 sequence is available.) Satisfactory completion requires that a student must have at least a B in the final quarter.

4. Comprehensive Examination and Committee: Incoming students will be advised by the department head.

The comprehensive examination must be taken after coursework is completed. Language requirements fulfilled, and at least nine months before the degree is expected. This exam should normally be taken before beginning the 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, or both.

I. Ancient and Medieval

(1) Ancient Near East

(2) Greece

(3) Rome

(4) Early Middle Ages, 375-1122

(5) Late Middle Ages, 1095-1450

II. Early Modern

(1) Renaissance and Reformation

(2) Europe, 1559-1815

(3) American History to 1815

(4) Latin America 1492-1825

III. Modern

(1) Europe, 1815-1914

(2) European World Since 1914

(3) United States, 1815-present

(4) Latin America, 1789-present

(5) East Asia, 1641-present

(6) Middle East, 1798-present

IV. National, Sectional and Topical

(1) England, 1485-1763

(2) Great Britain, 1760-present

(3) France, 1559-1815

(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) Africa

The comprehensive examination will be both written and oral.

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.
College of Liberal Arts/History

125

3060-70 History of Western Religious Thought and History (2, 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, liberal government, church and society; origins of Anglo-American law monarchy and parliamentary government, Reformation, seventeenth century, political, social, cultural and industrial revolutions; class conflict, empire, welfare state, world wars, economic crisis.

3311-21 History of Tennessee (3, 3) 3311—Eighteenth Century to Civil War Era. 3321—1865 to present.

3411 The Renaissance (3) (Same as Religious Studies 3411.)

3412 The Reformation (3) Reformation, Counter Reformation, and Wars of Religion, 1517-1618. (Same as Religious Studies 3412.)

3421-22 Early Modern Europe 1600-1815 (3, 3) 3421—Seventeenth Century Europe. 3422—Eighteenth Century Europe.

3431-32 Nineteenth-century Europe (3, 3) 3431—French and industrial revolutions 1848. The milieu of ferment for conflicting economic, social and political ideas; rising in massive revolutionary upsurge. 3432—Maturity and challenge (1848-1890). Industrial and capitalist maturity in era of intense national rivalry; triumph of bourgeois, intellectual climate of realism, scientism, and materialism.

3445-46 History of France (4, 4) 3445—Emergence of Modern France (1715-1785). Social, intellectual and political forces in Ancien Regime; age of experimentation as revolutionary and traditional France confront one another. 3446—Since 1871.

3470-80-90 History of Russia (3, 3, 3) 3470—To 1801. 3480—Nineteenth Century. 3490—Twentieth Century.


3710-20-30 History of Germany (3, 3, 3) 3710—Germany to 1700: First Reich's fortune and failure. Dependent German imperial state from medieval greatness to baroque age weakness, disastrous means used to attain them, shifting strategy, tactics and weaponry involved in our wars, and relationship between American society and women's protest movement.

3820 Women in American History (4) Comparative analysis of role and image 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.

3820 Women in American History (4) Approaches of 4280 applied to American Society.


3420 The American Experience in World War II (4) Team-taught. Diplomacy and warfare in Europe and Asia and impact of war on American society.

3470 U.S. Military History, 1754 to the Present (4) Examination of nation's broad strategic aims and means used to achieve them, shifting strategy, tactics and weaponry involved in our wars, and relationship between American society and its armed forces.

3480 Civilian-Military Relationships in the Modern Western World (3) Civilian-military affairs from about 1500 to the present in Western Europe, Russia, and America: emphasis in Western Europe: e.g., Dreysen Affair, Army in Nazi Germany, and Truman-MacArthur controversy.


4470 Poland and Its Neighbors (3) A survey of Polish history from its beginnings to present with some emphasis on the Polish question within context of international political developments.

4480 Russian Intellectual History (3) From eighteenth century to present, emphasizing problems of Westernization, nationalism, and revolutionary tradition.

4490 Soviet Foreign Policy (3)

4500 History of Medieval England (3) From Anglo-Saxon to modern, relationship between legal and constitutional developments and structure of society.


4551 British Society and the Industrial Revolution, 1760-1848 (3) Emergence of modern industrial society: urbanization, mechanized factory production, social engineering via schools and police, mass politics and reform, class conflict, economic and population growth.

4570 Twentieth Century Britain (3) Emergence of welfare state, political impact of Labour movement, World War II and Depression, chronic economic crisis, persistence of class.

4610-20-30 The American Frontier and Westward Movement I, II, III (3, 3, 3) Settlement and development of the "West" throughout American history. 4610—From the Atlantic to the Mississippi. 4620-30—The Trans-Mississippi West.

4641-51 America: Mind, Mood and Society (3, 3) Social and cultural history and thought from mythology behind colonization to major beliefs and values which form the foundation of present-day life in the United States. 4651—Colonial period to 1865. 4651—1865 to present.

4661 Studies in American Social and Cultural History and Thought (3) Intensive examination of specific themes, problems, or ideas.

4670 Cities and Urbanization in American History (4) Origins, growth and influence of American cities in development of the nation, from colonial era to present.

4680 History of Knoxville (3) Knoxville, Tennessee, as a historical case study to analyze interplay of tradition and change in urban America in general and urban South in particular. Economic growth and development, population changes, and political, social, and cultural conflicts of forces focused with change and modernization.

4710-20 Medieval History, (3, 3) 4710—Age of Heroes: 500-1000. Pattern of early medieval heroic, its social and cultural assumptions, individual who exemplify it, continuing harsh environment of early Middle Ages. 4720—Age of Chivalry; 1000-1200. Chivalry from heroics of feudal epics of eleventh century to knightly ideals of thirteenth century romances.

4741 Italian City-States, 1250-1500 (3) Evolution of urban civilization in northern and central Italy in medieval and Renaissance periods. Architectural and townscapes formed in socioeconomic as well as cultural contexts. Florence is primary focus, but other major cities also involved.

4770-80 Austria and Central Europe (3, 3) 4770—To 1867. 4780—Since 1867.

4811-21 History of Japan (4, 4)

4840 History of Mexico (3)

4850 History of the Caribbean (3) Caribbean region from discovery and colonization to contemporary times.

4870-80-90 China (3, 3, 4) 4870—Chinese high culture from Confucius to Mao Tse-tung. Traditional religious, philosophical, fine arts, literature under communism; similarities and differences between Chinese and Western cultures. 4880—To 1865. Uniqueness of Chinese experience, its influence.
ence on Japan and West; relevance in today's world. 1850—Modern China since 1850; Chinese Revolution in context; imperialism, reform, nationalism, communist movement, Mao Tse-tung; China in today's world. No previous knowledge of China required.

4910-20 History of the South (3, 3, 3) 4910—1867-1870. 4920—1870-1870. 4930—Since 1870.
5000 Thesis (1-15) P/NP only. E
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. E
5015 Periods in History (3) May be repeated. Maximum 9 hrs.
5016 Periods in American History (3) May be repeated. Maximum 9 hrs.
5011 Foreign Study (1-12) See page 103. E
5102 Off-campus Study (1-12) See page 103. E
5103 Independent Study (1-12) See page 103. E
5211-5226 M.A. Reading Courses (3 hrs each) Directed reading courses in preparation for fields required for Master's oral examination. 5211, Ancient History; 5212, Medieval; 5213, Early Modern Europe; 5214, Europe Since 1789; 5215, American History from 1815; 5216, American History Since 1798; 5217, Latin America: 5218, Far East; 5219, Colonialism and Imperialism; 5221, England; 5222, Russia; 5223, Germany; 5224, France; 5225, Middle East; 5226, Historical Preservation. Open only to Master's candidates in history. S/NC only. E
5240 Introduction to Historical Research (3) Principles and techniques of research in study of history: traditional and newer methodologies. Required of all candidates for advanced degrees. E
5260 American Historiography (3) Introduction to the historical literature of American history.
5270 Schools of Western Historical Thought (4) Principal schools of western historical thought and their philosophic assumptions. Required of all candidates for advanced degrees except historic preservation.
5271-72 The Teaching of College History (0, 0, 0)looects for both 4940 and 5940.
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 Social and Cultural History (3)
5445 Topics in American Urban History (3)
5450 Topics in the American Westward Movement (3)
5660 Topics in Afro-American History (3) May be repeated. Maximum 9 hrs. (Same as Religious Studies 5660).
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)
5750 Topics in Ancient History (3)
5780 Topics in German National Socialism (3)
5790 Topics in Middle Eastern History (3)
5820 Topics in Mexican History (3)
5850 Topics in Chinese History (3)
5860 Topics in Japanese History (3)
5910 Topics in Southern History (3) May be repeated. Maximum 9 hrs.
5940 Local and Regional History (3) Concept and applicability of regionalism, analysis and study of United States regional models. May not receive credit for both 5940 and 5940.
5950 Material Culture (3) Use of cultural artifacts—public, residential, and commercial buildings, photographs, films, clothing, furnishings—to gain insight into American past. Primary emphasis on 19th and 20th centuries.
5960 Historical Agencies (3) Management and organization: philosophy and purpose, problems of fund raising, and public relations.
5970 Historic Preservation Internship (3) Practical work experience with regional historical agency, project or site. Students expected to do internships near completion of graduate program, and to submit scholarly written analysis of relationship between academic program and applied project to both project supervisor and departmental advisor.
6000 Doctoral Research and Dissertation (3-15) P/NP only. 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/she 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)
6650 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)

NOTE: Registration in topics and seminar courses may be repeated for credit with consent of department.

Latin

See Classics

Mathematics

MAJOR

DEGREES

Mathematics

M.M., M.A., M.S., Ph.D.

Professors:

G. E. Albert (Emeritus), Ph.D. Wisconsin; J. J. Breyfogle (Emeritus), Ph.D. Iowa; J. H. Carruth, Ph.D. Louisiana State; C. E. Clark, Ph.D. Louisiana State; R. E. Cline, Ph.D. Purdue; R. J. Davernon, Ph.D. Wisconsin; D. L. Johnson, Ph.D. Maryland; D. E. Dobbs, Ph.D. Cornell; E. D. Eaves (Emeritus), Ph.D. Texas; H. Frankse, Ph.D. Illinois; D. A. Gardiner, Ph.D. North Carolina State; R. T. Gregory (Emeritus), Ph.D. Illinois; T. G. Hafley, Ph.D. Missouri; D. B. Hinton, Ph.D. Tennessee; A. S. Householder (Emeritus), Ph.D. Chicago; L. S. Hutch, Ph.D. Florida State; G. A. Klaasen, Ph.D. Nebraska; R. M. McConnel, Ph.D. Duke; H. T. Mathews, Ph.D. Tulane; D. Miller (Emeritus), Ph.D. Michigan; B. S. Rajput, Ph.D. Illinois; K. C. Reddy (Emeritus), Ph.D. Indian Institute of Technology (India); P. W. Schafer, Ph.D. Maryland; F. W. Stallmann, Ph.D. Georgia; E. Wachwass, Ph.D. Rensselaer Polytechnic Institute; W. R. Wade, Ph.D. California (Riverside); C. G. Wagner, Ph.D. Duke.

Associate Professors:


Assistant Professors:

L. A. Richardson, Ph.D. Harvard; D. A. Ross, Ph.D. Nebraska; D. J. S. Cohen, Ph.D. Washington; S. Ellner, Ph.D. Cornell; L. J. Gross, Ph.D. Cornell; S. Hanenthal,* Ph.D. Carnegie-Mellon; G. Karakashian, Ph.D. Harvard; S. Lenhart, Ph.D. Kentucky; M. Miller, Ph.D. Illinois; S. Malley, Ph.D. Purdue; H. Simpson, Ph.D. California Institute of Technology; C. Sundberg, Ph.D. Wisconsin.

MASTER OF 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 or at least one of the states of the United States, or (b) three years of successful elementary or secondary school teaching experience. Evidence of the requirement being met must be supplied by the student.

Applicants for admission to this program

*Space Institute, Tullahoma.
A student selecting only three from the above list will also be required to pass a written exam on an area of applied mathematics (e.g., Fluids, Elasticity, Mathematical Ecology) approved as an examination topic for that student by the Graduate Committee and the Applied Mathematics Committee. 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.

A student may take as many of the written examinations as desired at any time these exams are given 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 exams may be taken at any one time, where n denotes the number of exams previously passed by the student.

c. A student may take a collection of written examinations a maximum of four times; but no one falling five exams, counting possible repetitions, will be permitted to take another round of exams.

d. 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.

e. 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 an oral exam in one foreign language. Of these, 9 hours may be in an area outside the department and 21 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, 30 hours (at least 24 of which are in mathematics) must be in courses numbered above 5000. Of the additional 9 hours, 9 must be in an area outside the department and 21 must be in courses in mathematics numbered above 5000.

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 a comprehensive examination upon completion of all course work.

THE MASTER’S 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 must be in an area outside the department and 21 must be in courses in mathematics numbered above 5000.

A student offering mathematics as a minor for the Master of Arts degree is required to obtain at least 30 hours of graduate credit in mathematics 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 Algebra 5250-60-70
   f. Partial Differential Equations 5450-60-70
   g. Ordinary Differential Equations 5870-80-90
   h. Numerical Mathematics 5655-65-75
   i. Mathematical Statistics 5760-60-70
   j. Students may not take examinations in both d. and e. nor may they take examinations in both f. and g. as their comprehensive 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.

A student 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 a comprehensive examination upon completion of all course work.

The written exams mentioned in 1. are normally given twice each year, once in the fall and once in the winter. The fall exams usually are given during the second week of the fall quarter, and the winter exams are given early in January. Note: Math 3500, 3060, 3090, 3100, 3110, 3310, 3320, 3330, 3510, and 3720, are intended primarily for students preparing to teach in elementary or secondary schools.

Any 3000 or 4000 course in the department whose course number ends in “zero” may be offered as an honors level. In the case of honors level, the title will be preceded by the word “Honors” both in the timetable and on the student's transcript. Honors versions of 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).

3050 Elementary Probability and Statistical Analysis (3) Combinatorial problems; sample spaces, sets, and events; statistical independence; axiomatic probability theory; random variables and their distributions; simple random processes. Does not satisfy requirements of major or minor in mathematics. Prereq: 1550 or equivalent. W, Sp

3060 Elementary Statistical Analysis (3) Elementary probability distributions used in statistics: binomial, Poisson, normal and their properties; sampling theory; confidence intervals; chi-square, normal, and other tests of hypotheses; least squares and line regression. Does not satisfy requirements of major or minor in mathematics. Prereq: 3050 or consent of instructor. Sp, Su

3090 Polynomials and Rings (3) An introduction to abstract algebra, beginning with study of integers followed by more general notion of rings, integral domains, and fields. Emphasis on properties to determine ring theoretic properties shared by integers and polynomial rings over certain fields. Prereq or coreq: 3100 or consent of instructor.

3100 Logic and Sets (3) Elements of mathematical logic; elementary algebra of sets. Primarily for students in the College of Education. Does not satisfy requirements of major or minor in mathematics. Prereq: 1 year of college mathematics.

3110 Real Number System (3) Laws of arithmetic; rational and irrational numbers; fields. Prereq: 1 year of college mathematics. Primarily for students in the College of Education. Does not satisfy requirements of major or minor in mathematics.


3150 Introduction to Numerical Algorithms and Programming (3) (Same as Computer Science 3156) E

3155 Introduction to Numerical Algorithms (3) (Same as Computer Science 3155) E

3215 Discrete Structures II (3) (Same as Computer Science 3215) E

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 year of college mathematics. F

3320 Non-Euclidean Geometry (3) Foundations of geometry. Elliptic and hyperbolic plane geometry. Prereq: 1 year of college mathematics. W

3330 Transformational Geometry (3) Fundamental transformations in the plane and space, isometries, congruence, similarity, axioms of isometries and similarities; symmetries of a polygon; inversions. Prereq: 1 year of college mathematics. Sp

3510 Introduction to Analysis for Teachers (3) Primarily for students in secondary mathematics education. Course covers elementary calculus from an 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. Does not satisfy requirements of major or minor in mathematics. Prereq: 1550-60 or 1860. Su


3780-90 Introduction to Combinatorial Theory (3, 3) Introduction to problems of arrangement and

**5202 Mathematics for Business Decisions (3)** Exponential function, applications to growth and decay models, antiderivatives, integration as area, fundamental theorem of calculus, method of substitution, integration over simple regions, applications of definite integrals, applications to business, economics, and social science. Credit available only to satisfy MGA core requirement. Prereq: Math 1550 or equivalent.

**5100 Introductory Business Mathematics (3)** Graphing of simple equations, straight lines, circle, parabola, functions, algebra of functions, limits, continuity, derivatives of algebra functions, applications to maxima and minima, convexity and concavity, implicit differentiation, chain rule, higher derivatives, and applications. Credit available only to satisfy MGA core requirement. Prereq: Math 1560 or equivalent.

**5014 Analysis for Teachers (3-4)** Functions of several variables, vectors, limits and continuity, partial derivatives, directional derivatives and gradients, implicit function theorem, maxima and minima, transformations. Prereq: Math 5013 or equivalent. Prereq: Consent of instructor.

**5012 Differential Geometry for Teachers (3-4)** Advanced techniques applied to graphing functions. Curves, surfaces, parametrizations, singular points, tangential lines and tangent planes, osculating planes, length of curves in plane and curves on surfaces, curvature, torsion, asymptotic, local coordinates, Frenet formulas. Prereq: 1 yr of calculus, or consent of instructor.

**5013 Geometry for Teachers (3-4)** Primarily for high school teachers of geometry. Modern and traditional 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.

**5051 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, F, and t distributions; interval estimation of means and variances, simple hypothesis testing. Prereq: 1 yr of calculus and 3050 or consent of instructor.
functions and functions of bounded variation, Radon-Nikodym theorem. Hahn-Jordan decomposition, product measures and Fubini theorem. F, W, Sp, A

5520-60 Applied Linear Analysis (3, 3) Introduction to differential and integral equations. Systems of linear bounded and unbounded operators, spectral theory. Applications to differential and integral equations. Functions of bounded variation, shock waves in perfect fluids, viscous flows and boundary layer phenomena, additional special topics. Prereq: 4530 or 4710 or consent of instructor.

5530-80-90 Mathematical Principles of Fluid Mechanics (3, 3, 3) Equations of motion, incompressible flows (low Mach number), Navier-Stokes equations, linear stability analysis, the Navier-Stokes equations. Prereq: 5520. Must be taken in sequence. W, Sp, A


5775 Combinatorial Algorithms (3) (Same as Computer Science 5775.)

5810-20-30 Number Theory (3, 3, 3) Arithmetical functions, distribution of primes, Diophantine equations, approximation theory, Shirelman density and Mann's theorem, quadratic forms, Dirichlet's theorem, prime number theory. Prereq or coreq: 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 a qualitative modeling perspective. Physical environmental modeling with effects in ecosystems. Specific ecosystem models; predator-prey, competition, parasite-host, food chains, and food webs. Stochastic growth models, natural resource impacts. Comparison of stochastic with deterministic models. Prereq for 5840-50: 4610, 4520 or consent of instructor; or prereq for 5860: 4750 or 4450 or consent of instructor.

5870-80-90 Introduction to Ordinary Differential Equations (3, 3, 3) Existence and uniqueness, extendibility, continuity of solutions; linear equations, power series, Frobenius methods for regular singular equations. Prereq: 3150 or 3155, and one 4000-level mathematics course. Prereq: 5510-20-30 and 5520 or consent of instructor. (Same as Computer Science 5455.) F

5890-90-100 Mathematical Programming (3, 3, 3) Linear second-order equations in two variables; properties of elliptic, hyperbolic and parabolic equations, separation of variables, and Fourier series, nonhomogeneous problems, problems in higher dimensions, multiple Fourier series, Fourier and Laplace transforms. Prereq: 4510-20-30 and 4610 or consent of instructor. F, W, Sp, A

5940-50-60 Applied Probability (3, 3, 3) Development of probabilistic techniques useful in applications. Topics include: Probability, random variables, independence; expected value; point of view of distribution functions. Discrete and continuous time Markov chains, birth and death processes, Markov processes, martingales, renewal processes, general Markov processes, branching and stationary processes. Stochastic differential equations, diffusion processes, stochastic control. Applications to queueing, inventory control, signal theory, biological and physical sciences. Prereq: 4510-20-30 and either 4650-60-70 or 4520-60-70, or consent of instructor.


5990 Graduate Reading in Mathematics (1-3) Open to graduate students with consent of department head. Independent study with faculty guidance. May be repeated. Maximum 9 hrs.

5991 Seminar Analysis (1-3)

5992 Seminar Topology (1-3)

5993 Seminar Algebra (1-3)

5994 Seminar Foundations (1-3)

5995 Seminar Applied Mathematics (1-3) May be taken for S/NC or letter grade.

NOTE: Registration for seminars may be repeated with consent of department.

6000 Doctoral Research and Dissertation (3-15) P/NP only. E


6450-50-60 Partial Differential Equations (3, 3, 3) Advanced topics in classical and modern theoretical partial differential equations. Prereq or coreq: 5110-20-30 and 5210-20-30 or consent of instructor.

6510-20-30 Modern Algebra (3, 3, 3) Intensive study of abstract algebraic theory. Subject matter will vary according to interests and preparation of students. Prereq: 5510-20-30.

6570 Theory of Groups (3) Structure of groups, free groups, nilpotence and solvability, extensions and products, permutation groups, abelian groups. Prereq: 5520.

6610-20-30 Advanced Ordinary Differential Equations (3, 3, 3) Theory of ordinary differential equations from advanced viewpoint. Topics from current literature. Subject matter varies according to interests and preparation 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: 5910-20-30.

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) Homology theory, 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 5920.

6991 Seminar Analysis (1-3)

6992 Seminar Topology (1-3)

6993 Seminar Algebra (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

Microbiology

DEGREES

M.S., Ph.D.

Professors:

A. Brown (Head), Ph.D. Chicago; R. W. Beck, Ph.D. Wisconsin; J. M. Becker, Ph.D. Cincinnati; R. J. Courney, Ph.D. Syracuse; T. C. Monte, Ph.D. Michigan; R. D. Dodge, Ph.D. Yale; B. T. Rose, Ph.D. Quebec (Canada); J. M. Woodward (Emeritus), Ph.D. Kansas; C. J. Wust, Ph.D. Indiana.

Associate Professors:

D. A. Parks, Ph.D. Cornell; D. A. Brian, Ph.D., D.V.M. Michigan State; G. S. Sayler, Ph.D. Idaho.

Assistant Professors:

R. N. Moore, Ph.D. Texas (Austin); K. M. Stoklin, Ph.D. Michigan; G. Slacey, Ph.D. Texas (Austin).

Lecturers:

H. F. Adler, Ph.D. Cornell; B. B. Bellomy, M.D. Georgetown; W. Parks, Ph.D. Duke; C. L. Lozzio, M.D. Buenos Aires.

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, 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.

3610 Food Bacteriology (3) Standard methods for examination, cultivation, and identification of bacteria associated with food fermentation and food spoilage. Prereq. 2910 or 3700 and Chemistry 2230 or 3211. Sp

3810 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. W

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. W

3829 Yeasts and Molds Laboratory (2) Laboratory methods for examination and cultivation of yeasts and molds. Prereq. 2919 or 3519. Coreq. 3820. W

4110 Physiology of Bacteria (3) Modern concepts of bacterial physiology and metabolism including cell structure and function. Prereq. 3700 and 12 hrs of organic chemistry. W

4119 Bacterial Physiology Laboratory (2) Prereq. 3519. Coreq. 4110. W

4130 Taxonomy of Bacteria (3) Bacterial classification. Prereq. 3700 and 3519. F

4140 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. 3700 or consent of instructor. Sp

4149 Techniques in Microbial Genetics (2) Practical experience in basic techniques in experimental microorganisms. Coreq. 4140. Sp

4150 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, Biology 3130, or consent of instructor. Sp

4150 Experimental Microbial Ecology (3) Survey of techniques for assessment of microbial forms, functions, activities, and interactions in a variety of habitats. Prereq. 3519. Coreq. 4150 or consent of instructor. 1 hr and 2 labs. Sp

4270 Immunology (3) Principles of inflammation and immunity. Characteristics of microbial structure and theories of formation, complement, hypersensitivities, cell cooperation in immune mechanisms, abnor-

malities 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. 3510. F

4320 Pathogenic Bacteriology (3) Disease producing microorganisms including bacteria, rickettsia, and chlamydia. Prereq. 3300. W

4329 Pathogenic Bacteriology Laboratory (2) Techniques for isolation, cultivation, and identification of pathogenic bacteria. Prereq. 3500. Coreq. 4320. W

4330 Medical Mycology (3) Disease-causing fungi; cytology; physiology, pathogenesis and immunity; emphasis on methodology of isolation and identification. Prereq. 3700. Sp

4339 Medical Mycology Laboratory (2) Prereq. 3519. Coreq. 4330. Sp

4420 Molecular Virology (3) Molecular aspects of the replication, assembly and expression of viruses, with emphasis on bacteriophage. Prereq. 3703. F

4430 Medical Virology (3) General virology with emphasis on medical aspects. Prereq. 3200. W

4439 Medical Virology Laboratory (2) Laboratory procedures for isolation, handling and culturing of animal viruses. Prereq. 3519. Coreq. 4430. W

5000 Thesis (1-15) P/NP only. 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.

5011-12-13-14-15-16 Mini-course in Microbiology (1, 1, 0, 1, 0, 0) 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 surveys and laboratory methods for development and interpretation of microbiological research. May be repeated.

5350 Advanced Microbiology for Secondary Education Internship (4) Major bacterial populations encountered in natural habitats; laboratory methods for isolation and characterization of natural mechanisms of microorganisms. Prereq. Consent of instructor and introductory course in microbiology and general chemistry. Not for degree credit in microbiology. Sp

5360 Topics in Immunology and Immunochromatography (4) Molecular and genetic aspects of immunoglobulin synthesis. Theoretical and practical exercise in immunohematology. Prereq.: 4270, Biochemistry 4110-20 or equivalent.

5510-20-30 Research Problems (3, 3, 3) May be repeated with consent of department.

5730 Pathogenesis of Infectious Disease (3) Host response to infection. Derangement of host-metabolism stimulated by microbial invasion, exotoxins, endotoxins and other factors related to virulence. Alteration of genetic and hormonal controls resulting from progressive infection. Prereq. 4320.

5750 The Oncogenic Viruses (3) Lectures and special laboratory exercises dealing with known tumor-inducing viruses. Prereq.: 4430 or consent of instructor. 2 hrs and 1 lab.

5760 The Bacterial Viruses (3) Lectures and discussions dealing with bacterial viruses with emphasis on the biological and chemical consequences of bacteriophage infection. Text supplemented by readings from literature. Prereq.: 4420; Biochemistry 4110-20.

5819 Molecular Genetics Laboratory (3) Principles and methods of research in molecular genetics. Fundamentals of genetic concepts (mutation, complementation, recombination) at molecular level. Studies of lactose operon of Escherichia coli. Prereq.: 4140 and Biochemistry 4110-20 or consent of instructor.

5910-20-30 General Seminar (1, 1, 1) Reviews of current literature. May be repeated with consent of department. S/NC only, E.

6000 Doctoral Research and Dissertation (3-15) P/NP only. E

6310 Seminar in Immunology (1) Readings and discussions based on current literature. May be repeated. S/NC only, E.

6320 Seminar in Microbial Pathogenesis (1) Readings and discussions based on current literature. May be repeated. S/NC only, E.

6330 Seminar in Microbial Physiology (1) Readings and discussions based on current literature. May be repeated. S/NC only, E.

6340 Seminar in Microbial Genetics (1) Readings and discussions based on current literature. May be repeated. S/NC only, E.

6430 Seminar in Immunology (1) Readings and discussions based on current literature. Maximum 9 hrs. S/NC only, F, W, Sp

6430 Seminar in Microbial Physiology (1) Readings and discussions based on current literature. May be repeated. S/NC only, E.

6430 Seminar in Microbial Genetics (1) Readings and discussions based on current literature. May be repeated. Maximum 9 hrs. S/NC only, F, W, Sp

6430 Seminar in Microbial Physiology (1) Readings and discussions based on current literature. May be repeated. Maximum 8 hrs. S/NC only, F.

6410 Concepts of Immunity (3) Discussion and readings of recent advances in immunology and immunohematology.

6420 Seminar in Biophysical Membrane Research (1) (Same as Biochemistry 6420.) S/NC only.

6720 Advanced Topics in Microbial Physiology (3) Prereq.: 5720. May be repeated with consent of department.

6730 Advanced Topics in Microbial Pathogenesis (3) Prereq.: 5730. May be repeated with consent of department.

6740 Advanced Topics in Virology (3) Prereq.: 4420 or 4430. May be repeated with consent of department.

6750 Advanced Topics in Microbial Genetics (3) Prereq.: 6340. May be repeated with consent of department.

6810-20-30 Problem Seminar (1, 1, 1) Research problems and methods. Critical analysis of experimental data and validity of conclusions. May be repeated with consent of department. S/NC only.

Music

MAJOR

Music

DEGREES

M.M., M.A.

Professors:


Associate Professors:

G. C. Bitzas, M.M. Converse; W. Bommelje, M.M. Tulsa; M. Fraley, B.M. Oberlin; P. M. Horodysky, M.M. Manhattan Sch. of Music; D. Hough, M.M.

College of Liberal Arts/Microbiology


The Department of Music offers the degree of Master of Music with concentrations in performance, composition, theory, choral conducting, instrumental conducting, Suzuki string techniques, and piano pedagogy and 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 conferred by The University of Tennessee, Knoxville, in the appropriate area of concentration on the Master's level.

Applicants who plan to pursue the degree in performance (applied music) are required to audition before the 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

The department requires a minimum of 45 quarter hours of coursework for the Master of Music degree. These hours are specifically distributed according to the area of concentration. All areas require coursework in music history/literature and/or theory and allows for elective courses. Music theory and composition require a thesis. Detailed programs will be established by the student's faculty committee.

THE MASTER OF ARTS PROGRAM

The department requires a minimum of 45 quarter hours including 21 hours of coursework above the 5000 level and 9 hours of thesis.

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.

3122 Oratorio (3) Choral works other than those appropriate for use in church.
**3500 Flute (1-4)
**3505 Oboe (1-4)
**3510 Bassoon (1-4)
**3515 Clarinet (1-4)
**3520 Saxophone (1-4)
**3525 Horn (1-4)
**3530 Trumpet (1-4)
**3535 Trombone (1-4)
**3540 Baritone (1-4)
**3545 Tuba (1-4)
**3550 Percussion (1-4)
**3555 Voice (1-4)
**3560 Violin (1-4)
**3565 Viola (1-4)
**3570 Cello (1-4)

3340 Oratorio (3) Choral works other than those appropriate for use in church.

3411 Choral Arranging (3) Analysis of scores and writing of arrangements for men's, women's and mixed choirs. Prereq: 3112 or consent of instructor.

3424 Marching Band Arranging (3) Study and application of techniques employed in scoring for marching band. Prereq: 3112 or equivalent.

3434 Concert Band Arranging (3) Study and application of techniques employed in scoring for concert band. Prereq: 3112 or equivalent.


4241 Music of the United States (3) From colonial times to present. Emphasis on 20th century. Includes both folk and art music traditions. Recommended: 1210.


4290 Gregorian Chant (3) Chants of Latin rite. Masses and Offices examined as functional music as well as by type.

4340-50 Works of Bach (3, 3) Detailed examination of sonatas, chamber, keyboard, and orchestral works; cantatas, motets, passions and oratorios. 4340—instrumental works; 4350—vocal works.

4400 Jazz Directing (1) Rehearsal techniques for jazz ensembles: special conducting techniques, repertoire, library systems, programming, and supervised experience in rehearsing university jazz ensembles. Prereq: Enrollment in Applied Music with jazz emphasis or consent of instructor.

**4500 Flute (1-4)
**4505 Oboe (1-4)
**4510 Bassoon (1-4)
**4515 Clarinet (1-4)
**4520 Saxophone (1-4)
**4525 Horn (1-4)
**4530 Trumpet (1-4)
**4535 Trombone (1-4)
**4540 Baritone (1-4)
**4545 Tuba (1-4)
**4550 Percussion (1-4)
**4555 Voice (1-4)
**4560 Violin (1-4)
**4565 Viola (1-4)
**4570 Cello (1-4)
**4575 String Bass (1-4)
**4580 Piano (1-4)
**4585 Harpsichord (1-4)
**4590 Organ (1-4)
**4595 Guitar (1-4)

4495 Composition with Electronic Media (1-3) Prereq: Consent of instructor.

4500 Flute (1-4)
**4505 Oboe (1-4)
**4510 Bassoon (1-4)
**4515 Clarinet (1-4)
**4520 Saxophone (1-4)
**4525 Horn (1-4)
**4530 Trumpet (1-4)
**4535 Trombone (1-4)
**4540 Baritone (1-4)
**4545 Tuba (1-4)
**4550 Percussion (1-4)
**4555 Voice (1-4)
**4560 Violin (1-4)
**4565 Viola (1-4)
**4570 Cello (1-4)
**4575 String Bass (1-4)
**4580 Piano (1-4)
**4585 Harpsichord (1-4)
**4590 Organ (1-4)
**4595 Guitar (1-4)
**4597 Composition with Electronic Media (1-3) Prereq: Consent of instructor.

4599 Composition (1-3) Prereq: Consent of instructor.
4840 Jazz Pedagogy (1) Methods and materials relating to teaching of jazz and administering of jazz program. Prereq: Enrollment in Applied Music with jazz emphasis or consent of instructor.

4850 Jazz Composition (2) Prereq: 4870-75.

4860 Advanced Improvisation (2) Emphasis on further development of individual skills and solving individual problems in jazz improvisation. Prereq: 3052-53.

4870-75 Stage Band Arranging (2, 2) Analysis of scores and scoring for stage band. Prereq: 3112 and consent of instructor. Must be taken in sequence.

5000 Thesis (1-18) P/NP only. E

5001 Project in Choral Conducting Performance (1-3) Public performance; critical document; recording project. May be repeated. Prereq: Consent of instructor.

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student wishes to remain in the graduate program. May not be used toward degree requirements. May be repeated. S/NC only. E

*5010 Organ Literature Seminar (3) Topics vary. Prereq: Organ literature.

5012-22-32 Pedagogy of Voice (2, 2, 2) 5012—Survey of voice production processes in singing including voice classification, quality, diction registration, breath support, and control. 5022—Examination of teaching materials, preparation of programs for various vocal categories and levels of study. Observation of studio teachings. 5032—Analysis of the vocal problems of a selected group of students. Supervised teaching. Prereq: 4012-22-32 or consent of instructor.

*5020 Piano Literature Seminar (3) Topics vary. Prereq: Organ literature.

5033-34-35 Advanced Diction for Singers (2, 2, 2) Practical performance and application of diction theory. Prereq: 2055-65-75 or equivalent.

*5040 Vocal Literature Seminar (3) Topics vary.


5050 Graduate Recital (3)

5051 Opera Performance (3)

5052 Vocal Chamber Music Performance (3)

5054 Lecture-Recital (3)

5055-56 Practicum for Instrumental Conductors (1, 1) Intern experience in choral music and in an instrumental field other than the area of major interest. S/NC only.

5057 Instrumental Conducting Seminar (3) Rehearsal and performance problems and techniques allied to score reading and preparation. Particular attention to individual problems. Prereq: 4050 or equivalent.

5060 Advanced Choral Conducting II (3) Expansion and continued refinement of conducting technique; development of choral rehearsal skills. Prereq: 4060 or consent of instructor.

5061 Choral Conducting Seminar (3) Score reading and preparation; problems in interpretation, performance practices, and conducting techniques of individual. May be repeated. Prereq: 5060 or consent of instructor.

5062-63-64 Choral Literature (2, 2, 2) Choral music from Middle Ages to present with consideration of historical development of major choral genres.

*5070 Opera Production (1-3) Prereq: Consent of instructor.

5080 Instrumental Conducting Performances (1) Jury performance; conducting band or orchestra in public.

*5090 Special Topics in Performance (1-3) Prereq: Consent of department head.

*5100 Independent Study in Music Theory (1) Prereq: Consent of department head.

5114 History of Music Theory (3) Work and contributions of theorists from ancient Greece to present. Emphasis on 1600 to present. Prereq: Consent of instructor.

5116 Musical Styles (3) Elements of design and their role in definition of musical styles. Exercises in aural and visual identification. Prereq: Consent of instructor.

5121 Analytical Techniques (3) Analytical techniques with emphasis on contemporary approaches. Tonal and neotonal music. Prereq: Consent of instructor.

*5125 Practicum in Computers and Music Research (3) Programming languages, design and implementation of projects in musical analysis, composition and indexing. Prereq: Consent of instructor.

*5150 Seminar in Music Theory (3) Topics vary. Prereq: Consent of instructor.

*5200 Independent Study in Music History and Literature (1-3) Prereq: Consent of department head.

5210 Introduction to Music Research (3) Principles and techniques of research. Required of all candidates with concentrations in musicology or in music theory; recommended for all music students who intend to enroll in a doctoral program.

5220 Music Bibliography (3) Bibliographic methods; illustrative projects in information retrieval and problem solving in music.

*5270 Composer Seminar (3) Topics vary. Prereq: Consent of instructor.

5315 Band Literature (3) Band literature and origins of band emphasizing its important, expanded cultivation during past century in United States and Europe.

5350 Music in the Middle Ages (3) Emphasis on early Christian chant, medieval secular song, early theory, and early development of polyphony and musical notation.

5352 Music in the Renaissance (3) From 1400 to 1600: Mass, motet, chansons, madrigal, and other vocal and instrumental forms and genres.

5353 Music in the Baroque Period (3) From 1600 to 1750: rise of opera and oratorio, church and secular cantata, instrumental forms, performance practice.

5355 Music in the Classic Period (3) Preclassic music (Rococo) and music of Haydn, Mozart and early Beethoven. Includes background of other cultural and artistic activities.

5357 Music in the Romantic Period (3) Survey from Beethoven through post-Romantic instrumental and vocal styles.

5359 Music in the Twentieth Century (3) From 1890 (Debussy) to the present (Stockhausen and others).

5400 Musical Aesthetics (3) Nature of music and musical experience, sense perception and emotions, value in music, and role of artist in society. Aesthetic viewpoint of individuals and historical eras through selected writings.

*5500 Flute (1-4)

*5505 Oboe (1-4)

*5510 Bassoon (1-4)

*5515 Clarinet (1-4)

*5520 Saxophone (1-4)

*5525 Horn (1-4)

*5530 Trumpet (1-4)

*5535 Trombone (1-4)

*5540 Baritone (1-4)

*5545 Tubas (1-4)

*5550 Percussion (1-4)

*5555 Voice (1-4)

*5560 Violin (1-4)

*5565 Viola (1-4)

*5570 Cello (1-4)

*5575 String Bass (1-4)

*5580 Piano (1-4)

*5585 Harpsichord (1-4)

*5590 Organ (1-4)

*5595 Guitar (1-4)

5597 Composition with Electronic Media (1-3) Prereq: Consent of Instructor. May be repeated. Maximum 9 hrs.

*5599 Composition (1-3) Prereq: Consent of instructor.

**5600 Small Ensemble (1)

**5601 Woodwind Choir (1)

**5602 Woodwind Choir (1)

**5604 Jazz Ensemble (1)

**5606 Trombone Choir (1)

**5610 Percussion Ensemble (1)

**5611 Marimba Choir (1)

**5612 Baroque Ensemble (1)

**5620 UT Singers (1)

**5630 Chamber Singers (1)

**5632 Collegium (1)

**5634 Saxophone Choir (1)

**5640 Opera Theatre (1)

**5642 Opera Workshop (1)

**5650 Concert Band (1)

**5652 Campus Band (1)

**5654 Varsity Band (1)

**5656 Laboratory Band (1)

**5657 Marching Band (1)

**5670 Symphony Orchestra (1)

**5690 Concert Choir (1)

**5682 University Chorus (1)

**5699 Accompanying (1)

1 May be repeated.

2 May be repeated. Maximum 6 hrs.

Philosophy

MAJOR

DEGREES

M.A., Ph.D.

Philosophy

Professors:

J. W. Davis (Head), Ph.D. Emory; R. E. Aguila, Ph.D. Northwestern; L. B. Cedik, Ph.D. Nebraska; R. B. Edwards, Ph.D. Emory; G. C. Graber, Ph.D. Michigan; D. Van de Vate, Jr., Ph.D. Yale.

Associate Professors:

THE MASTER’S PROGRAM

The department offers both an M.A. with thesis and a non-thesis M.A. The latter is available only to students who have passed the doctoral comprehensives and are ready to begin writing a dissertation, but who have not written a Master’s thesis. See general requirements on page 18. 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 hours 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) 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 Philosophy or Religious Studies Departments.

3111 Ancient Western Philosophy (4) F, W
3121 Medieval Philosophy (4) F, Sp
3131 Seventeenth- and Eighteenth-century Phi- losophy (4) E
3141 Nineteenth-century Philosophy (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. A
3330 Philosophy of History (4) Speculative and critical aspects of the philosophy of history. A
3410 Philosophical Ideas in Literature (4) Philosophical interpretations and implications in major literary works. F, W, Su
3420 Philosophy of Literature (4) Study of the nature, functions, values and epistemical principles of literary arts. A
3430 The Concept of Woman (4) Nature of woman as conceived by major western philosophers from Plato to Simone de Beauvoir. F, W
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
3590 Business Ethics (4) Ethical problems as they confront both business as social institution and individuals in business. May not be taken for graduate credit by philosophy majors. Sp
3605-06 Professional Responsibility (4, 4) 3605—Critical analysis of selected classic texts from philosophy, religious studies, and social sciences; nature of responsibility, professionalism, and application of concepts of responsibility to professional activity; illustrations from various professional fields of practice. 3606—Application of theoretical principles and analytic skills developed in 3605 to internship and clinical supervision. F, Sp
3610 Philosophy and Religion in India (4) (Same as Religious Studies 3650.) F
3620 Buddhist Philosophy and Religion (4) (Same as Religious Studies 3660.) F
3671 Religion and Philosophy in China (4) (Same as Religious Studies 3671.) W
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 scientific theories. Historical description of thought on the nature of matter and of light, and on that of life. Prereq: 8 hrs of physics or consent of instructor. F, Sp
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 to 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.)
4200 Classical Indian Systems of Philosophy: The Moksha Tradition (4, 4) (Same as Religious Studies 4200.)
4310 Intermediate Ethics (4) Topics in metaphysics or ethics. Sp
4370 Theoretical Issues in Medical Ethics (4) Prereq: 2310 or 3611 or consent of instructor. (Same as Religious Studies 4370.) Sp
4410 Plato (4) Prereq: 8 hrs philosophy or consent of instructor. A
4420 Aristotle (4) Prereq: 8 hrs philosophy or consent of instructor. A
4450 Continental Rationalism (4) Prereq: 8 hrs philosophy 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.
4511 Advanced Topics in Logic (4) Prereq: Consent of instructor. May be repeated.
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 philosophy or consent of instructor.
4710 Philosophy of Natural Science (4) Consideration of standard topics pertinent to natural science including reduction of theories and teleological explanation. Familiarity with symbolic logic is recommended. Prereq: 3770 or 2 yrs natural science.
4720 Philosophy of Social Science (4) Examination of methodology 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) P/NP only. 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
5050 Symbolic Logic (4)
5860 Philosophy of Logic (4) Nature of logic; epistemological, metaphysical and axiological assumptions and implications in various theories of logic. Prereq: 4510 or equivalent.
5101 Foreign Study (1-12) See page 103. E
5102 Off-campus Study (1-12) See page 103. E
5103 Independent Study (1-12) See page 103. E
5110-20-30-40-50-60 Studies in the History of European Philosophy (4, 4, 4, 4, 4, 4) Intensive critical work on major philosopher or school. 5110—Greek. 5120—Hellenistic or Medieval. 5130—Modern, before Kant. 5140—Kant. 5150—Nineteenth Century. 5160—Twentieth Century.
5250 Studies in the History of American Philoso- phy (4) Intensive, critical work on major philosopher or school.
5355 Orientation to Medical Ethics (2) Survey of ethical theories in application to issues in medical ethics. Consent of Medical Ethics Committee required. (Same as Religious Studies 5355.) F
5365 Applied Ethical Theory (4) Single author, tradition, or topic in ethical theory with special attention to application to issues in health, business, technology, ecology, and other practical fields. (Same as Religious Studies 5365.) W
5370 Topics in Medical Ethics (4) Prereq: 4370 or consent of Medical Ethics Committee.
5375 Clinical Medical Ethics (1) Medical terminology, history of medical ethics, case study discussion, clinical observation. Open only to students concentrating in medical ethics. Prereq: 3556 and consent of Medical Ethics Committee. May be repeated. Maximum 8 hrs. S/NC only.

College of Liberal Arts/Philosophy 133
Physicists and Astronomy

Major

DEGREES

M.S., Ph.D.

Physics

Professors:

W. M. Bugg (Head), Ph.D. Tennessee; C. R. Bingham, Ph.D. Tennessee; W. E. Blass, Ph.D. Michigan State; A. T. Balcett, Ph.D. Purdue; L. G. Christpheroff, Ph.D. University of Manchester (England); G. T. Condo, Ph.D. Illinois; W. E. Reed, Ph.D. Ohio State; J. B. Dicks, Ph.D. Vanderbilt; J. L. Fowler, Ph.D. Princeton; K. Fox, Ph.D. Michigan; N. M. Gallari, Ph.D. Ohio State; S. G. Ghosh, Ph.D. Manchester (England); E. G. Harris, Ph.D. Tennessee; E. L. Hart, Ph.D. Dornell; P. G. Huray, Ph.D. Tennessee; H. C. Jacobson, Ph.D. Yale; D. T. King, Ph.D. Brown; R. J. Lovell, Ph.D.; A. A. Mason, Ph.D. Tennessee; A. H. Nielsen (Emeritus), Ph.D. Michigan; F. E. O'Connell, Ph.D. Dornell; Ph.D. Pittsburgh; L. R. Painter, Ph.D. Pennsylvania; D. D. Stephens, Ph.D. Massachusetts; L. L. Blanding, Ph.D. Vanderbilt; P. R. Ritchie, Ph.D. Tennessee; W. C. Schwenk, Ph.D. Massachusetts Institute of Technology; M. Stilin, Ph.D. Chicago; C. C. Shih, Ph.D. Dorn; P. H. Stelton, Ph.D. Massachusetts Institute of Technology; J. R. Thompson, Ph.D.


Associate Professors:


Assistant Professors:

M. Briedinger, Ph.D. Oregon; J. Budinger, Ph.D. Frie University; R. Depew, Ph.D. Chicago; T. Ferrell, Ph.D. Clemson; T. H. Handler, Ph.D.; Rogers; S. Nave, Ph.D. Tennessee.

A student who enrolls in The Graduate School with the intention of attaining an advanced degree in Physics shall, in general, have completed an undergraduate major in physics or its equivalent. Physics 3210-20-30, 3710-20-30; 4110-20-30; 4210-20, 4230 or 4240 constitute the minimum courses of graduate physics study. A student who intends to present Physics as a graduate minor shall, in general, have completed an undergraduate minor in Physics or its equivalent. Physics 3210-20, 4210-20 constitute the minimum course work prerequisite to graduate study.

Graduate programs leading to the degrees of Master of Science and Doctor of Philosophy are offered in a number of specialized fields including mathematical physics, elementary particle physics, atomic and low temperature physics, health physics, molecular spectroscopy, nuclear physics, plasma physics, solid state physics, theoretical physics, ultrasonics, heavy ion atomic physics, biophysics, and liquid state physics.

Departmental graduate programs providing special opportunities for academic research in areas of atmospheric and space physics are available at the Space Institute, Tullahoma.

All first-year graduate students are required to take a qualifying examination in undergraduate physics during the fall quarter registration period.

The Physics Department has two Master's degree programs—thesis and non-thesis. The thesis program is primarily designed for students intending to go into industrial or governmental laboratories as physicists. The course requirements include 36 quarter hours in such courses as Physics 4510-20-30, 4610-20-30, 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 is primarily designed for students intending to go into industrial or governmental laboratories as physicists. The course requirements include 36 quarter hours in such courses as Physics 4510-20-30, 4610-20-30, 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.

A reading knowledge of one foreign language in which there exists a significant body of literature is required. German or French 3030 with a grade of A or B may be substituted for the corresponding language examination.

The thesis topic will be chosen with reference to one of the fields in which research facilities can be made available either at the University laboratory or at the Oak Ridge National Laboratory, Oak Ridge, Tennessee.

A program leading to the Ph.D. in chemical physics is conducted jointly with the Chemistry Department, which offers a similar degree. Physics departmental requirements for the degree in chemical physics include the successful completion of Physics 4510, 4610-20-30, 5110-20-30, 5210-20-30, 5310-20-30, 5410-20-30, 5510-20-30, 5610-20-30, 6110-20-30, and either 6310 or 5720; Chemistry 4150-70, 5430, and any two courses from 5340-50, 6730 or 6810-20.

Astronomy


Physics


3220 Heat and Thermodynamics (3) Concepts of temperature and heat, laws of thermodynamics; applications of laws to simple physical and chemical problems. Prereq: 2320 or 2330 and calculus; 3210-20 or consent of instructor. Sp, Su.

3610-20 Electronics (3, 3, 3) Electronic components and circuits of interest to physicists. Prereq: 2310-20-30 or 2210-20-30 and calculus. 3 labs. F, W, Su.


3710-20-30 Introduction to Atomic and Nuclear Physics (3, 3, 3) 3710—Special relativity and early
quantum theory. 3720—Atomic and molecular physics. 3730—Nuclear physics. Prereq: Mathematics 2860; 2320 for 3710; 3510 or 3710 for 3720-30. E


5140 Elementary Nuclear Physics (3, 3, 3) General properties of nuclei, two-nucleon systems, nuclear forces, nuclear models, nuclear reactions, nuclear disintegration, and nuclear reactions; one-electron spin and magnetism. Prereq: 3730 or 4120. Sp.

5160 Physical Acoustics (4) Considerations fundamental to detailed investigation of any branch of acoustics; propagation of acoustic waves in the insonic, the audible, the ultrasonic, and the hyper-sonic ranges of frequencies. Prereq: 3210-20, 3230. 3 hrs and 1 lab. Sp.

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: 3920 or 2220 and Mathematics 2869. F, W, Sp, or W, Sp.

4230-40 Modern Optics (4, 4) Geometrical Optics: Reflection and transmission of light at a dielectric interface; paraxial theory of interfaces, lenses, perfecting mirrors; the 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. W.


4540-50 Experimental Nuclear and Radiation Physics (4, 4) Interaction of charged particles and electromagnetic radiation with matter; theory and characteristics of various detectors; statistics of counting, nuclear properties. Experiments illustrate recent techniques for investigating the nucleus and nuclear radiation. Prereq: 3230. 1 hr and 6 hrs lab. F; Su

5450 Principles of Nondestructive Testing (3) Detection and characterization of discontinuities in metallic and nonmetallic materials. Ultrasonic, electromagnetic, holographic and penetrating radiation techniques are discussed. Prereq: 2330 or equivalent and instructor. (Same as Engineering Science 5450). W.


4710-20-30 Introduction to Health Physics (3, 3, 3) Radioactivity, interaction of electromagnetic radiation with materials and quantities and point kernel and extended sources, X-rays and gamma rays, neutron activation, interaction of charged particles with matter, stopping power, range-energy relations, counting statistics, shielding, dosimetry, waste disposal, criticality prevention, radiation biology and ecology. Prereq: 3730, F, W, Sp, A.

5000 Thesis (1-15) P/NP only. E

5002 Non-Thesis Graduation Completion (3-15) Requires student to fulfill all requirements of a graduate program registered during any quarter when such a student uses university facilities and/or faculty time before defense. This is subject to the usual graduation requirements. May be repeated. S/NC only. E

5080 Graduate Research Participation (3) Advanced research techniques under supervision of staff research director whose research area coincides with interests of student. Open to all graduate students. Prerequisite: Permission of research director and research director. May be repeated with consent of department. S/NC only. E

6000 Doctoral Research and Dissertation (3-15) P/NP only. E

6110-20-30 Quantum Mechanics (3, 3, 3) Fundamental principles of quantum mechanics and principal applications. From atoms to atomic, molecular and nuclear physics. Dirac equation; quantum electrodynamics. Prereq: 4550, 5340, or 5420. Department determines specific prerequisite. May be repeated as major research interest dictates.


6310 Electromagnetic Theory of Light (3) Classical electron theory including the breadth, dispersion and absorption; scattering of light and X-rays; dielectric and magnetic properties of gases and solids. Optical properties of electromagnetic waves in isotropic media including reflection, refraction and polarization and also theory of diffraction. Prereq: 5410-20-30. Su.

6320 Special Relativity (3) Lorentz transformation; Einstein postulates; relativistic tensors; relativistic mechanics; relativistic hydrodynamics. Prereq: 5310-20, 5410-20, 6310. F.

6330 General Relativity (3) Tensor calculus; general theory of relativity; gravitational field equations. Prereq: 6320. W.

6420 Advanced Topics in Classical Theory (3) Topic to meet special needs of students. Possible topics: renormalization; quark model; electroweak model; noncommutative geometry; quantum gravity. Prereq: 5310-20, 5410-20, 6310-20. May be repeated with consent of department.

6430 Advanced Topics in Quantum Theory (3) Topic to meet special needs of students. Possible topics: angular-momentum theory, beta decay, theory of atomic spectra, molecular structure and valence 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.


6510 Interactions of Radiation with Gases (3) Interaction of electromagnetic radiation with atoms and molecules; oscillator strength, interaction of charged particles with atoms and molecules; ionization; translation and rotational emission. Interactions of radiation, transport and capture; electron swarm and electron beam experiments. Prereq or coreq: 6110-20-30. E

6520 Interactions of Electrons with Solids (3) Collisions with free electrons; stopping power, electron slowing down spectra; energy straggling; nuclear scattering; electron stopping; Collective phenomena in irradiated solids; techniques in electron spectroscopy; applications to dosimetry. Prereq or coreq: 6110-20-30. W.

6530 Interaction of Radiation with Matter (3) Topics in atomic collision theory. Photon-atom interactions; electron-atom and electron-molecule collisions; collective phenomena in irradiated solids; techniques in electron spectroscopy; applications to dosimetry. Prereq or coreq: 6110-20-30. E

6710-20-30 Advanced Solid State Physics (3, 3, 3) Lattice dynamics; phonons; Brillouin zones; heat...

6810 Vibrational Problems in Molecular Spectra (3) Normal coordinates and potential functions; group theoretical methods and selection rules in gases and condensed phases. Lasers and spectroscopy of non- and optoelectronic phenomena. Prereq: 5420 or equivalent. (Same as Chemistry 6810).

6820 Molecular Vibration Rotation Theory (3) Molecules as vibrating and rotating systems possessing specific symmetry properties; quantum mechanical theory of symmetric and asymmetric molecular vibrations including vibration-rotation interaction theory; intensities and energies of molecular transitions; methods of analysis used in high resolution molecular spectroscopy. (Same as Chemistry 6820).
Comparative approach to theory and process of making public policies. F or Sp; W.

4675 Special Topics in Comparative Government and Politics (4) May be repeated with consent of department. Maximum 8 hrs.

4711 International Law (4)

4727 Politics of Inter-American Relations (4) Analysis of selected theoretical and policy issues concerning international relations in the Americas with emphasis upon imperialism, intervention, and the Cuban Revolution, nationalism, foreign assistance, trade and economic integration. Sp. &

4740 Political Parties and Elections (4) Analysis of party systems and electoral processes. F, W.

4750 Political Campaigns (4) All aspects of campaign process. F, W.

5000 Thesis (1-15) P/NP only. 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.

5101 Foreign Study (1-12) See page 103. E.

5102 Off-campus Study (1-12) See page 103. E.

5103 Independent Study (1-12) See page 103. E.

5110-20 Seminar in Political Theory (3, 3) Selection of political thinkers, schools, historical periods. F; W; Sp.

5140 Politics, Administration and Community in Nonmetropolitan Areas (3) Analysis of problems and processes associated with community development. Sp.

5150 Internship in Political Science (3-9) Open to students participating in approved internship programs. May be repeated with consent of instructor. Maximum 9 hrs. S/NC only. E.

5210-20-30 Seminar in World Politics (3, 3, 3) Research in world problems and organization. F; W; Sp.

5211 Directed Readings in Political Science (3) May be repeated with consent of instructor and student’s advisor. Maximum 9 hrs. May be taken for letter grade or S/NC. E.

5250 Seminar in African Politics (3) Selected topics in African politics.

5270 Seminar in the Politics of Development (3) Selected topics dealing with political problems of less developed countries. F.

5310 Seminar in Comparative Government (3) Selected topics in modern governments.

5340 Seminar in Latin American Government (3)

5370 Seminar in Soviet Politics and Government (3) W.

5410-20 Seminar in Public Law (3, 3) Special problems in constitutional and administrative law. F.

5440 Theory and Analysis of U.S. Foreign Policy Processes (4) Theoretical approaches to decision making in foreign policy area and analysis of policy-making process. W.

5510 Seminar in International Organization (3) Introduction to regional international organizations; political integration at international level.

5540 Seminar in Comparative Public Administration (3) Approaches to and methods used in comparative analysis.

5600 Public Administration (3) Public administration theory and functions, approaches to public management, contemporary problems in public administration. F.

5605 Research and Methodology in Public Administration (3) Basic assumptions and techniques of research in public administration: measurement, analysis, and reporting of data. W.

5610 Seminar in Organization Theory (3) Appraisal of major theories of organization and their applicability to public sector. F.

5611 Seminar in State-Local Administration (3)

5645 Operations Research for Public Administrators (3) Operations research methodology; applications and limitations in public sector; linear programming, fractional and assignment problems, network analysis, PERT, dynamic programming and other methods.

5640 Seminar in Metropolitan Areas (3)

5641 Seminar in Contemporary Public Policies (3) Problems in one or more public policy areas from political and administrative perspectives. Topics selected by instructor.

5670-80 Seminar in Policy Analysis (3, 3) Role of administrators in policy analysis and decision making with special attention to historical and current issues. Sp.

5710 Seminar in the Politics of Administration (3) Examination of public administration in context of American political system with emphasis upon political and administrative roles of public administrators and agencies. W.

5730 Seminar: Public Budgeting (3) Technical and political aspects of planning, preparing, and adopting government budgets.

5735 Seminar: Public Financial Management (3) Management of public expenditures and management implications of revenue collection, debt management, treasury function, accounting, internal auditing, purchasing, risk management, post-auditing.

5740 Seminar in Organizational Analysis (3) Organization theory applications in public management; field analysis of public organizations.

5750-55 Seminar in Public Management (3, 3) Selected problems. F; W.

5785 Law and the Administrative Process (3) Constitutional position; decisional processes, regulation and management; limitations on governmental action; questions of structure, role, and administrative choice. W.

5770 Practicum in Public Administration (3) Sp.

5790 Seminar in Personnel Management (3) Functions and organizations of personnel administration in public service. Sp.

5795 Seminar in Staff Functions (3) Functions of administrative assistants, personnel serving public officials and agencies. F.


5820 The American Political Process (4) Principal patterns of political activity linking citizens and political institutions.


5831-32 The Systematic Study of Politics (3, 3) Scope, methods and procedures of analysis in political science. F; W.

5840 Ethics, Values, and Morality in Public Administration (3) Moral-ethical-value dilemmas confronting administrators in American political system.

5850 Seminar in Comparative State Politics (3) Intensive readings in comparative state politics focusing on environment of state politics, institutions and party making.

5910-20 Quantitative Political Analysis (3, 3) Methods and techniques in quantitative political analysis. F; W.

6000 Doctoral Research and Dissertation (3-15) P/NP only. E.

6210 Advanced Studies in International Politics (3)

6310 Advanced Studies in Political Theory (4) Research into selected topics. F.

6440 Advanced Studies in Comparative Politics (3) Research into selected topics. Sp.

6510-20 Advanced Studies in American Constitutional Law (3, 3) Systematic investigation of federal relationships, civil liberties, courts in political settings, judicial institutions, personnel, and public policy content.

6510-20 Advanced Studies in Public Administration (3, 3) Research into selected topics. W; Sp.

6710 Directed Research in Political Science (3) May be repeated with consent of instructor and student's advisor. Maximum 9 hrs. May be taken for letter grade or S/NC.

6810-20 Advanced Studies in the Political Process (3, 3) Open to advanced graduate students upon approval of instructor. F; W.

Psychology

MAJOR

DEGREES

Psychology

M.A., Ph.D.

Professors: W. H. Calhoun (Head), Ph.D. California (Berkeley); C. M. Burghardt, Ph.D. Oregon State; Z. A. B. Butstein, Ph.D. Chicago; J. F. Byrne, Ph.D. Tennessee; C. P. Cohen, Ph.D. Kansas; J. H. Fine, Ph.D. Pennsylvania; J. A. Wiberley, Ph.D. Tennessee.


The Psychology Department emphasizes doctoral degree programs with specializations in clinical, school, community, social, 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 37996-0900.

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.

3720 Ethology and Sociology (3) Evolutionary approach to behavior with special reference to controversial issues in applications to psychology, social sciences, and arts.
4107 Experience in Individual Instruction (1-4) Experience as proctor in individualized instruction. Prereq: Consent of instructor. May be repeated. Maximum in 6 hrs. (Same as Sociology 4107.) F, W, Sp
4120 Topics in Social Psychology (4) Intensive analysis 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 auditory and visual functions. Prereq: 3150. Recommended: 2550. F
4239 Laboratory in Sensory Processes and Perception (2) Prereq or coreq: 4230.
4460 Organizational-Industrial Psychology (3) Cannot be taken for credit by students who have credit for Management 3460. E
4510 Personality Theories (4) Prereq: 3650 or consent of instructor. F, Su
4520 Personality and Social Systems (4) Prereq: 2540.
4610 Group Processes (3) Study and experience of theory and techniques of group processing and facilitation. Those participating in 4610 are expected to continue into 4620 and 4630. Prereq: 3616-26 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 achievement. Prereq: 3150. F, Su
4650 Symbolic Processes (4) Logic of signs and symbols; directed and associative thinking; memory, proof solving, and concept formation; nature, use, and development of language. Prereq: 3210 or consent of instructor. F
4680 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.
4670 Cognitive Development (4) Theory and research on development of language and thinking in children and adolescents. Prereq: 3210 or 3550.
4710 Physiological Psychology (4) Nervous system and physiological correlates of behavior. Prereq: 1 yr of biology or zoology and 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.
4770 Psychology and the Law (4) Psychological aspects of the legal system. Prereq: Junior standing.
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 Woman (3) 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.)
5000 Thesis (1-15) P-NP only. E
5002 Non-thesis Graduation Completion (3-15) Required for all non-thesis students, who 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 requirements. May be repeated. S/N only. E
5017 Colloquium in Ethology (1) May be repeated. Maximum 9 hrs. (Same as Zoology 5017.) S/NC only.
5019 Research Practicum (1-3) Required of all first-year graduate students as group facilitators. Prereq: 4610. (Same as Zoology 5019.) 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/N only.
5079 Practicum in College Teaching (2) Supervised participation in college teaching. S/N only. Sp
5100 Developmental Psychology (3) Prereq: 3550 or Educational Psychology 2430. (Same as Educational Psychology 5100.) F, Su
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, application, intimacy and isolation including psychosocial and psychosexual identity and models for considerations. Prereq: 5105 or consent of instructor. (Same as Educational Psychology 5111.) S/N only.
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
5149-59-69 Practicum in School Psychology (1, 2, 2) First-year School Psychology Program practicum core course sequence. Coreq: 5140-50-60. (Same as Educational Psychology 5149-56-69.) S/NC only. F; W; Sp
5170-80-90 Proseminar in Industrial and Organizational Psychology (3, 3, 3) (Same as Management 5170-80-90.) F, W, Sp
5200 Topics in Developmental Psychology (3) Prereq: 5100 or equivalent and consent of instructor. May be repeated. Maximum 20 hrs. S/NC only. E
5300 Readings and Special Problems in Psychology (1-5) May be repeated. Maximum 20 hrs. S/NC only.
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 consent of instructor. (Same as Educational Psychology 5319.) S/NC only. F, W, Sp
5325 Behavioral Interventions (3) Principles and techniques for planning, implementing, and evaluating interventions derived from social learning theory. Focuses on interventions by people in community settings. S/NC only. E
5340 Group Dynamics (3) (Same as Educational Psychology 5340.)
5350-60-70 Seminar in Psychology (3, 3, 3) May be repeated. Maximum 18 hrs.
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 in 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 Mental Measurement (3) Reliability, validity, scaling and equating, norm-referenced tests into batteries. Prereq: 1 qt 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 5050-70 or equivalent and consent of instructor.
5540 Probability Models in Psychology (4) Introduction to use of probability models in theory of binary test items, difference in psychological concepts and models for decision making in clinical psychology, social work and community and mental health professions. Prereq: Consent of instructor.
5550 Developmental Assessment (3) Techniques for assessing development in infants and children. Does not include practicum. Prereq: 5100 or equivalent and consent of instructor.
5560 Seminar in Social Psychology (3) Prereq: 5550. May be used for credit in sociology. May be repeated. Maximum 5 hrs.
5580 Theories of Personality (3)
5591 Psychodynamic Approach to Clinical Psychology (3) Basic concepts and techniques of adult assessment, including interviews derived from social learning theory, discussion of normal and deviant behaviors. Prereq: Admission to doctoral program in Clinical Psychology or consent of instructor.
5620 Behavioral Approach to Clinical Psychology (3) Human development and strategies for behavior change from viewpoint of social learning theory. Discussion of normal and deviant behaviors. Prereq: Admission to doctoral program in Clinical Psychology or consent of instructor.
5583 Phenomenological Approach to Clinical Psychology (3) Normal development and psychopathology, emphasis on existential theory and conscious experience. Prereq: Admission to doctoral program in Clinical Psychology or consent of instructor.
5589 Adult Psychological Assessment (3) Basic concepts and techniques of adult assessment, including intelligence tests and personality tests. Prereq: Admission to doctoral program in Clinical Psychology or consent of instructor.
5591 Seminar in Object Relations Theory (3) European and American conceptions of normal and psychopathologic development of object relations, practical significance for psychotherapy and psychoanalysis. Prereq: Admission to doctoral program in Clinical Psychology or consent of instructor.
5592 Descriptive Psychopathology (3) Diagnostic criteria of the DSM-III. Examples from written case histories and recorded interviews. Prereq: Admission to doctoral program in Clinical Psychology or consent of instructor.

5601 Dynamics of Psychopathology (3) Psychoanalytic view of causes and symptoms of major psychoses, neuroses and adjustment disorders. Prereq: Consent of instructor. Admission to doctoral program in Clinical Psychology or consent of instructor.

5610-20 Psychology of Learning (3, 3) Prereq: 3210 or Educational Psychology 3730. F, W

5670 Forensic Psychology (2) Psychologist's role in relation to law, including questions concerning licensure requirements, legal restrictions, and testimony as expert witness. Offered in alternate years. Prereq: M.A. in psychology or equivalent.

5680 Neural Basis of Behavior (3) Neuroanatomy and symptomatology of neurological syndromes encountered in clinical psychology. Prereq: M.A. in psychology or equivalent.

5690 Psychopharmacology (3) Review and evaluation of pharmacology as it relates to psychology. Prereq: Consent of instructor. S, P

5702 Community Psychology (3) Psychological aspects of research, evaluation, intervention, and planning in communities. Community ecology, systems theory, community mental health, planning of 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 of which can be used as an assignment. Prereq: 5100 and consent of instructor. May be repeated. S/NC only.

5750 Ethological Psychology (3) Evolutionary and physiological basis of comparative psychology and implications for human behavior. Prereq: Introduction to ethology and graduates standing.

5760 General Vertebrate Neuroanatomy (3) Lec- ture and laboratory dealing with structure and function of central and peripheral nervous system. Prereq: 4710, 4719, or consent of instructor. (Same as Zoology 5760.)

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.)

5840 Student Appraisal (3) (Same as Educational Psychology 5840.)

5850 Child Psychological Assessment (3) Introduction: behavioral observations, interviews, objective tests, projective techniques. Prereq: 5100 and Admission to Clinical Training Program or consent of instructor.

5859 Practicum in Psychological Appraisals (2)

5860 Interpersonal Assessment (3) Focus on objective tests such as MMPI and Leary System of interpersonal diagnosis. Prereq: 5580 or equivalent and admission to Clinical Training Program or consent of instructor.

5869 Practicum in Psychological Appraisal (3) Prereq: Admission to doctoral program in Clinical Psychology or consent of instructor.

5870 Projective Techniques in Assessment (3) Diagnosis of psychological disorders using case history and mental status, projective techniques. Prereq: 5601 or equivalent and admission to Clinical Training Program or consent of instructor.

5879 Practicum in Psychological Appraisals (3) Prereq: 5869.

5890 Counseling Theories and Techniques (3) (Same as Educational Psychology 5890.)

5900 Theory and Practice of Consultation (3-2) Issues in consultation, models of consulting process, and evaluation of consulting techniques. Must be taken in sequence. Coreq: 5658-68 and consent of instructor. (Same as Educational Psychology 5950-60.) W, Sp

5909 Practicum in Psychological Appraisal (2, 2) Coreq: 5850-60-70. Prereq: Consent of instructor. Must be taken in sequence. Coreq: Educational Psychology 5959-60. S/NC only. W, Sp

6000 Doctoral Research and Dissertation (3-15) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. S/NC only.

6050 Seminar on Methods of Social Research (3) Prereq: Consent of instructor. May be repeated. Maximum 18 hrs. S/NC only.

6100 Seminar in Community Psychology (3) Evaluation, research, intervention, and systems for delivery of services in communities. Prereq: 5700.

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.

6159 Practicum in Program Evaluation (3) Designing, conducting, and analyzing results of program evaluation in school or community setting. Prereq: 6150 and consent of instructor.

6210-20 History, Systems, and Theories in Psychology (3, 3) Prereq: M.A. in psychology or equivalent. Must be taken in sequence. May be repeated. Maximum 12 hrs. S/NC only.

6250-60-70 Seminar in Industrial and Organizational Psychology (3, 3, 3) (Same as Management 6250-60-70).

6280 Factor Analysis (3, 3) Factor analysis; component analysis; introduction to latent structure analysis. Prereq: 4640 and 5500.

*5310 Seminar in Motivation and Emotion (3)

*5319 Field Work in School Psychology: Level II (3) Supervised on-the-job fieldwork in school psychology. Limited to students fully admitted to doctoral program in School Psychology assigned to program's approval under field study. Prereq: 5950-60. May be repeated. Maximum 6 hrs. (Same as Educational Psychology 6319.) S/NC only. F, W, Sp

*6320 Seminar in Research Method (3)

*6330 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 Organizational Psychology (3) (Same as Management 6380.)

6385 Hypnosis and Imagery (3) Demonstration and practice of hypnotic induction methods, survey of clinical applications of hypnosis and imagery. Prereq: Consent of instructor.

*6390 Seminar in Psychotherapy (2) Treatment of current case, focusing upon psychodynamics, psychopathology, and therapeutic techniques employed. Prereq: Consent of instructor.

*6395 Seminar in Assessment (3) Seminar for advanced graduate students in clinical psychology, to deal with current case, focusing upon psychodynamics, psychopathology, and therapeutic techniques employed. Prereq: Consent of instructor.

*6400 Seminar on Changing Concepts in Clinical Psychology (3) New developments in field in relation to their impact on experimental and theoretical schools of thought. Prereq: M.A. in psychology or equivalent.

5405 Seminar in Psychopathology (3) Prereq: Consent of instructor.

5410-20 Psychotherapy (2, 2, 2) Theories and principles. Prereq: Consent of instructor.

6411 Seminar in Group Processes (2) Theory and practice of group therapy; communication skills. Prereq: Admission to Clinical Training Program or consent of instructor.

6412 Seminar in Inference in Psychotherapy (2) Uses of actuarial and inferential data for assessment of strategies and tactics used in psychotherapy. Prereq: Admission to Clinical Training Program or consent of instructor.

6413 Seminar in Techniques of Behavior Modification (2) Practical applications of systematic desensitization, operant conditioning, aversive conditioning and related techniques for modification of behavior disorders. Prereq: Admission to the Clinical Psychology Program.

6414 Seminar in Marital and Family Therapy (2) Evaluating marital and family problems, methods of investigation. Psychodynamic, behavioral, and systems-theory concepts. Prereq: Admission to the Clinical Psychology Program.

6419-20-30 Psychotherapy Practicum (1, 1, 1) Coreq: 6410-20-30. May be repeated. Maximum 12 hours.

4540-60 Advanced Psychometrics (3, 3) Construction and standardization of psychometric tests, questionnaires, and rating scales. Design of errors or measurements; item analysis, scaling, theory of errors, reliability, validity, factor analysis, scaling, equating, and norms development. Prereq: 4650, 5440, and 5500. May be repeated. Maximum 9 hrs.

4900 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 Off-Campus Placement in Clinical Psychology (1-4) Required of all students on placement by Clinical Training Program. May be repeated. Maximum 24 hrs. S/NC only.

6492 Psychology Clinic Placement (1-4) Required of students assigned to Psychology Clinic. May be repeated. Maximum 24 hrs. S/NC only.


6494 Field Experience in Clinical Psychology (1-4) For students who have finished internship with placement in clinical psychology in local area. May be repeated. Maximum 12 hrs. S/NC only.

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, 5500 or equivalent, and consent of instructor. May be repeated. Maximum 9 hrs.

6510 Ethical and Professional Issues in Psychology (3) (Same as Educational and Counseling Psychology 6510.)

6515 Seminar in Advanced Social Psychology (3)

6575 Seminar in Mental Health Administration (3) Theory and problems in organization and management of mental health administration.


6699 Practicum in Organizational Development
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 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 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 page 20.

French

3010-20-30 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

4001-02-03 Introduction to Consecutive and Simultaneous French Translation (3, 3, 3) 4001—Oral translation into English; 4002—Consecutive translation to and from English; 4003—Simultaneous translation from an English. Training of students with intermediate or advanced knowledge of French for consecutive and simultaneous oral translation from French into English, and vice versa on variety of practical subjects such as business, economics, politics, and sciences. Given mainly in language lab with additional classroom supervision by instructor. Prereg: 3430 or equivalent. Must be taken in sequence.

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) Prereg: Intermediate French or equivalent. A

4150 Theatrical French (1-3) Performance in one or more French plays. Prereg: 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. Prereg: Completion of 9 hrs of courses on 3000 level. F; W; Sp

4210 Phonetics (3) Prereg: 2130, 2520, or equivalent. F

4220-30 Advanced Grammar (3, 3) Prereg: 2130, 2523, or equivalent. W; Sp

4250 Introduction to Descriptive Linguistics (3) Phonetics and phonemics, morphology and syntax of German and French. Commonalities, 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. Prereg: 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 those languages), or consent of department. (Same as German, Russian, Spanish and Linguistics 4250.) F

4260 Introduction to Historical and Comparative Linguistics (3) Same as German, Russian, Spanish and Linguistics 4260.) W

4270 Introduction to Romance Linguistics (3) Development of Classical Latin through Vulgar Latin into the major Romance languages. (Same as Spanish and Linguistics 4270.) Sp

4310-20-30 French Literature of the Eighteenth Century (3, 3, 3) Prereg: Intermediate French or equivalent. A


4410-20-30 French Civilization (3, 3, 3) Prereg: Intermediate French or equivalent. A

4510-20-30 French Literature of the Nineteenth Century (3, 3, 3) Prereg: Intermediate French or equivalent. A

4710-20-30 French Literature of the Twentieth Century (3, 3, 3) Prereg: Intermediate French or equivalent. A

5000 Thesis (1-15) P/NP only. 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 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 103. E

5102 Off-campus Study (1-12) See page 103. E

5103 Independent Study (1-12) See page 103. E

5110-20-30 Old French (3, 3, 3) Medieval French language and literature. A

5121 College Teaching of Romance Languages (3) Seminars, 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. Prereg: 3430 or equivalent. Must be taken in sequence.

5151-61-71 Bibliography and Methods of Research (1, 1, 1) (Same as Italian and Spanish 5151-61-71) S/NC only. A

5210-20-30 French Literature of the Sixteenth Century (3, 3, 3) A


5241 French Theatre of the 18th and 19th Centuries (3) Development of new dramatic forms and evolution of traditional forms in serious and comic theatre of eighteenth and nineteenth century France. 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 in French (3, 3) A

5530-40-50 Latin American Literature (3, 3, 3) A

5452 Lyric Poetry of the Eighteenth Century (3) A

5453 Lyric Poetry of the Nineteenth Century (3) A

5540-55-60 Medieval French Literature (3, 3, 3) A

5550-60 Advanced Syntax and Stylistics (3) A

5610-20-30 Trends in Contemporary French Literature (3, 3, 3) A

5650-60 Advanced Syntax and Stylistics (3) A

5670 Problems in Linguistics: Romance Language (3) Topics vary. Prereg: 2450 or consent of instructor. May be repeated. Maximum 6 hrs with consent of department. (Same as Spanish 5670.) A

5710-20 Seminar in French Literature (3, 3) Topics vary. May be repeated with consent of department. Su

5910 Literary Criticism: The Foundations of Romance Criticism (3) Same as Spanish 5910.) A

Italian

3310 Italian Literature in English Translation (3-4) Sicilian School, Dante, Petrarch, Boccaccio, Machiavelli, Ariosto, Tasso. 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) Prereg: Intermediate Italian or equivalent. Recommended for literature majors. F; W

4030 Italian Drama in English Translation (3-4) Twentieth-century theatre; operatic drama, the Grottesco, Pirandello, Di Filippo, Frati. 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

4050-60-70 Dante and Medieval Culture (3, 3, 3) Readings and lectures in English for students majoring or minoring in other departments. Readings, reports, and term papers in Italian for students majoring or minoring in Italian. (Same as Comparative Literature 4050-60-70.) A

4220 Petrarch (3) Prereg: 3130, 3520 or equivalent. A

4230 Boccaccio (3) Prereg: 3130, 3520 or equivalent. A

4410-20 Literature of the Rinascimento (3, 3) From Pulci to Tasso, the Quattrocento and the Cinquecento. Prereg: 3130, 3520 or equivalent. A

4530 The Modern Novel (3) Prereg: Intermediate Italian or equivalent. A

4540 The Modern Theatre (3) Prereg: Intermediate Italian or equivalent. A

4620 Contemporary Poetry (3) Prereg: Intermediate Italian or equivalent. A

4630 Contemporary Prose (3) Prereg: Intermediate Italian or equivalent. A

4760 Italian Folklore (3) Folk arts, music, traditions, rituals and lore of Italy from Middle Ages to present. (Same as Anthropology 4760.)

5103 Independent Study (1-12) See page 103. E

5610-20-30 Readings in Italian Literature (3, 3, 3) Topics vary and may be repeated with consent of department. A

5670-20 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

4310-20-30 Directed Readings in Brazilian and Portuguese Literature (3, 3, 3) May be repeated with consent of instructor. F, W, Sp

5101 Foreign Study (1-12) See page 103. E

5102 Off-campus Study (1-12) See page 103. E

5103 Independent Study (1-12) See page 103. E

Spanish

4050-60-70 Hispano-Arabic Literature and Culture (3, 3, 3) A

4110-20 Spanish Literature of the Golden Age (3, 3) The picaresque novel; Cervantes; the Comedia. A

4140 Theatrical Spanish (1-3) Performance in one or more Spanish plays. Prereq: Intermediate Spanish or equivalent and consent of instructor. May be repeated with consent of department. Maximum 6 hrs.

4160-70-80 Advanced Conversation (2, 2, 2) Intensive study 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: 2130, 2520, or equivalent. F

4220-30 Advanced Grammar (3, 3) Prereq: 2130, 2520, or equivalent. W, Sp

4250 Introduction to Descriptive Linguistics (3) (Same as French, German, Russian, Linguistics 4250.) W

4260 Introduction to Historical and Comparative Linguistics (3) (Same as French, German, Russian, and Linguistics 4260.) W

4270 Introduction to Romance Linguistics (3) (Same as French and Linguistics 4270.) Sp

4410 Spanish Civilization (3) Prereq: Intermediate Spanish or consent of instructor. F

4420-30 Latin American Civilization (3, 3) Prereq: Intermediate Spanish or equivalent. W, Sp

4510 Special Topics in Nineteenth Century Spanish Literature (3) Prereq: Spanish or equivalent. May be repeated with consent of department. Maximum 9 hrs. A

4710-20-30 Spanish Literature of the Twentieth Century (3, 3, 3) 4720—Drama. 4730—Lyric poetry. Prereq: Intermediate Spanish or equivalent. A

4810-Prose fiction: major authors. 4820—Poetry: major authors. 5101 Foreign Study (1-12) See page 103. E

5102 Off-campus Study (1-12) See page 103. E

5103 Independent Study (1-12) See page 103. E

5110-20-30 Old Spanish (3, 3, 3) Medieval Spanish language and literature. A

5121 College Teaching of Romance Languages (3) Seminars, 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 French and Italian 5151-61-71) S/NC only. A

5211-20 Don Quixote (3, 3) Must be taken in sequence. A

5212-32 Golden Age Prose (3, 3) 5212—La Celestina. 5213—Novel. 5214—Fernando de Rojas' life and work. Celestinesque genre; Felipe de Silva's Segunda Celestina. 5232—Guzmán de Alfarache and Spanish picaresque genre. A

5250-60 The Generation of '98 (3, 3) Angel Garinia, Vicente Blasco Ibañez, Unamuno, Valle Inclán, Benavente, Azorín, Pérez de Ayala. A

5270 The Contemporary Novel (3) Civil War and post-Civil War period. A

5310 Directed Readings (3) E

5311-21 Special Topics in Spanish or Spanish American Literature (3, 3) May be repeated. A

5340 Problems in Hispanic Culture (3) Prevaling 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

5550-60 The Golden Age Theatre (3, 3) 5550—Introduction to Spanish Theatre, Lope and Tirso. 5560—Castro, Alarcon, Moreto and Calderon. A

5610 Spanish American Prose to 1900 (3) Novel, short story, and Spanish picaresque genre. 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 such as Inés, Quero, Borges, Areoela, and Ruffo. A

5633 Twentieth-century Latin American Theatre and Film (3)Readings from works of Carlos, Sotozano, Rodolfo Usigli, Conrado Nale Roitx, Roberto Cass, Rene Marques and Sebastian Salazar Bondy. Presentation of films as adaptations of classics such as Doña Bárbara, Los de abajo and Don Segundo Sombra as well as exponents of experimental cinema of today. A

5680 Latin America: Women Writers (3) Feminine point of view, modern image of woman, female relationships and society as context for woman's destiny. Readings from poetry and fiction, including such authors as Alfonsina Storni, Delmira Agustini, Gabriela Mistral, Silvina Ocampo and Rosario Castellanos. A

5670 Problems in Linguistics: Romance Languages (3) (Same as French 5670) A

5810-20 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) P/NP only. E

6210-20-30 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

MAJOR

DEGREES

Sociology

M.A., Ph.D.

Professors:

J. A. Black, Ph.D. Iowa, D. J. Champion, Ph.D. Purdue; E. Eberly, Ph.D. Pennsylvania; D. Hastings, Ph.D. Massachusetts; N. Shover, Ph.D. Illinois; S. Wallace, Ph.D. Minnesota.

Associate Professors:

W. D. Betz, Ph.D. Michigan State; D. Clelland, Ph.D. Michigan State; T. G. Hood (Acting Head), Ph.D. Duke; R. G. Perrin, Ph.D. British Columbia.

Assistant Professors:


For a full statement of departmental requirements, students are referred to the Departmental Graduate Manual.

All registration for 3000- and 4000-level courses require the consent of the instructor.

THE MASTER'S PROGRAM

The department offers both a thesis and non-thesis option for a Master's degree. For information concerning the Master's degree with thesis, see the General Requirements on page 19. Those interested in the non-thesis option should obtain details from the department.

THE DOCTORAL PROGRAM

General requirements for the degree of Doctor of Philosophy are described on page 20. Additional specific requirements for the degree of Doctor of Philosophy in Sociology include:

1. A minimum of 108 credit hours following the Bachelor's degree, exclusive of credits for the Master's thesis, is required. Of this number, 36 hours shall be allocated to doctoral research and dissertation. A maximum of 12 hours credit outside the major may be taken in related fields, with the approval of the student's committee. Exclusive of doctoral research and dissertation at least one-half of all credits shall be in courses numbered 5000 or 6000.

2. A written comprehensive examination covering sociological theory, research methodology, and two other areas in sociology must be passed prior to admission to candidacy. This examination must be passed no later than one academic year before the date on which the degree is granted.

3. No later than one month before granting of the degree, the candidate will be required to present a dissertation to the candidate's major committee for approval. The dissertation must be accepted by this committee before the candidate may be approved for the degree.
pass an oral examination on the doctoral dissertation. At the oral examination the candidate will be expected to show a thorough knowledge of sociological theory and methodology related to the research.

4030 Society and Law (4) General treatment of so- cial origins and consequences of law and legal process. Emphasis is placed on problems of law and social change, and on structure and functioning of legal sanctions. Some attention is paid to law and law-like phenomena in formal organizations and primitive societies.

4110 Population Problems (4) Demographic fac- tors and social structure; trends in fertility, mortality, population growth, migration, distribution, and com- position; population policy.

4120 Topics in Social Psychology (4) (Same as Psychology 4120.)

4130 Sociology of Punishment and Corrections (4) Traces development of correctional movement, develops a critical sociological perspective on con- temporary correctional programs, and provides overview of evaluative research in corrections.

4160 Theory of Attitudes and Values (4) Organiza- tion, functions and measurement of attitudes and values; approaches to attitude change, and rela- tionship to attitudes, values and behavior.

4130 Criminology (4)

4330 Urban Ecology (4) Examination of public, pri- vate, collective, and individual space. Classical school of ecology, its neoclassical revisors, social area analysis, and cognitive symbolic ecology emphasized.

4410 Educational Sociology (3) (Same as Curricu- lum and Instruction 4410.)

4530 Community Organization (4) Structure; func- tion; linkages; change and development and impor- tant community studies are reviewed and discussed. Emphasis on sociological analysis, not on the imple- mentation of change.

4540 Social and Religious Change (4) Critical re- view 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.)

4560 Formal Organization (4) Analysis of bureau- cratization process, division of labor, delegation of authority, 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, orga- nization, and function of social movements; attention is given to the ideology, leadership and organization of political, religious and other types of social move- ments.

4940 Sociology of Religion (4) Interrelationship of society, culture, and religion. (Same as Religious Studies 4940.)

5000 Thesis (1-15) P/NP only. E

5020 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

5210 Introduction to Sociological Theory (3) F

5220 Seminar in Sociology of Medicine (3) May be repeated with different instructors. Maximum 6 hrs.

5300 Methods of Sociological Research I (3) Assumptions and foundations of sociological re- search strategies and techniques.

5310 Seminar in Methods of Sociological Re- search (3) Major methodological issues in sociology; scaling techniques; reliability, validity, sampling, and qualitative methodology.

5320-30 Social Statistics (3, 3) General survey of parametric and nonparametric procedures in analy- sis of sociological data; assumptions underlying pro- cedures, techniques of hypothesis formulation and special applications. Must be taken in sequence. F; W

5350-60 Statistical Analysis in the Social Sciences I, II (3, 3) Topics include multiple regression, analysis of variance, analysis of covariance, ordinal and nominal measures of association, sampling, signif- icance tests, and confidence intervals. Extensive use of social science computing packages.

5470 Foundations of Social Psychology (3) Current and classical theoretical perspective in social psychology. May be used for credit in psychology.

5480 Foundations of Social Conflict and Change (3)

5510 Delinquency and the Social Structure (3) Critical assessment of contemporary theories of delin- quency, related to them, and their implications for formal strategies of control and rehabilitation.

5520 Crime, Law, and Social Control (3)

5650 Demographic Techniques (3) Life, table, standard rates, and survey techniques of population analysis.

5660 Seminar in Community (3)

5680 Historical Demography (3) Family reconstruc- tion, aggregate analysis, examination of documents containing information on population. Research findings on historical patterns of change in fertility, mortality, migration and different types of family structure.

5710 Seminar in Collective Behavior and Social Movements (3) A

5720 Social Interaction (3) Critical assessment, through reading and actual research, of contempo- rary theoretical orientations to study of small groups. Research designed to test selected theoretical prob- lems. May be repeated. Maximum 6 hrs.

5740 Seminar in Social Attitudes (3)

5810 Seminar in Race and Culture (3) Critical ex- amination of theoretical and conceptual approaches in study of intergroup relations. A

5830 Social Differentiation and Stratification (3) Sources of differentiation in society, their relation to conflict in society, and their relationship to class structure in society.

5840 Seminar in Occupations (3) Occupations and their relation to individual and society, technology and occupations; unequal rewards and occupations; social organization and occupations.

5850 Seminar in Occupations (3) Continuation from material in Sociology 5840; interface between occupations and settings in which they are per- formed.

5870 Social Organization (3) Structure and function of human groups, with special attention to voluntary associations and administrative organizations.

5890 Seminar in Research Problems in Inter- group Relations (3) Research techniques and prob- lems as encountered in race and intergroup relations are explored; actual field research projects are per- formed.


6000 Doctoral Research and Dissertation (3-15) P/NP only. E

6050 Seminar on Methods of Social Research (3) Experimental research projects. (Same as Psychology 6050.)

6220 Sociological Theory I (3) Prereq: 5410 or con- sent of instructor.

6230 Sociological Theory II (3) Prereq: 5410 or consent of instructor.

6330-40 Survey Design and Analysis (3, 3) Application of general research methods and particular operating context of survey. Systematic exploration of survey problems through student par- ticipation in design and analysis of survey (2 qtrs). Prereq: 5300-10 or consent of instructor.

6350 Field Research (3) Prereq: 5300-10 or con- sent of instructor.

6360 Field Research Practicum (3)

6410 Tutorials in Advanced Topics (3) Individual instruction. Prereq: Consent of department. 6410 and 6420 may be repeated in any combination for a max- imum of 10 hrs.

6420 Special Topics (3) Topic of special interest or student-initiated courses which will not be regularly offered. Prereq: Consent of instructor. 6410 and 6420 may be repeated in any combination for a max- imum of 10 hrs.

6520 Sociology of Deviance (3) Advanced studies in deviant behavior. Theories and findings regarding cause and procedures and programs for social con- trol. Prereq: 4310 and 5520.

6530 Sociology of Law (3) Analysis of social and cultural factors influencing emergence and mainte- nance of law as social institution and affecting rela- tions between law and deviant behavior; approach to theoretical and methodological issues encountered in studying law. A

6640 Seminar in Environmental Sociology (3)

6650 Urban and Regional Sociology (3) Prereq: Consent of instructor.

6660 Human Fertility (3) Historical, topical, region- al, and methodological approaches to human fertility and demographic problems. Consideration of rela- tions obtained between socioeconomic and demog- raphic change in various parts of world; fertility rates and national power; controversies on control of vital rates of growth. Prereq: 5650 or consent of in- structor.

6670 Theory and Methods of Human Ecology (3) Theoretical perspective and research techniques of human ecology applied to selected research sites. Prereq: Consent of instructor.

6680 Theory and Research in Human Migration (3) Prereq: 5650 or consent of instructor.

6690 Population Theory (3) Malthus, Marx, opti- mum population, and selected variables. Prereq: 5650 or consent of instructor. A

6730 Advanced Studies in Social Psychology (3) Social interaction and personality; genesis and func- tioning of self; interplay of social structures and indi- vidual actions; theories of social psychology related to these problems and recent research are discus- sed. May be repeated. Prereq: 5470 or consent of instructor.

6740 Formal Organization (3) Major formal organi- zational theories; bureaucracy; functions of theore- tical models of organizations; major organizational variables; organizational authority patterns; com- munication in formal organizations. Prereq: 5470 or consent of instructor.

6750 Formal Organization (3) Organizations, orga- nizational change and effect of technology; social consequences of automation; segmentation and orga- nization; organizations and community interrelated- ness. Prereq: 5740 or consent of instructor.

6780 Mass Behavior (3) Prereq: 5470 or consent of instructor.

6790 Socialization (3) Process to learn cognitive systems and forms of behavior of social world. Ex-
amination of main currents in socialization theory and research. Prereq: 5470 or consent of instructor. 

5820 Political Sociology (3) Political system from societal, organizational, and group perspectives.

5830 Seminar in Class and Status (3) Classic and recent studies of class and status. Methods used in research and current position of theory. Prereq 5480 or consent of instructor.

5840-50 Social Change (3, 3) Major theories, methods and research.

5860 Seminar on Community Power (3) Analysis of theories and methods used in studying social power in communities. Prereq: 5480 or consent of instructor.

Spanish
See Romance Languages

Special Programs

5010 Perspectives in the Liberal Arts (3) Seminar on role of liberal arts in education from historical and regional perspective.

5020 Inquiry in the Liberal Arts (3) Seminar on nature of evidence in social sciences, natural sciences, and humanities and fine arts to provide overview of research and issues pertinent to disciplinary focus.

5030 Learning in the Liberal Arts (3) Seminar on creative approaches to promoting liberal learning environment in classroom, incorporating use of "Great Books," critical thinking and creative problem-solving processes, values sensitivity, and other components.

Speech and Hearing Sciences
See Audiology and Speech Pathology

Speech and Theatre

MAJOR

Speech and Theatre

Theatre

Degree

M.A.

M.F.A.

Profs:

P. Garve (Head), M. A. Cambridge; R. M. Cohan; R. C. Field, M.A. Miami (Ohio); J. F. Fields (Emeritus), M.A. Ohio State; J. Harris, Ed.D. Tennessee; H. W. Henshaw, Ph.D. Pittsburgh; R. R. Mashburn, Ph.D. Florida State; P. L. Soper (Emeritus), Ph.D. Cornell; G. A. Veachm, Ph.D. Louisiana State.

Assoc Professors:


Assistant Professors:


The Department of Speech and Theatre offers the Master of Arts degree in Speech and Theatre with area concentrations in speech communication and theatre. Students in the Master of Fine Arts degree in Theatre with area concentrations in acting and directing, playwriting, and design and technical theatre.

In their prospective concentrations at the Master's level, i.e., speech or theatre, applicants must have completed undergraduate degrees approximately equivalent in requirements to those specified for degrees conferred by The University of Tennessee, Knoxville.

The Graduate Record Examination is required of all applicants. All M.F.A. applicants must submit two letters of recommendation. Auditions before appropriate faculty are required of M.F.A. acting/directing applicants. Applicants for admission to M.F.A. design/technical theatre and playwriting programs must submit samples of their work.

For detailed information about the graduate program, contact the Dean of the College of Liberal Arts, the Dean for Graduate Studies, Department of Speech and Theatre.

MASTER OF 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 30 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 formal theoretical 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 speech communication.

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.

MAY BE INCLUDED IN THE 45-HOUR MINIMUM

F, Sp

No more than 18 quarter hours from Theatre 5911-12-13 may be included in the 45-hour minimum for the degree.

Any such credits applied from a previous graduate program would be from courses that are directly relevant to the student's MFA curriculum, and must have been earned within the time limits (6 years) established for completion of the MFA degree.

Speech

4222 Advanced Argumentation and Debate (4) Prereq: 2231 or consent of instructor. Sp.

4461 Quantitative Research Methods in Speech Communication (4) Designing experiments; planning field studies; using statistical analysis.

4541 Rhetorical Theory and Criticism (4) Survey of Western rhetorical theory; contemporary approaches to criticism of public address. Recommended: 1211.

4550 Rhetoric of the Women's Rights Movement (4) Historical and critical study of public addresses in campaign for women's rights from the 1830s to present. F.

4571 British Oratory (4) Historical and critical study of British public address. Sp, A

4591 Persuasive Uses of Imaginative Literature (4) Topics in social and political uses of novels, plays, and poems. W.

4811 Advanced Phonetics (4) Phonetic aspects of contemporary dialects of the English language. Prereq: Consent of instructor. Sp, A.

4930 Studies in American Public Address (4) May be repeated. Maximum 12 hrs.

4999 Colloquium in Speech Communication (1) May be repeated. E.

5140 Communications Theory (3) Analysis of contemporary theories of human communication, emphasizing similarities and differences of communication processes in interpersonal, small-group and mass communications systems. F.

5210 Topics in Group and Interpersonal Communication (3) May be repeated. Maximum 9 hrs. Sp.

5220 Quantitative Projects in Speech Communications (3) May be repeated. Maximum 9 hrs. E.

5440 Organizational Communication (3) May be repeated. Maximum 9 hrs. F.

5550-60-70 Studies in Persuasion (3, 3, 3) W.

5750-60-70 Studies in Rhetoric (3, 3, 3) F.

5911 Directing the Forensic Program (4) Philo-

Methods and directing of curricular and extra-
curricular forensic activities in high schools and col-
leges: competitive and noncompetitive approaches to directing debate, oral interpretation and publication.

(Same as Curriculum and Instruction 5911) Sp.

Speech and Theatre

4640 Group Performances of Literature (4) Oral interpretive techniques of choral reading, readers theatre and chamber theatre. F, W.

5000 Thesis (1-5) P/NP only. 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 Introduction to Graduate Research in Speech and Theatre (3) F.

5120 Directed Reading and Research (3) May be repeated. Maximum 9 hrs. E.

5160 Theory and Technique in Oral Interpretation (4) Literary, psychological, communicative, and aesthetical approaches to collection, adaptation, and oral

Theatre

3214-15 Technical Theatre (4, 4) Special techniques in scenery, property construction, stage management; problems in basic technical theatre practice. Prereq: 2211-21, or consent of instructor. Must be taken in sequence. Graduate credit available to Theatre M.F.A. students only.

3221-22 Introduction to Scene Design (4, 4) 3221—Problems in stage design with reference to space, design, movement, scale, and style; study of rendering and groundplan preparation. 3222—Play interpretation through scenic means; setting as environment for dramatic action, and rudiments of model-making. Must be taken in sequence. Graduate credit available to Theatre M.F.A. students only.

3252-53-54 History of the Theatre (4, 4, 4) Drama in performance with particular emphasis on theatre architecture, scene design, and acting styles. 3252—Antiquity to the Renaissance. 3253—The European Theatre, 1650-1850. 3254—Modern Theatre. Graduate credit available to Theatre M.F.A. students only.

3262-63 History of American Theatre (2, 2) Development of theatrical as social institution in American life. 3262—from its beginnings to 1900. 3263—from 1900 to present. Graduate credit available to Theatre M.F.A. students only.

3321-22 Introduction to Lighting Design (4, 4) Mechanics of stage lighting; elementary theory; problems in basic lighting practice. Prereq: 2211-21 and consent of instructor. Must be taken in sequence. Graduate credit available to Theatre M.F.A. students only.

3511-12 Introduction to Costume Design (4, 4) Costumes as an expression of character on stage; the application of costume history to specific design problems. W; Sp

3512. W; Sp

5124 Special Problems in Technical Theatre (4) Theatrical technical direction. Prereq: Consent of instructor. May be repeated. Maximum 8 hrs.

5241 Studies in Scene Design (4) Advanced scene design techniques and approaches to design for complex dramas and varied dramatic forms. May be repeated. Maximum 8 hrs.

5250 Seminar in Playwriting (3) Sp

5310 Studies in European Theatre History (3) May be repeated. Maximum 9 hrs. F, W

5320 Studies in American Theatre History (3) May be repeated. Maximum 9 hrs. F, W

5341 Studies in Lighting Design (4) Scene design techniques and approaches to design for complex dramas and varied dramatic forms. May be repeated. Maximum 8 hrs.

5511 Costume Design and Production (4) PracticaL application and production of costume designs for the stage. Prereq: 2231, 3511, 3512, 4541, 4542 and/or consent of instructor. May be repeated. Maximum 8 hrs.

5520 Projects in Lighting Design (3) May be repeated. Maximum 9 hrs. E

5530 Projects in Play Directing (3) May be repeated. Maximum 9 hrs. E

5540 Projects in Scene Design (3) May be repeated. Maximum 9 hrs. E

5550 Projects in Costume Design (3) Problems of play interpretation and theatrical costume design centralizing around individual projects. Students will design costumes for complex play for public performance. May be repeated. Maximum 9 hrs. E

5560 Projects in Technical Theatre (3) Problems of set design, interpretation, and execution. E

5570-71-72-73-74-75 Master Class in Acting (5, 5, 5, 5) Available to Theatre M.F.A. students only.

5610 Studies in Design (4) May be repeated. Maximum 8 hrs. E

5650 Projects in Scene Design (3) May be repeated. Maximum 9 hrs. E

5670-71-72-73-74-75 Master Class in Acting (5, 5, 5, 5, 5) Available to Theatre M.F.A. students only.

5680-81-82 Design and Technical Theatre Seminar (1-8, 1-5, 1-6) Available to Theatre M.F.A. students only. May be repeated. Maximum 6 hrs.

5680 Projects in Costume Design (3) May be repeated. Maximum 9 hrs. E

5950-69-70 Studies in Dramatic Theory and Criticism (3, 3, 3) F, W, Sp

Speech Pathology

See Audiology and Speech Pathology

Zoology

MAJOR DEGREES Zoology

M.S., Ph.D.


Associate Professors: K. D. Burnham, Ph.D. Iowa; A. C. Ehretzsch, Ph.D. Kansas; D. J. Fox, Ph.D. Johns Hopkins; M. A. Harder, Ph.D. Kansas State; J. A. McCaby, Ph.D. California (Davis); M. L. Pan, Ph.D. Pennsylvania; S. L. Piirun, Ph.D. New Mexico State; S. E. Rechert, Ph.D. Wisconsin; G. V. Vaughan, Ph.D. Duke; M. C. Whitehead, Ph.D. Indiana.

Assistant Professors: T. T. Chen, Ph.D. Florida; L. D. Etkin, Ph.D. Indiana; M. Greenberg, Ph.D. Rutgers; G. F. McCracken, Ph.D. Cornell.

The Department of Zoology offers the Master of Science and Doctor of Philosophy degrees with concentrations in aquatic biology, ecology, cell biology and molecular biology, physiology, evolutionary biology, and recombinant 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 hours; (2) upper division zoology, 18 quarter hours; (3) chemistry, two years including 12 quarter hours of general inorganic; (4) mathematics, 9 quarter hours including differential and integral calculus; (5) physics, 12 quarter hours.

Graduate Record Examination scores (Verbal, Quantitative and Advanced Biology); and (7) a grade point average of 3.0 or better. Otherwise superior students, deficient in one or more of the above requirements, may be admitted at the discretion of the Graduate Affairs 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 six areas of zoology as determined by a qualifying examination. The qualifying examination will be taken 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 two years of your division, zoology, or advanced graduate study.

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 comprehensive examination will be 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 sizable amount of literature relevant to major field of study. The student has the option of demonstrating a reading knowledge of this foreign language by (a) passing a written examination given by the language department or (b) earning at least a B in the third quarter of a language course. This requirement for the first language must be fulfilled before the student can take the comprehensive examination.

The student's faculty committee may require of the student any level 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.


3060 Comparative Vertebrate Anatomy (5) Physiology and anatomy of organ systems. Dogfish, shark, and cat primarily used in laboratory. 3 hrs and 2 labs. W, A.


3110 General Entomology (5) Introduction to insects: basic structure, development, behavior; classification of insects and representative families; interpretation and use of keys. Prereq: Biology 3130 or consent of instructor. 3 hrs and 2 labs. F.

3150 Invertebrate Zoology (5) Biology of invertebrates (except insects) with emphasis on ecology and behavior. Prereq: Biology 3130. 3 hrs and 2 labs. W.

3220 Physiology of Reproduction (3) (Same as Animal Science 3220) F, Sp.


3410 Bioethics (3) Relationship between biological discoveries and moral, legal, ethical and religious values. Open discussion of selected dilemmas arising from new knowledge about medicine, behavior, resources, and technology. Sp.

4007-4017 Minicourse in Zoology (2 hrs each) Selected, advanced topics in zoology, concentrated in time and subject matter. Consult departmental listing for actual topics offered. Prereq: As posted. May be repeated. E.

4050 Developmental Biology (4) Experimental morphogenesis, fertilization, cellular interactions, hormonal effects and related topics with examples drawn primarily from invertebrates and vertebrates. Prereq: 3090. 2 hrs and 2 labs. W.

4120 Undergraduate Research Participation (2) Experience in active research projects under supervision of staff members. Prereq: Consent of instructor. E.

4140 Practicum in Zoology (1-3) Participation in practical application of zoology in community institutions, government organizations and industry. Approximately 5 hrs involvement per week. Prereq: Biology 3110, 3120, 3130 and senior standing. E.

4190 Mammalogy (4) Classification, evolution, distribution, reproduction, populations, and behavior. 2 hrs and 2 labs or field periods. F.

4200 Ichthyology (4) Classification, collection and identification, role and interaction in maintenance of the organism and species. Prereq: 3090 or equivalent. W.

4240 Comparative Animal Physiology Laboratory (I) (1) Coreq: 4250. W.


4270 Immunology (3) (Same as Microbiology 4270) Prereq: 4280 or equivalent. W.

4280 Comparative Endocrinology (5) Comparative analysis of the physiology and morphology of endocrine glands in vertebrates and invertebrates. Their role and interaction in maintenance of the organism and species. Prereq: 3090 or equivalent. 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. 2 hrs and 2 labs or field periods. Sp.

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.

4369 Genetic Genetic Laboratory (2) Mainly Drosophila experiments 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 inheritance in humans. 4410 General Parasitology (4) Morphology, taxonomy and ecology of parasitic worms and protozoa, with emphasis on human parasites. Prereq. Biology 3130 or consent of instructor. 3 hrs and 1 lab. F.

4460 Introduction to Aquatic Ecology (4) Physiochemical nature of inland waters. Biotic communities are described, interrelationships explored. Prereq: Chemistry 1110-20-30. 3 hrs and 2 labs. W, A.

4700 Arachnology (4) Biology of spiders, mites, scorpions, and relatives. Prereq. 3110, or 3150. 2 hrs and 2 labs. Sp.

4720 Comparative Animal Behavior (4) Methods and principles. (Same as Psychology 4720) F, Sp.

4729 Comparative Animal Behavior Laboratory (4) Laboratory and field studies. Coreq. 47220. (Same as Psychology 4729) F.

4810-20-30 Insect Morphology and Anatomy (4, 4, 4) 4810-30—Insect morphology of both generalized and specialized forms. 4830—Taxonomy of major orders. 4850—Taxonomy of minor orders and immatures. Prereq for 4820-30: 3110 or consent of instructor. 2 hrs and 2 labs. W; F; Sp; A.

4940 Physiology of Exercise (4) Functions of body in muscular work: physiological aspects of fatigue, training, and physical fitness. Prereq: 2390-30 or 3090. 3 hrs and 1 lab. F, Sp.

5000 Thesis (1-15) P/NP only. E.

5017 Colloquium in Ethology (1) (Same as Psychology 5017) S/NC only.

5050 Zoology Seminar (1) Advanced topics or controversial issues in zoology. May be repeated. Maximum 6 hrs. All senior Zoology major encouraged. Recommended for all upper-level second-year graduate students. S/NC only. F, W, Sp.

5075 Zooplankton Ecology (4) Secondary productivity in aquatic systems. Prereq. 4060 or equivalent. Su.

5080 Graduate Research Participation (3) Advanced research techniques studied under supervision of staff research director whose research area coincides with interests of student. Open to all graduate students in good standing. Prereq. Consent of department and research director. May be repeated with consent of department. S/NC only. E.

5110-20-30 Special Problems (2, 2, 2) E

5150 Zoological Bibliography (1) Methods of locating and using zoological literature, bibliographies, and abstracts, as well as preparing bibliographies and scientific papers.


5270 Advanced Neuronal Physiology (5) Cellular and molecular aspects of phenomena associated with conduction of excitation and muscular contraction. Prereq: 4250. 3 hrs and 2 labs.

5280 Insect Physiology (4) Functions and interrelationships of systems relative to metabolism, growth, coordination, movement, and reproductive processes. Coreq: 4810. 1 yr general chemistry or consent of instructor. 2 hrs and 2 labs. W, A.

5290 Quaternary Problems (4) (Same as Geology 5290 and Botany 5290) Sp.

5350 Biometry (3) Statistical methods used in analysis of quantitative biological data. Prereq: 1 yr statistics or consent of instructor. F.

5380 Isotopic Methods and Techniques: Lecture (2) Theory of isotopic decay, measurement of isotopic decay by liquid scintillation counting, and double isotope counting, applications using Cerenkov radiation, radioimmunossay, synthesis of metabolic intermediates, experimental design and data analysis. Coreq: 5389. Prereq: Upper division laboratory course in either biochemistry, microbiology, or consent of instructor. F.

5389 Isotopic Methods and Techniques: Laboratory (4) Use of liquid scintillation counter, optimization of counting parameters for single and double isotope counting, quenching and correction, measurement of Cerenkov radiation, procedures for measuring blood volume, solute uptake into cells, radioimmunossay of steroid hormones, hormone synthesis, synthesis of metabolic intermediates and other topics. Coreq: 5360. Prereq: Graduate standing and one upper division laboratory course in either biochemistry, microbiology, or consent of instructor. Chemistry 3810 highly recommended. F.

5410 Advanced Parasitology (4) Life cycles, techniques of collection, preservation, and identification of parasitic worms and protozoa. Prereq: Consent of instructor.

5510-20 Advanced Animal Physiology (5, 5) Primarily mammalian physiology; 5510—membrane neuron, central nervous system, cardiovascular system, and control mechanisms; 5520—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 of consent of instructor. Biochemistry 4120 also recommended. (Same as Animal Science 5510-20) 4 hrs and 1 lab. W, Sp.


5620 Foundations of Radiation Biology (4) Physical, chemical, and biological mechanisms involved in actions of different kinds of radiations on living cells and its components. Recommended prereq: 1 yr biological science, general physics, biochemistry, calculus. (Same as Radiation Biology 5620) 3 hrs and 1 lab.

5660 Physiology of Development (3) Chemical aspects of growth, differentiation, and cytodifferentiation. Recommended prereq: Biochemistry 4110-20. F.
5740 Physiological Ecology of Animals (2) Adaptive physiological responses of animals to natural changes in or extremes of physical and biotic environment. Emphasis on terrestrial vertebrates. Term paper including review of assigned topic with emphasis on creative development of special aspect. 1-2 hrs. Su

5760 General Vertebrate Neuroanatomy (3) (Same as Psychology 5760.)

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.

6000 Doctoral Research and Dissertation (3-15) P/NP only. E

6110 Advanced Topics in Cell and Molecular Biology (1-3) Readings and discussions of recent advances in cell biology. Prereq: Biology 3120 and consent of instructor. May be repeated with consent of department. Maximum 12 hrs.

6210 Seminar in Physiology (2) Two physiology courses or consent of instructor. May be repeated. Maximum 6 hrs.

6310 Seminar in Cytology (2) May be repeated. Maximum 6 hrs.

6350 Seminar in Developmental Biology (2) Internal regulation in differentiating cell. Prereq: 3050, 4050; Biochemistry 4110-20. W

6510 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, Botany 5061, 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: 5510. Coreq: 5620. May be repeated. Maximum 6 hrs. (Same as Radiation Biology 6910.)
Robert L. Summitt, Dean

The major campus of the College of Medicine is located in Memphis, Tennessee. The College, however, is a statewide organization with other units in Chattanooga, Jackson, and Knoxville.

In addition to the Department of Medical Biology faculty listed here, the Knoxville campus has other College of Medicine faculty and students in undergraduate and graduate medical education.

The College of Medicine traces its origin to the establishment of the Medical Department of the University of Nashville in 1851. Later, through a merger of four medical schools, it became The University of Tennessee College of Medicine and moved to Memphis in 1911.

Department of Medical Biology/Memorial Research Center

Professors:
- R. D. Lange, Ph.D. California (Los Angeles).
- W. R. Farkas, Ph.D. Florida State; P. B. Coulson, Ph.D. Illinois; J. E. Fuhr (Director), Ph.D. St. John's; C. C. Congdon (Emeritus), M.D. Michigan; J. B. Jones, D.V.M. Illinois; R. D. Large, M.D. Washington (St. Louis); C. B. Lozzio, M.D. Buenos Aires (Argentina); T. P. McDonald, Ph.D. Tennessee; E. A. Machado, M.D. Buenos Aires (Argentina); J. C. Parker, Jr., M.D. Medical College (Virginia); P. W. Wigler, Ph.D. California (Berkeley); C. J. Wust, Ph.D. Indiana (Bloomington).

Associate Professors:
- J. P. Chen, Ph.D. Pennsylvania State; P. B. Coulson, Ph.D. Illinois; E. W. Fuson, Ph.D. Tennessee; W. T. Hanna, M.D. Ain-Shams (Egypt); A. T. Ichiki, Ph.D. California (Los Angeles); K. D. Lin, M.D. National Taiwan; E. C. Schroeder, D.V.M. Michigan State.

Assistant Professors:

The Department of Medical Biology of The University of Tennessee College of Medicine-Knoxville was formed from the faculty of The University of Tennessee Memorial Research Center and Hospital in 1978. The Research Center was established in 1956. Its faculty has education, research, and service interests in cancer, blood diseases, birth defects and clinical genetics, and biochemistry of disease. Courses in these areas are offered to students at the graduate and undergraduate levels. Elective courses are also available to students in the College of Medicine by special arrangement.

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

Courses

4210 Introduction to the Study of Cancer (3) Lectures, classroom discussion, and case reports surveying major topics of oncology. Prereq: Biology 3110-20 or consent of instructor. Sp

4310 Introduction to Hematology (4) Pathophysiology of blood and blood forming systems. Lectures, class discussions and demonstrations. Prereq: Upper division biology background to include histology and/or general anatomy. F

4430 Clinical Genetics (3) Human genetic disorders, case presentations. Prereq: General biology and general genetics background or consent of instructor. Sp

5000 Thesis (1-15) P/NP only. E

5080 Graduate Research Participation (3) Advanced research techniques studied while conducting individual biomedical research projects under supervision of faculty. Prereq: Consent of instructor. Open to all graduate students. May be repeated with consent. Maximum 9 hrs. S/NC only. E

5220 Special Topics in Cancer (1-3) Special topics in clinical hematology. Prereq: 4210 and consent of instructor. May be repeated. Maximum 9 hrs. F, W, Sp

5230 Special Topics in Hematology (1-3) Special topics in clinical hematology. Prereq: 4310 and consent of instructor. May be repeated. Maximum 9 hrs. F, W, Sp


5410 Molecular Basis for Metabolic Disease (5) Metabolic disorders of humans and animals. Emphasis on molecular mechanisms in inborn errors of metabolism, toxic reactions, and deficiency states.

Clinical and pathologic correlations. Prereq: Biochemistry 4110-20 or equivalent. W, A

5420 Special Topics in Metabolic Disease (1-3) Biochemical and physiological basis of selected diseases of humans and animals. Clinical-pathophysiologic correlations. Prereq: 5410 and consent of instructor. May be repeated. Maximum 9 hrs. F, W, Sp

5430 Metabolism of Drugs (2) Drug mechanisms of action: membrane transport, enzyme reactions, drug receptors, ionization, stereoisomerism and metabolic pathways. For students interested in biochemical pharmacology. Prereq: Biochemistry 4110-20. Sp

6000 Doctoral Research and Dissertation (3-15) P/NP only. E

6110 Advanced Topics in Medical Biology (2) New developments in biologic research applicable to clinical medicine. Primarily for doctoral candidates in Comparative and Experimental Medicine. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. F, W, Sp

### Degree Requirements

1. **Complete a baccalaureate nursing program.**
   - who are Tennessee residents;
   - 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, or
   - who are currently employed as nurse educators in programs preparing registered nurses; or
   - who are currently employed as directors of nursing service.
2. 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: 23 hrs
   - Clinical concentration option: 20 hrs
   - Role preparation option: 11 hrs
   - Electives: 6 hrs
   - Total: 60 hrs

3. A Master's thesis is not required, but those students who wish to complete a thesis as a part of their program may substitute the thesis for the 6 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/tertiary care nursing, parent-child nursing or community mental health nursing as their clinical concentration option. Students selecting the primary care nursing option must complete 5450, 5460, 5550. Students selecting the secondary/tertiary care nursing option must complete 5120-30 and 5310. Students selecting the parent-child nursing option must complete 5220, 5255, and either 5230 or 5245. Students selecting the community health nursing option must complete 5410, 5480, 5490, 5500 and 5510.
6. The core requirement that must be completed by all students regardless of clinical option includes the following courses: 5010, 5020, 5030, 5070, 5210, 5560 and a graduate level statistics course that must be approved in advance by the student's faculty advisor.
7. Students may select a role preparation option in teaching or advanced clinical practice. Students selecting the teaching option must complete 6 hours of graduate level courses in education and 5630. Students selecting the advanced clinical practice option must complete 5560 and 5560 if their clinical option is primary care, 5320 and 5340 if their clinical option is secondary care, 5220 and 5540 if their clinical option is community mental health, or 5265 and 5270 if their clinical option is parent-child nursing. Except for electives, all courses taken in other colleges must be approved in advance by the student's faculty advisor.
8. Students whose baccalaureate degrees are not in nursing must complete the equivalent of a baccalaureate nursing major by taking or challenging a series of undergraduate nursing courses as determined by each student's major advisor.

### Requirements for Second Master's Degree

1. Students must complete 60 hours at the graduate level (with a cumulative GPA of 3.0) unless they already have Master's or doctoral degrees. For the latter up to 15 hours may be applied to the second Master's degree, with approval of the student's committee, Dean of the College, Dean for Graduate Studies and/or Vice Chancellor for Graduate Studies and Research.
2. Any hours so applied would be from courses in the first degree program that are directly relevant to the second. Hours from the first program to be applied to the second shall have been earned within the time limits (six years) established for the second.
3. Reduction of hour requirements, when appropriate, will not be used to reduce the residency requirements of the second Master's degree.
4. The 45 to 60 hours must include the following components:
Prereq: 5010, 5030, 5070. 3 hrs and 3 labs. W
5120 Secondary/Tertiary Nursing of Adults II (6) Continuation of 5120 with further exploration of role of clinical nurse specialist in assisting adults to maintain or restore homeostasis in clients experiencing selected physiological and/or behavioral deviations. Specific topics are determined by faculty and students. Prereq: Consent of instructor. May be repeated with consent of instructor. Maximum 12 hrs.

5150 Oncology Nursing (3) In-depth exploration of cancer problem, medical and nursing intervention. Process of care and roles of various disciplines in care of cancer patients; elimination of cancer and metastasis, and examines treatment modalities and nursing intervention employed in all phases of the disease in the interdisciplinary approach analysis. Prereq: 4230, R.N. status, or consent of instructor.

5170 Readings in Applied Physiology (3) Carefully planned library study of selected topics in physiology and pathophysiology related to various body systems. Prereq: 5010, 5030, 5070.

5210 Applied Nursing Research (4) Utilization of research process to identify and investigate common nursing problems; critical assessment of nursing research methods and techniques; development and critique of nursing research proposals. Prereq: 4440 or equivalent; graduate level statistics course. W, Sp

5220 Parent-Child Nursing (4) Care of childbearing and child-rearing families: health promotion and recognition of threats to health of mothers and children; child-bearing or child-rearing families in acute care or community settings. Prereq: 5010, 5030, 5070. 4 hrs and 2 labs. W


5245 Pediatric Nursing (6) Continuation of 5220. Role of clinical nurse specialist in working with children and families experiencing acute, chronic, or terminal illnesses. Nursing, physiological, developmental and psychological theories in acute pediatric facilities. Prereq: 5220. 4 hrs 2 labs. W


5270 Parent-Child Nursing Seminar (2) Issues and problems in delivering high quality parent-child nursing care; theories and concepts from 5680 as they affect role of parent-child clinical specialist. Prereq: 5680 Coreq: 5255. F

5310 Secondary/Tertiary Care Nursing Field Work I (8) Advanced clinical practice in acute care setting with opportunities to apply newly acquired nursing knowledge to more complex clinical nursing situations. Prereq: 5100, hospital setting experience in acute care setting. Prereq: 15 hrs approved education courses or consent of instructor. Tu, W, Th, F

5320 Secondary/Tertiary Nursing Field Work II (9) Continuation of 5310. Further acquisition and refinement of nursing skills needed to provide high quality nursing care to acutely ill patients. Prereq: 5310. W

5340 Secondary/Tertiary Nursing Seminar (2) Examination of issues and problems in delivery of secondary/tertiary nursing care; further analysis and exploration of theories and concepts included in 5680 as they affect role of nurse as secondary/tertiary clinical specialist. Coreq: 5320. Prereq: 5680. W

5410 Principles of Community Mental Health (3) Exploration of historical and legislative mandates that impact community mental health; discussion of nursing and other mental health care provider roles in current mental health care delivery systems. W

5450 Family Centered Primary Care Nursing I (6) Primary care nursing and health care management of individuals and families in childbearing and child rearing stages of development; application of nursing process with emphasis on selected nursing, physiological, and psychological theories. Prereq: 5010, 5030, 5070. 4 hrs and 2 labs. W

5460 Family Centered Primary Care Nursing II (6) Primary care nursing and health care management of individuals and families in middle and later life stages of development; application of nursing process to management of selected episodic and chronic health problems. Prereq: 5020, 5450. Coreq: 5210. 4 hrs and 2 labs. W

5480 Community Mental Health Nursing: Individual (3) Application of nursing process within system framework to understand, develop, and treat mental health problems of individuals experiencing mental health problems; study of psychopharmacological issues; analysis of specific mental Health problems. Prereq: 5010, 5030, 5070. 2 hrs and 1 lab. W

5490 Community Mental Health Nursing: Family (3) Application of nursing process, utilizing communication and systems theory; application with families experiencing mental health problems; current models of parent education. Prereq: 5020, 5480. Prereq or coreq: 5210. 2 hrs and 1 lab. W

5500 Community Mental Health Nursing: Group (3) Study of group leadership and group dynamic theory; utilization of leadership strategies in both structured and unstructured group processes. Prereq: 5480. 2 hrs and 1 lab. W

5510 Community Mental Health Nursing Field Work I (8) Clinical practicum in a community setting providing opportunities to apply mental health nursing knowledge in planned interactions with individuals and groups at primary, secondary or tertiary care levels. Community and mental health systems assessment. Su

5520 Community Mental Health Nursing Field Work II (8) Clinical practicum in a community setting choosing functional concentration of advanced clinical practice. Objectives identified by student to meet special community and professional needs. Prereq: 5480, 5550. F

5540 Community Mental Health Nursing Seminar (3) Identification of issues and problems involved in delivery of community mental health nursing care; further analysis and exploration of theories and concepts included in 5680 as they affect the role of nurse as community mental health specialist. Prereq: 5680. Coreq: 5520. F

5550 Primary Care Nursing Field Work I (8) Placement in selected off-campus primary care health delivery site for purposes of applying newly acquired knowledge and developing clinical skills necessary to function as a nurse practitioner. Prereq: 5480. Coreq: 5680. F

5560 Primary Care Nursing Field Work II (8) Continuation of 5550 with further emphasis on acquisition of knowledge and skills necessary to function more autonomously. Prereq: 5550. F

5630 Teaching Strategies and Practices (3) Analysis and application of curricular and teaching methodologies; field placement with supervised opportunities to provide both classroom and clinical instruction to undergraduate nursing students. Prereq: 3 hrs advanced education courses or consent of instructor. 2 hrs and 3 labs. F

5680 Primary Care Nursing Seminar (2) Issues and problems involved in delivery of primary nursing care; further analysis and exploration of theories and concepts covered in 5680 as they affect role of nurse as primary care provider. Prereq: 5680. Coreq: 5550. F

5680 Advanced Nursing Seminar (3) Theories of leadership, motivation, power, conflict, authority, change and decision making and their application to advanced clinical nursing practice; examination and analysis of role of nurse as health care provider and client-family advocate. Prereq or coreq: 5510 or 5550 or 5510. Su

5730 Management Strategies and Practices (5) Analysis and application of managerial and supervisory theories and strategies; field placement in nursing service facility with supervised practice in nursing service administration. Prereq: 6 hrs approved management courses or consent of instructor. 2 hrs and 3 labs. Sp

5770 Special Topics (3) In-depth study of selected nursing topics, problems, or issues not covered in courses. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

5900 Graduate Seminar in Public Health (1-2) (Same as Public Health 5900, Nutrition and Food Science 5910, Physical Education 5900, and Social Work 5900. S-NC only, W
School of Architecture

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

Professors:

Assistant Professors:
J. S. Watson, M.Arch. Harvard; J. M. Rabun, M.Arch. Texas; D. A. Roberts, B. Arch. Ball College; J. W. Fortey, M.Arch. Illinois; G. K. Ruth, M.Arch. Iowa State; J. A. Kersavage, Penna.; R. M. de Toulouse (France); F. D. M. S. Arch. Amsterdam; J. G. I. Anderson, Professors:
W. S. Shell, W. E. Martel, B.Arch. California (Berkeley); M. S. Mofette, Ph. D. Massachusetts. Institute of Technology; V. Naranic, B.Arch. Belgrade.

Associate Professors:

Associate Professors:

4101 Community Form (3) Patterns of community development. Selected historical and contemporary examples. Basic urban design issues and exemplary design approaches through lectures, readings, essays, and sketch studies. F

4430 Architecture and Preservation (6) Rehabilitation, restoration, and adaptive uses of existing buildings.


4811 Special Topics in History, Theory and Criticism (1-4) Special topics in history-related subjects. May be repeated. Maximum 6 hrs.

4815 Criticism Seminar (3) Theories, function, and techniques of architectural criticism. Sp

4830 Introduction to Preservation (3) History and theory of architectural preservation and restoration. F

4831 Preservation Technology (3) Techniques of preservation: dating, methods of analysis, history of materials and technology used in old buildings. W

4832 Descriptive Analysis of Historic Buildings (3) Identification and analysis of characteristic elements of buildings from various architectural periods with emphasis on American architecture. Survey techniques. Sp

4833 Preservation law (3) Legal aspects of contemporary preservation activity.

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

4870 Architectural Photography (3) Introduction to special photographic techniques with emphasis on color printing and processing. Prereq: Consent of instructor. F, W, Sp

4871 Advanced Architectural Photography (3) Application of special photographic techniques with emphasis on architectural photography using black and white media. F, W, Sp

4887 Structural Design for Protection Against Extreme Hazards (3) 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.


4894 Proxemics (4) Seminar for graduate students and upper division students. Introduction to proxemic research. Definition of proxemic variables. Proxemic notation exercises. Analysis of etic data and the identification of emic categories. Observer bias and methods of bias reduction. Members of seminar required to design, conduct, and present original proxemic research. Prereq: 2000 or consent of instructor.

4895 Environment as Code (4) Advanced lecture of graduate students and upper division students. Advanced lecture course of theoretical issues involved in considering environment as a medium of human communication. Codes and methods of coding human, animals, and cultures. Relationship between coding behavior and the organization of the central nervous system. Coding and social behavior. Communication process as a generic model of human environment relations. Hierarchical aspects of environmental communications. Prereq: 2000 or consent of instructor.
W. E. Barnett, Director

MAJOR
Biomedical Sciences

DEGREES
M.S., Ph.D.

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, cellular, developmental and mammalian biology, and radiation biology. Included are such subjects as immunology, protein and enzyme chemistry, nucleic acid chemistry, cytology, radiation and environmental biology, virology, developmental biology, experimental pathology, microbial and mammalian genetics, mutagenesis, 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 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 (5150); 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 at least one of the seminars during each quarter of residence after the first year is strongly recommended.

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

5. Pass both written and oral comprehensive examinations.

6. A dissertation reporting the results of original and significant scientific research. A minimum of 36 quarter hours of course 6000 is required.

7. A final oral examination on the dissertation.

8. A formal seminar presentation of the dissertation research.

SPECIAL MASTER OF SCIENCE DEGREE PROGRAM

The graduate faculty has designed a Master of Science program in Biomedical Sciences primarily to fill the need for such a degree within the Oak Ridge National Laboratories; however a limited number of students from other institutions may be accepted if qualified and 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 (5150); Molecular Genetics (5170); and Mammalian Physiology (5200). Additional credits may be obtained (5 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 5500).

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. Bilen, Ph.D. Tennessee; D. E. Ollint, Ph.D. Rockefeller.
M. D. Mannack, Ph.D. Baylor.

Assistant Professor:
M. D. Mannack, Ph.D. Baylor.

Research Professor:

Research Associate Professor:
C. T. Hadden, Ph.D. Washington.

Research Assistant Professor:
E. A. Hiss, Ph.D. Notre Dame.
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; H. Adler, Ph.D. Cornell; B. Allison, M.D. Tennessee; W. Au, Ph.D. Cincinnati; G. Braskaswky, Ph.D. Notre Dame; G. Bunich, Ph.D. Pennsylvania; W. Gehrs, Ph.D. Cornell; J. C. Cook, Ph.D. Princeton; R. B. Cumming, Ph.D. Texas; J. Dunnington, Ph.D. Cleveland; J. Einstedt, Ph.D. Harvard; J. L. Epster, Ph.D. Florida State; R. J. M. Fry, M.D. Dublin (Ireland); R. R. Fujimura, Ph.D. Wisconsin; H. H. W. Gude, Ph.D. Oregon; M. Generosi, Ph.D. Missouri; D. G. Gostale, Ph.D. North Carolina State; E. H. Gref, Ph.D. California Institute of Technology; R. F. Grell, Ph.D. Tennessee; R. A. Griesemer, D.V.M. Ohio State; W. D. Gude, M.S. Tennessee; F. Hartman, Ph.D. Pennsylvania Medical Units; B. Hingerty, Ph.D. Princeton; A. Holland, Ph.D. Wisconsin; J. M. Holland, D.V.M. Kansas State; A. W. Hele, Ph.D. Indiana; K. J. Selkirk, Ph.D. Hawaii; C. (England); R. J. M. Fry, Ph.D. Michigan; R. J. Preston, Ph.D. Reading (England); E. H. Perkins, Ph.D. Oregon State; K. S. Nyoghi, Ph.D. Northwestern; E. F. Oakberg, Ph.D. Iowa State; T. T. Odel, Ph.D. Indiana; H. P. Ullrich, Ph.D. Utah; R. A. Poppe, Ph.D. Michigan; L. R. Russell, Ph.D. Chicago; C. A. Segal, Ph.D. Louisiana State; J. K. Selkirk, Ph.D. Syracuse; L. Shugart, Ph.D. Tennessee; L. H. Smith, Ph.D. Syracuse; J. L. Snyder, Ph.D. North Dakota; A. L. Stevens, Ph.D. Western Reserve; J. B. Storer, M.D. Chicago; P. A. Stevens, Ph.D. Stanford; J. Turner, Ph.D. Vanderbilt; R. L. Tyndall, Ph.D. Pennsylvania State; R. L. Ullrich, Ph.D. Rochester; V. R. Upjohn, Ph.D. Indiana; H. W. Vallee, Ph.D. Vanderbilt; E. Volko, Ph.D. Duke; L. C. Waters, Ph.D. Georgia; C. H. Wei, Ph.D. Wisconsin; H. Witschi, M.D. Berne (Switzerland); W. K. Yang, Ph.D. Tulane.

*Staff of Oak Ridge Associated Universities

5180 Cell Biology I (3) Structure and composition of major nuclear and cytoplasmic organelles of eukaryotic cells. Pertinent instruments and techniques; mechanisms of cell cycle; chromosome structure; nuclear RNA metabolism; nucleoli and ribosome biogenesis; survey of specialized cells. Structure and function of transcription and translation in bacteria. Coreq: 5110.


5200 Mammalian Physiology (4) Mammalian organ systems and their functions. Nervous, muscular, endocrine, digestive, respiratory, circulatory, reproductive, and excretory systems. Interrelationships of these systems and fundamental importance of interactions in contemporary biological research. Pre. req: 5190.

5310-30-40 Biomedical Sciences Laboratory (3, 3, 3) Students will work in small groups with both: approaches and technologies in various areas of modern biology. Students spend a quarter in each of three or four laboratories conducting research in different areas of biomedical science. Required of all first-year students.

5430-60-90 Graduate Research Participation (3, 3, 3) May be repeated.

5410 Techniques in Cell Biology (3) Application to specific research problems, kind of data they yield, and cautions in data interpretation. Laboratory demonstrations may be arranged where appropriate. Pre. req: 5180 or consent of instructor.

5450 Immunology (3) Structure, functions, and techniques in modern immunology and emphasis on concepts and techniques used in research. Additional courses may be arranged where appropriate. Pre. req: 5180 or consent of instructor.

5510-30-40 Advanced Topics in Biomedical Sciences (3, 3, 3, 3) Current and future research developments. Topics listed under Special Topics Courses, may be taken either as tutorials or as literature survey courses requiring substantial student participation. May be repeated.

5600 Mammalian Genetics (3) Orderly presentation of known genetic variants affecting each organ system of experimental mammals, especially laboratory mice. Pre. req: 5160.

5610 Mammalian Biochemical Genetics (3) Combined biochemical and genetic approaches to problems of immunology, glycolysis, and metabolism of chemical carcinogens. Radiation biology; aging research. Additional courses may be arranged where appropriate. Pre. req: 5180 or consent of instructor.

5660 Microbial Genetics (3) Basic principles in microbial genetics: transduction, transformation, conjugation, and mutation. Genetics of bacteria and viruses. Pre. req: 5180 or consent of instructor.

5750 Regulation of Intermediary Metabolism (3) Pathways involved in intermediary metabolism. Steady-state processes, "nouequilibrium" reactions, first enzymes, feedback inhibition, isozymes, multisubunit systems and compartmentation, control mechanisms, genetic and negative control, catabolite repression, autoregulation, stringent control, attenuation, hormonal control, other selected topics. Pre. req: 5110-20 or consent of instructor.

5825 Molecular Biology of DNA (3) DNA replication, repair, and recombination. Recent advances in mechanisms at molecular level using biochemical and genetic techniques. Pre. req: 5110-20 or consent of instructor.

5827 Viral Carcinogenesis (3) History of viral oncology and descriptive catalog of tumor viruses. Biology of normal and transformed cells. DNA tumor viruses and their genomes. Histology transformation; genetic and natural history. RNA tumor viruses; endogenous and exogenous states; genetics; induction; transformation; natural history.


5850 Cancer Biology and Biochemistry (3) Pathology and nomenclature of cancer. Tumor immunology and immunotherapy. Biochemistry of tumor cells; enzymes, metabolism, membranes; DNA repair; regulation; strategies in chemotherapy.

5860 Membrane Biology (3) Transport kinetics, membrane biogenesis and turnover, endocytosis and exocytosis, receptor regulation, hormone-membrane biogenesis interactions. Pre. req: 5110-20 and 5180-90 or consent of instructor.

5890 Techniques in Cell Biology (3) Application to specific research problems, kind of data they yield, and cautions in data interpretation. Laboratory demonstrations may be arranged where appropriate. Pre. req: 5180 or consent of instructor.

5940 Immunology (3) Structure, functions, and techniques in modern immunology and emphasis on concepts and techniques used in research. Additional courses may be arranged where appropriate. Pre. req: 5180 or consent of instructor.

5950 Immunology (3) Structure, functions, and techniques in modern immunology and emphasis on concepts and techniques used in research. Additional courses may be arranged where appropriate. Pre. req: 5180 or consent of instructor.

6240 Chemistry and Metabolism of Lipids (3) Chemistry and metabolism of lipids and lipoproteins. Structure and composition of lipids and lipoproteins. Lipid biochemistry of mammals; comparative aspects, particularly lipid pathways in bacteria and yeast. Pre. req: 5110.

6251 Molecular Biology of RNA (3) RNA synthesis and metabolism of RNA viruses, enzymes, and their viruses. Pre. req: 5110 or consent of instructor.
Graduate School of Library and Information Science

Ann E. Prentice, Director

MAJOR
Library Science

DEGREE
M.S.L.S.

The Graduate School of Library and Information Science provides a program leading to the preparation of librarians and information scientists for work in all types of libraries and information centers. The program of study includes a 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 enable students to:

1. 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. Understand and use the concepts and procedures related to the selection, acquisition, organization, and dissemination of knowledge;
3. Understand and apply the principles of management to the library and information center;
4. Assume individual and collective responsibility for the well-being and development of their profession and of professional service.

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. 24 hours of which form a core curriculum required of all students. Either a thesis or a non-thesis option 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 academic libraries, public libraries, school libraries, special libraries and information centers as well as a variety of library and information related activities.

The SREB Academic Common Market applies to applicants from Arkansas, Georgia, West Virginia, and Virginia.

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 program 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. Applicants are required 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 and information agencies in the Knoxville area.

Work opportunities in a scientific-technical environment are available through subcontracts with Oak Ridge National Laboratory and the Department of Energy.

A limited number of graduate assistantships are available through the School 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: M. H. Karrenbrock, Ed. D. Georgia; M. S. Stephenson, Ph.D. North Texas.

Courses

4140 Libraries and Librarianship (3) Librarianship as an occupation: its organization, responsibilities, problems and prospects. F, W, Su

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.) F, W, Su

4270 Organization of Library Collections I (6) Acquisitions, cataloging and maintenance of library collections. F, W

4310 History of the Book (3) History of writing and various methods of bookmaking from earliest times through 19th century. W

4330 Introduction to Reference Materials (3) Basic information sources and services for all libraries. F, W, Su

4750 Utilization of Instructional Media (3) Same as Curriculum and Instruction 4750 and Vocational-Technical Education 4750. E

5000 Thesis (1-15) F, N, S only. 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
5140 Research Methods in Library Science (3) Research methods applicable to librarianship. Process and conduct of research; analysis of published research. F, W, Sp, Su

5200 Subject Reference and Bibliography (3) General patterns of bibliographical organization and basic information sources in subject fields including non-English materials; experiences in bibliographic methods and search techniques. Prereq: 4330. W, Sp, Su

5210 Sources and Services for the Social Sciences (3) English and non-English literature and bibliographic sources in education, economics, political science, history, geography, anthropology, psychology, and sociology; organization of collections for optimum use. Prereq: 5200. W

5220 Sources and Services for the Natural Sciences (3) English and non-English literature and bibliographic sources in mathematics, physics, astronomy, chemistry, geology, biology and medicine; organization of collections for optimum use. Prereq: 5200. W

5230 Sources and Services for the Humanities (3) English and non-English literature and bibliographic sources in literature and language, fine arts, music, philosophy and religion; organization of collections for optimum use. Prereq: 5200. W

5240 Organization of Library Collections II (3) Construction and maintenance of library catalog as retrieval instrument; indexing; and subject analysis. Theory, comparative classification with emphasis on Library of Congress system; and problems in reclassification. Prereq: 4270. F, Sp

5250 Government Publications I (3) Acquisition, organization and utilization of U.S. federal government publications; legislative, executive and judicial branches. Prereq: 4330 or consent of instructor. F

5260 Government Publications II (3) Acquisition, organization and utilization of publications of state and local governments in U.S.; publications of foreign governments and intergovernmental organizations; United Nations, UNESCO. Prereq: 4330 or consent of instructor. W

5270 Legal Bibliography (3) Introduction to literature of Anglo-American jurisprudence. Use of reports, statutes, administrative regulations and decision, treaties, periodicals, and indexes as bibliographic tools. Sp

5300 Library Management (3) Management and organization concepts applicable to libraries and librarians. F, Sp

5310 Multitype Networks (3) Organization, structure, governance, planning, evaluation, and services in state, regional, national, and international networking of information. W, Sp

5320 Academic Libraries (3) Persistent and current problems. Topics vary depending upon needs and interests of group. W

5355 School Library Media Program Management (3) Attitudes, knowledge and skills necessary to manage a school library media program at building and district levels. Curricular services and role of school library media program in curriculum development. Application of technology to program implementation. Prereq: 4150 or consent of instructor. Sp

5360 Special Libraries and Information Centers (3) Development and present status, scope and objectives, administration and organizational problems, acquisition, organization, and use of information. W

5370 The Library in the Community (3) Public library as social agency; role in education and communication systems of community. F

5380 Seminar in Library and Information Science (3) Advanced study of varying topics. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

5400 Library Facilities (3) Problems inherent in planning and construction of library quarters. Interrelationship of staff, materials, and user space requirements. Sp, Su


5510 Nonbook Resources (3) Selection, processing, storage and utilization: films, video technology, sound recordings and microforms as information media. Prereq: 5560 or consent of instructor. F, Sp

5515 Serials (3) Serials collections: selection, acquisition, bibliographic control, process, storage, maintenance, and public service. Prereq: 5560 or consent of instructor. W

5520 Contemporary Publishing (3) Creation, production, marketing, and distribution of materials acquired by libraries, with special attention to various types of publishers. F

5540 Archives and Manuscripts (3) Problems involved in acquisition, organization, description, storage, preservation and utilization. Prereq: Consent of instructor. W

5550 Records Management for Information Professionals (3) Functional elements and objectives of records management within organizations, emphasizing control of creation, distribution, retention, storage, retrieval, protection, and disposition regardless of medium. Prereq: 4330, 4270, or consent of instructor. W

5605 Development of Children's Literature (3) Children's literature from earliest times to 20th century. Representative titles of particular periods. W


5625 Resources for Young Adults (3) Critical survey of library materials for young adults with emphasis on personal, vocational and recreational needs and interests. Evaluation, selection, and utilization for school and public libraries. W

5635 Library Services and Programs for Youth (3) Philosophy and objectives of public and school library services for children and young adults. Reading, listening and viewing guidance for individuals and groups. Program planning, implementation and evaluation. Prereq: 5615 or 5625 or consent of instructor. Su

5645 Traditional Literature and Oral Narration (3) Nature of traditional materials and principles of collection; reference sources for folk literature; history and techniques of storytelling; use of traditional materials with all age groups. F

5691 Advanced Production of Audiovisual Software (3) (Same as Curriculum and Instruction 5691.)

5700 Automation of Library Processes (3) Computer concepts and operations; applications to basic library operations; acquisitions, catalogs, circulation and serials. Coreq: 4270, 5500, or consent of instructor. F, W, Su

5710 Introduction to Information Science (3) Content and method of information science; application of research findings to general library practice. F, Su

5715 Information in Society (3) Characteristics of information society, nature of knowledge and information, use and effect of media. W

5720 Information Systems Analysis and Design (3) Examination of tools and technologies in library/information center systems planning and implementation. Role and training of systems analyst; systems study from planning through implementation and evaluation, and related topics. Prereq: 5760 or consent of instructor. W

5725 Organization of Materials for Information Storage and Retrieval (3) Principles and techniques in organization and description of materials for input to information storage and retrieval systems: indexing, abstracting, document representation, thesaurus construction and maintenance, related topics. Prereq: 5710 or consent of instructor. W

5730 Information Retrieval Systems Laboratory (3) Comparative capabilities of various types of information retrieval systems; analyzing performance of systems to arrive at generalizations with respect to theory, design and operation of information retrieval systems. Sp

5750 Information Technologies (3) Computer-based and non-computer related media and methods for information storage, retrieval, and transfer within and external to library environment; existing and prototype hardware and software and interfacing of these technologies. Prereq: 5700 or consent of instructor. Sp

5999 Practicum (6 or 9 or 12) Opportunity to translate library theory into practice under guidance of qualified librarians. Prereq: Completion of 21-hour curriculum plus approval of director. F
The Graduate School of Planning offers a program of studies leading to the professional degree of Master of Science in Planning (M.S.P.). Students may elect to build concentrations in land use planning, community development, energy planning, environmental planning, quantitative methods, housing, historic preservation, or transportation planning to complement the core curriculum.

MAJOR OF SCIENCE IN PLANNING

The M.S.P. degree program prepares planners for a diversity of career opportunities in both the public and private sectors. Graduates are candidates for professional positions in regional, city, county, and metropolitan planning agencies; in local, state, and federal agencies concerned with physical, economic and administrative planning; in private business and organizations dealing with development problems; and in private consulting practice.

The degree program typically requires a minimum of six quarters, or 72 credit hours. A core curriculum of 40 hours is required of all candidates. Twenty-three or more additional hours of elective course work and 9 hours for the required thesis or major paper enable the student to pursue special interest areas or topics in the field of urban and regional planning. Elective courses may be selected from courses offered by the School of Planning or by related University departments and programs such as geography, civil engineering, environmental engineering, ecology, real estate and urban development, public administration, and public health. Elective courses are chosen with the advice of the student's faculty advisor.

A work internship is recommended, but not required, during the summer between the first and second year of the program. Students who do not have prior experience in comprehensive plan preparation are advised to enroll in an intensive credit-hour synthesis project course. The required thesis or major paper option provides the student an opportunity to develop and apply research and analytical skills to a particular planning problem or topic.

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, experienced professional planners in TVA and other public and professional organizations frequently teach courses on a visiting basis. Each year a guest lecture series brings to the University and the School outstanding leaders in the fields of planning and development.

The Graduate School Planning is accredited by the American Planning Association.

ADMISSION PROCEDURES

All applicants should submit two letters of recommendation with their applications. Reference letters should be from teachers familiar with the applicant's undergraduate or, where applicable, graduate academic record. If the applicant has had prior planning experience, a letter from a supervisor or other person familiar with the work of the applicant should also be provided.

Graduate Record Examination scores are not required, but, if available, may be provided at the option of the applicant. All applicants are also requested to submit a statement of career goals.

The M.S.P. degree is approved for SREB Academic Common Market participation in Arkansas, Georgia, Kentucky, and West Virginia.

All inquiries concerning admission should be addressed to: Director, Graduate School of Planning, The University of Tennessee, Knoxville, Tennessee 37996-3306.

FINANCIAL ASSISTANCE

The following courses are the required core curriculum courses. The student meeting the time of approval of the major study proposal in at least 24 hours of planning core curriculum courses.

The student meeting these criteria may present a proposal to his/her committee for a major study which will include at least 9 hours of subsequent elective course work related to the study topic. The proposal shall justify the selection of topic, problem or issue and the approach to the study.

Students in the Graduate School of Planning must pass a comprehensive written examination after approximately five quarters of course work.

Faculty

Professors:
Courses

4100 Survey of Planning (3) History of city development and of planning with special attention to the U.S., Europe, and other branches of the field. Prereq: other levels of planning. State of the art, the process, the comprehensive plan, implementation devices. Planning issues in society. Not for credit for M.S.P. degree. F

5000 Thesis (1-15) P/NP only. 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

5005 The Planning Process (3) Identification and examination of generic aspects of planning process and planning techniques applied in a 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. W

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. E

5100 Theory of Planning (3) Analysis of nature and objectives of planning process; role of planner and planning function in public decision-making. Prereq: 5130. Sp

5110 Introduction to Planning (4) 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 GSP students. F, Su

5130 Planning Research Methods I (3) Research techniques in subject areas associated with city and regional planning. Research tools, data collection and analysis as basis for planning and decision-making. F, Su

5150 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. Sp

5141 Statistics for Planners (4) Applications of basic descriptive and inferential classical and nonparametric techniques in planning research. Data organization and display; measures of location, dispersion and association; data transformations; some basic probability theory; selected one and two sample tests; correlation and regression analysis. Prereq: 5130 or consent of instructor. W

5145 Library Research for Planning (1) Survey of publications of interest to planners, including sources and research techniques. Use of facilities and collections of UTK library. F

5160 Planning and Utilitiies (3) Planning for adequate water supply and sewage waste disposal in the urban environment. Impact of utility patterns on area development, and problems of utility service policies.

5170 Planning for Historic Preservation (3) Planning for preservation, restoration and conservation of historic buildings, areas and sites as related to comprehensive planning process. National, state, and local government role in preservation, designation of sites, legislative needs, financing and administrative organizations.

5180 Planning Analysis and Forecasting (4) Methods of quantitative analysis and modeling in urban and regional studies. Population, employment, and economic base studies with emphasis on forecasting techniques. Prereq: 5130. Sp

5230 Urban and Site Design (3) Principles of design of residential subdivisions and some components of physical community such as shopping centers, institutional complexes, central business districts. Problems of reviewing alternative designs against each other or written regulations. Extensive laboratory experience. F, Sp, Su

5235 Advanced Urban and Site Design (3-6) Review of principles of urban and site design and laboratory application to selected projects of projects involving three dimensional integrated planning of movement systems, activity patterns and land use. Prereq: 5230 or consent of instructor.

5270 Planning and Transportation (3) (Same as Civil Engineering 5270.) W

5280 Planning Methods (6) Tooling up studies; methods for preparation of land use and public facility elements of comprehensive development plans, including visual aspects. Prereq: 5180. Sp

5300 Regional Planning (3) Making planning process operative in intergovernmental context. Theories of regions and analysis of metro planning, area planning, regional planning by states, single-purpose agency planning, and TVA. Prereq: 5110 or consent of instructor.

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: 5110 or consent of instructor.

5340 Implementation (3) Policy formulation, information systems, taxation, capital improvement programming, and other aspects of plan implementation. Planning public actions to affect development. Prereq: 5440. W

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. experiences. Private market processes and public influences. Problems of change in housing supply, impact of new technology, and governmental programs to increase the supply and quality 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 eminent domain. Development and administration of zoning, subdivision controls, and related devices. Prereq: 5435. F, Su

5455 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.

5460 Planning Administration (2) Planning agency management, program development, and agency finance. Prereq: 5435.

5465 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. F

5500 Synthesis (3) 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

5570 Social Planning (2-3) Theory, philosophy 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 Social Work

Ben P. Granger, Dean
Lou M. Beasley, Branch Director, Nashville
M. Kate Mullins, Branch Director, Memphis
Roger M. Noe, Branch Director, Knoxville
Ronald K. Green, Director, Office of Continuing Social Work

A special bulletin describing the facilities, admission, fees, and degree requirements is obtainable from The School of Social Work, Henson Hall, Knoxville, Tennessee 37996-3333.

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; 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 an opportunity to elect a concentration emphasis in a field of practice.

THE PROFESSIONAL FOUNDATION
The professional foundation is a 30-quarter hour sequence of five basic courses required of all students before entering either of the concentration programs. As the initial phase of the school educational program, the foundation 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, administrators, and planners.

Fall Quarter, First Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>5070 Social Work Research I</td>
<td>3</td>
</tr>
<tr>
<td>5110 Social Welfare Policy and Services I</td>
<td>3</td>
</tr>
<tr>
<td>5210 Human Behavior and Social Environment I</td>
<td>3</td>
</tr>
<tr>
<td>5410 Social Work Practice I</td>
<td>3</td>
</tr>
<tr>
<td>5910 Field Practice</td>
<td>3</td>
</tr>
<tr>
<td>TOTAL QUARTER HOURS</td>
<td>15</td>
</tr>
</tbody>
</table>

Winter Quarter, First Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>5080 Social Work Research II</td>
<td>2</td>
</tr>
<tr>
<td>5120 Social Welfare Policy and Services II</td>
<td>3</td>
</tr>
<tr>
<td>5220 Human Behavior and Social Environment II</td>
<td>3</td>
</tr>
<tr>
<td>5420 Social Work Practice II</td>
<td>3</td>
</tr>
<tr>
<td>5920 Field Practice</td>
<td>4</td>
</tr>
<tr>
<td>TOTAL QUARTER HOURS</td>
<td>15</td>
</tr>
</tbody>
</table>

THE REQUIRED CONCENTRATION
Upon completion of the foundation curriculum (at the beginning of the third quarter), each student selects a concentration in either social work treatment or social welfare administration and planning and devotes the final four quarters of the program to required concentration courses and electives. Students must take 12 hours in their required concentration and may take courses in the other required concentration as electives. Although each branch offers a variety of elective courses, not every elective is offered every year at every branch.

Spring Quarter, First Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>5930 Field Practice</td>
<td>4</td>
</tr>
<tr>
<td>Specialization Courses and Electives</td>
<td>10</td>
</tr>
<tr>
<td>TOTAL QUARTER HOURS</td>
<td>14</td>
</tr>
</tbody>
</table>

Fall Quarter, Second Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>5940 Field Practice</td>
<td>2 or 3</td>
</tr>
<tr>
<td>Specialization Courses and Electives</td>
<td>2 or 3</td>
</tr>
<tr>
<td>TOTAL QUARTER HOURS</td>
<td>10 or 11</td>
</tr>
</tbody>
</table>

Spring Quarter, Second Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>5950 Field Practice</td>
<td>3</td>
</tr>
<tr>
<td>5961 Integrative Seminar</td>
<td>2</td>
</tr>
<tr>
<td>One Elective</td>
<td>2 or 3</td>
</tr>
<tr>
<td>TOTAL QUARTER HOURS</td>
<td>12 or 13</td>
</tr>
</tbody>
</table>

AREAS OF SPECIALIZATION

Social Work Treatment

The social work treatment concentration provides the educational basis for practice with individuals, families, and groups in order to enhance their social functioning, ameliorate problems, and prevent social dysfunction. The specialization attempts to develop a thorough knowledge of the theory and methodology basic to varied individual, family, and group methods applicable in the treatment of diverse client problems.

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>5070 Social Work Research I</td>
<td>3</td>
</tr>
<tr>
<td>5110 Social Welfare Policy and Services I</td>
<td>3</td>
</tr>
<tr>
<td>5210 Human Behavior and Social Environment I</td>
<td>3</td>
</tr>
<tr>
<td>5410 Social Work Practice I</td>
<td>3</td>
</tr>
<tr>
<td>5910 Field Practice</td>
<td>3</td>
</tr>
<tr>
<td>TOTAL QUARTER HOURS</td>
<td>15</td>
</tr>
</tbody>
</table>
Social Welfare Administration and Planning

The social welfare administration and planning concentration provides the educational basis for leadership in the design, implementation, and continued delivery of effective human service programs at local, state, and regional levels. This concentration emphasizes theory and skills related to administration and planning, and permits considerable flexibility in tailoring a program to fit the student's individual interests, capabilities, and career goals.

FIELD PRACTICE

Field instruction is a critical component of the student's first- and second-year program. Because the UT 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 arrange 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 plan consists 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 interests, and educational needs. The student actively participates with the field practice coordinator and the specialization coordinator to arrange 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. A minimum 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).
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/NC 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 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.
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.
4. Preference is given to applicants with a B average in undergraduate work and substantial preparation in the social sciences. Applications should be filed no later than March 1 for the year in which admission is desired.

THE ADMISSIONS PROCESS

Individuals who wish to be considered for admission submit application materials from the Office of Admissions, UT School of Social Work, Henson Hall, Knoxville, TN 37996-3333, telephone (615) 974-3175, or one of the Branch offices. Beginning students are admitted only in the fall quarter. Applications for first-year admission should be filed as early as possible. 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, many of 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, The University of Tennessee, Knoxville, Tennessee. Two official transcripts of all undergraduate, graduate, and extension work (except work taken at The University of Tennessee, Knoxville) should be sent to The Graduate School immediately after filing the Graduate Application for Admission.

The completed University of Tennessee School of Social Work Application for Admission and three reference forms should be returned to the Admissions 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 arrangements will be made concerning a time and place. Applicants may request a personal interview with a faculty member if they wish.

ACCELERATED PROGRAM

The University of Tennessee School of Social Work 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 achieved a 3.0 or above grade point average (on a 4.0 scale) in undergraduate work.
2. Have completed an undergraduate major in social work from a program accredited by the Council on Social Work Education, or an undergraduate major in a related area which included a supervised field practice component, or have completed at least two years of full-time employment in social work practice.
3. Pass a qualifying examination administered by the School of Social Work faculty in early spring.

The accelerated programs begin in the Knoxville and Memphis branches in March and 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 to the accelerated program is through the regular admission process. Applications should be filed not later than December 31 for the Memphis and Knoxville programs, and not later than January 31 for the Nashville program.

PART-TIME PROGRAM

Planned part-time programs are available in all three branches of the School. Admission requirements are the same as for full-time study. Course work can be completed over a three- or four-year period. Applications should be made to the School as outlined above.

TRANSFER CREDITS

Courses completed in another accredited graduate school of social work are usually accepted for The University of Tennessee School of Social Work degree requirement providing the applicants meet the admission requirements of The Graduate School and The University of Tennessee School of Social Work. If previous courses are equivalent to required or elective courses offered here. The University of Tennessee School of Social Work allows a maximum of 45 credit hours of graduate course work taken at another accredited institution to be transferred into the student's Master's program. Such work 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. This course 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.

THE DOCTORAL PROGRAM

The UT School of Social Work offers a Doctor of Philosophy degree with a major in Social Work. This newly approved Ph.D. program began fall quarter, 1983. The focus of social work education at the doctoral level is to foster the development within students of an attitude of scientific inquiry, competence in applying scientific method to improve and extend the knowledge base of social work practice and commitment to reflect this attitude, and competence in leadership roles in social work education, research, and practice.

The character of the UT School of Social Work doctoral program will be derived from its focus upon:

—Analysis and evaluation of the interrelationships between direct intervention and administration and planning practice and between each of them and their social policy, programmatic, organizational and community contexts.
—Development, within this interrelational framework, or research-based knowledge to inform and guide social work practice, social policy, planning and social welfare program development.

The core courses will be offered in four quarters on the Knoxville campus. After this, students will be assigned to one of the three branches for an internship and to complete dissertation research under the supervision of qualified faculty. For example, students interested in health care could be assigned to the Memphis Branch where there are opportunities for internships and for research in health care.

Requirements for admission to the doctoral program are being developed. Inquiries and requests for admission should be sent to Doctoral Program Admissions, UT School of Social Work, Henson Hall, Knoxville, TN 37996-3333, (615) 372-3715.

Graduate 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

Professors:
B. P. Granger (Dean), Ph.D. Brandeis; M. H. Bloch, M.S. Ohio State; R. C. Bonovich, D.S.W. Washington; G. W. Fryer, Ed.D. Columbia; G. M. Abee (Emeritus), M.S.W. Wisconsin;
M. K. Mullins, Ph.D. Chicago; R. M. Nunge, D.S.W. Tulane; B. Corona (Emeritus), M.S. Western Reserve; H. Rubenstein, Ph.D. Chicago; S. W. Spencer (Emeritus), M.S. New York School of Social Work.

Associate Professors:

Assistant Professors:
P. A. Campbell, M.S.S.W. Tennessee; J. Charing, Ph.D. Peabody; J. C. Collier, M.S.W. Tulane; H. P. Curry, Ph.D. Western Reserve; C. Faust, M.S.S.W. Tennessee; A. R. Ford, M.S.W. Atlanta; J. Gates, M.S.S.W. Tennessee; D. Jafalbag, Ph.D. Washington; D. C. Johnston, M.S. W. California (Berkeley); C. Lowry, M.S.S.W. R. Michigan; M. S. W. Ohio State; M. P. Strong, M.S.W. Tulane.

Courses

5000 Thesis (1-15) P/NP only. E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered. May be taken 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

5070-40 Social Work Research I, II (3) Research methodology as applied to problems in social welfare. Problem formulation; research design; instrument construction; data collection, analysis, and presentation; and research reporting. F, W

5081 Evaluative Research in Social Work (2-3) Advanced research course. Topics include sociopolitical and organizational context of evaluative research, research design and methods appropriate to evaluative research, and utilization of research findings. Prereq: Completion of core or consent of instructor. S

5082 Practicum in Social Work Research (3-9) Supervised practice in application of research methods and tools to social welfare program. Problem may be generated by faculty, students, or social welfare agency or organization. Prereq: 5070-40 and consent of faculty member conducting investigation. S/NC only. Sp

5083 Directed Readings in Research (2-4) May be repeated with approval of instructor. Maximum 4 hrs. F, W, Sp

5090 Special Problems in Social Work (2-6) Individual study or research on problems of special significance to student or program, under supervision of major professor. May be repeated. F, W, Sp

5110 Social Welfare Policy and Services I (3) Interests of social work profession in development of contemporary social policy at local, state, national, and international levels of organization. Contribution social work professionals can make to formal policy-making process through which macro-social change is effected, and through which aggregate social welfare services are proposed, authorized, financed, and programmed. Policy lab may be used to focus on beginning phase of work. Sp

5120 Social Welfare Policy and Services II (3) Examination of theories of complex organizations applied to social welfare service delivery settings. Transformation of collective social welfare resources into divisible and indivisible social welfare benefits 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 implications of social policy proposals. Prereq: Completion of core or consent of instructor. Sp

5151 Social Welfare Seminar (2-3) Problem area or field of practice seminar focusing on substantive knowledge about social problem or condition and interrelationships among problem definition, social policy, social welfare program, and social work practice. Fields such as health, mental health, child and family welfare, social work intervention, education, corrections, housing, labor force development, income maintenance, and aging. Prereq: Completion of core or consent of instructor. May be repeated. Maximum 9 hrs. W, F

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 functional, roles and process. Behavior of these systems conceptualized along functional-dysfunctional and normal-deviant continuum. Organizing themes, development and maturation, adaptive and deviant mechanisms. Open system approach used to understand interrelationships of biological, psychological, and social variables with emphasis on implications of culture and ethnicity. F, W

5290 Special Accelerated Program in Social Work (15) Ten-week program providing qualified students with intensive field and classroom experiences, including a practicum experience that qualifies them to enter second year of graduate study upon successful completion of this term. S/NC only.

5310 Human Behavior and Social Environment (2-3) Deepens and extends student's knowledge or range of adaptive behavior; continuum of behavior from optimum social functioning through pathology. Prereq: Second-year status. May be repeated.

5311 Imaginative Perspectives on the Human Condition (2-3) Examination of usefulness to social work students of prose, drama, and poetry, which illuminates and expands knowledge and appreciation of every person's humanness. Adaptive and maladaptive response to ordinary and extraordinary life situations and events, portrayed by creative writers. Artistic representation of molding of human personality and spirit through interaction of persons with one another and with society. Prereq: Completion of core or consent of instructor. F

5312 Psychopathology and Social Deviance (2-3) Theories of and recent research in etiology of physiologic, behavioral, and social variance. Categorical approach to psychopathology examined and differentiated from other approaches to human behavior. Prereq: Completion of core or consent of instructor. F

5313 Deviant Behavior of Children and Youth (2-3) Deviant behavior and conduct disorders in children and youth, etiology, symptomatology, and range of social services and treatment modalities. Prereq: Completion of core or consent of instructor. F

5315 Human Sexual Problems (2-3) Desensitization and resensitization of personal and social attitudes toward sexual behavior. Clinical problems and approaches to make social workers better able to deal with clients with sexual problems. Prereq: Completion of core or consent of instructor. F

5317 Social Work and Black Families (2-3) Historical and contemporary theories regarding Black families, emphasis on family as a system. Framework to assess and plan for Black families within service delivery systems. Prereq: Completion of core or consent of instructor. F

5410 Social Work Practice I (3) Basic theory, values, and skills for development generic to social work intervention at all system levels. Combines classroom skills and laboratory experiences. F

5420 Social Work Practice II (3) Assessment, planning, and delivery systems. Prereq: Completion of core or consent of instructor. W

5440 Family Therapy in Social Work Practice (2-3) Application of social practice therapy to assist in acquisition of skills in treatment of family as unit. Prereq: Completion of core or consent of instructor. W

5441 Transactional Analysis (2-3) Philosophy, theory, and therapeutic technique of transactional analysis. Lectures, exercises, and experiential methods facilitate acquisition of knowledge and skills to use transactional analysis as treatment modality. Prereq: Completion of core or consent of instructor.

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 design and evaluation of 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 design to assess treatment in-
tion of existing programs for appropriate deployment. Prereq: Completion of core or consent of instructor. May be repeated. Maximum 6 hrs. Sp

5442 Social Work Practice with the Poor (2-3) Problems, issues, and dilemmas of practice in social services with poor and attributes of service-delivery systems with which the professional is faced. Prereq: Completion of core or consent of instructor.

5460 Social Work Practice with Individuals and Families (3) Social work literature, professional work with individual and family, and as form of interpersonal treatment. Prereq: Completion of core or consent of instructor. Sp

5470 Contemporary Treatment Modalities: Individual and Family (2-3) 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 Special Topics in Social Work Treatment (2-3) Treatment with individuals, families, and small groups. Prereq: Completion of core or consent of instructor. May be repeated. Maximum 9 hrs. F, W, Sp.

5560 Social Work Practice with Groups (3) Development of knowledge and skill in use of group methods in social work practice; organization and forming group, structuring group tasks and experiences, facilitating group transfer; enabling problem-solving effectiveness, facilitating transfer of change and evaluating individuals and group. Prereq: Completion of core or consent of instructor. Sp

5561 Interpersonal Skill Development (2-3) Training group employed to enhance interpersonal competence in application of human relations skills in social work practice. Prereq: Completion of core or consent of instructor.

5570 Comparative Methods of Group Treatment (2-3) Comparative analysis and critical review of theory and methodology of some of major group treatment modalities with emphasis on theory-base, leadership, techniques and procedures, and research. Prereq: Completion of core or consent of instructor. A

5601 Social Work in Rural Communities (2-3) Characteristics of rural populations and rural community analysis. Outline and analysis of rural social services and delivery systems. Development of social work generalist concept and occupational function in rural areas. Prereq: Completion of core or consent of instructor. W

5661 Community Organization (2-3) Using behavioral and social science knowledge about communities and organizations to assist in development of resources to meet human needs. Prereq: Completion of core or consent of instructor. Sp

5670 Social Planning (2-3) (Same as Planning 5670) F

5671 Planning and Management of Change in Social Welfare (2-3) Theories and models of change such as planned change, conflict, and evolutionary change in relation to organizational change, community improvement, locality development, and economic development related to social welfare services. Prereq: Completion of core or consent of instructor. F

5702 Organizational Design of Social Welfare Agencies (2-3) Critical problems of adapting organizational structure and operational patterns to new tasks, objectives, and mandates. Planning and design techniques for new programs and for modification of existing programs for appropriate deployment of resources and personnel for maximum effectiveness and efficiency. Integration of theory and experience for development of practical skills for coping with variety of situations. Prereq: Second-year administration or organizationization. Prereq: Second-year administration or organizationization. Prereq: Management position of supervisor. Differences and similarities of levels of personnel. Goals, tasks, techniques, and processes in relation to individual and group supervision and field instruction. Prereq: Completion of core or consent of instructor. A

5742 Consultation in Social Work (2-3) Constellation of roles, relationships, and behaviors required of consultant. Consultation as distinguished from supervision, administration, and practice. Types of consultation in relation to various settings and levels of responsibility. Processes and practices of consultation, and dilemmas and pitfalls of consultant's position. Prereq: Second-year status or consent of instructor.

5743 Management of Human Resources in Social Welfare (2-3) Personnel function in administration of human services programs and agencies. Personnel recruitment, selection, appointment, and supervision; staff development, training, and evaluation; salary and benefit systems; employer-employee relations; and fair employment practices. Prereq: Completion of core or consent of instructor. W

5744 Education and Training in Social Welfare (2-3) Philosophies and practices of teaching and learning related to adults in social work and social welfare. Distinctions between teaching and learning; training and education; and adult education; measurement issues; models and styles of education. Prereq: Completion of core or consent of instructor. W

5761 Social Welfare Administration and Planning (3) Topics significant to managerial-planner roles such as decision making, budgeting, planning, and program development. Prereq: Completion of core or consent of instructor. Sp

5762 Seminar in Social Welfare Administration and Planning (3) To assist students in acquiring specific administrative and planning techniques appropriate for social welfare delivery systems. Prereq: Completion of core or consent of instructor. W

5771 Information Systems and Decision Making (2-3) Decision making in human services-organizations, utilization of information in policy formulation, delivery of services and evaluation of organizational performance. Information generation, collection, processing, storage, retrieval, and utilization in relation to management control, evaluation and forecasting. Prereq: Completion of core or consent of instructor. F

5772 Financial Management for Social Welfare Administration (2-3) Centralized decision making related to allocation of scarce resources in social service organizations. Technical aids to budgetary choices and other aspects of financial management examined for utility, parsimony, and feasibility. Prereq: Completion of core or consent of instructor. F

5800 Management of Residential Settings (2-3) Issues in supervision, management and programming in residential institutions for children, aged, mentally ill, mentally retarded, juvenile and adult offenders, and other groups. Prereq: Completion of core or consent of instructor. F

5820 Social Aspects of Illness (2-3) Social, economic, and emotional problems arising from or related to illness and disability as they affect individual, family, and community. Services needed to obtain optimum results from medical care. Lectures, discussion, illustrative case material. Sp

5821 Drugs: Use and Abuse (2-3) Survey and analysis of current social, psychological, and physiological factors underlying alcoholism and drug abuse. Recent research and treatment innovations, social work with user and family. Prereq: Completion of core or consent of instructor. Sp

5826 Social Work Treatment for Marital Adjustment (2-3) Theories regarding social and cultural values and personality processes which gain expression in marriage, concepts regarding contemporary marriage styles, problems in marriages, and appropriate treatment approaches. Prereq: Completion of core or consent of instructor. Sp

5830 Law and Social Work (2-3) Basic principles of law which relate to social work practice; organization of courts; legal aid societies; and other problems of legal nature that affect social work. Sp

5860 Social Gerontology (2-3) Physical, psychological, and social aspects of aging; economic and health status of aging; older person and family; community and professional roles in retirement—phenomenon of modern society. Sp

5855 The Roles of Women (2-3) Roles and statuses of women; emphasis on contemporary American scene. Empirical research as well as popular literature. Ascribed and achieved facets of women's statuses. A

5900 Graduate Seminar in Public Health I (2-3) (Same as Public Health 5900, Nursing 5900, Nutrition and Food Science 5910, and Physical Education 5900.) Sp/NC only. F, W

5910-20 Field Practice (3, 4) Instruction and supervised practice in methods of social work with individuals, groups and communities. Prereq: Admission to the School; 5410 concurrently or prior to 5410; 5420 concurrently or prior to 5920. Must be taken in sequence. Required course. F/NC only. F, W

5930-40-50-60 Field Practice (4, 4-8, 4-6) Specialized instruction and supervised practice methods of social work treatment, administration, and planning in community health and welfare programs and agencies. Prereq: Completion of core or consent of instructor. Must be taken in sequence. Sp/NC only. Sp; W

5951 Integrative Seminar (2) Required seminar facilitates integration of two-year M.S.S.W. program; attention given to current issues in profession and to pressing social problems. Student participation in symposia, presentations, demonstrations, and gaming situations prepares student to assume positions of responsibility and leadership within profession. Graduating student helped to plan toward continuing his/her education and professional development. Sp/NC only. Sp

6000 Doctoral Research and Dissertation (3-15) P/NP only. E

6050 Proseminar in Social Work Research I (5) May be repeated. Maximum 6 hrs. F/NC only.


6400 Evaluation Research on Social Work Practice, Programs, and Social Policy (3) Techniques and strategies for evaluating the impact on individuals and populations groups; techniques for evaluating processes and outcomes of social work practices.

6110 Philosophical and Historical Perspectives of Social Work (3) Social, cultural, economic and political contexts for development of social work profession and modern welfare system.


6140 Seminar on Areas of Practice (3) Comparative analysis of knowledge requirements for service delivery in specific areas of practice.

6210 Advanced Seminar in Areas of Practice (3) Impact of social contexts on service delivery in selected area of practice. May be repeated. Maximum 9 hrs.

6220 Seminar/Practicum in Social Work Education (3-3) Curriculum issues and teaching methods; classroom experience in social work teaching.
Index

164

Proficiency Examinations, 15
Provisional Admission, 11
Psychological Clinic, 137
Psychology, 137
Psychology, Industrial and Organizational, 96
Public Administration, 136
Public Health, 67
Qualifying Examination, 20
Radiation Biology, 140
Reading Education, 53
Readmission, 12
Recreation, 67
Refund of Fees, 13
Registrar, 3
Registration:
  Change of, 14
  Continuous, 20
  Dates of, 2
  Dissertation, 20
  Non-Thesis, 19
  Procedures, 12
  Research, 19, 20
  Thesis, 19
Regulations, Graduate School, 14
Rehabilitation, 60
Religious Studies, 140
Requirements:
  Admission, 9-5, 10
  Course, 19-20
  Doctoral Degree, 20
  Grades, 15
  Graduate School, 14
  Graduation, 21-22
  Language, 20
  Master's Degree, 19
  Residence, 16
  Research, 19-20
  Specialist in Education Degree, 19
Research Centers and Institutes, 18
Research Requirements, 19-20
Residence Halls, 16
Residency Requirements, 16
Responsibility, Graduate Students, 10
Restricted Programs, 8-9, 11
Revision of Program, 16
Romance Languages, 140
Rural Practice, 34
Rural Sociology, 25
Russian, 123, 142
Safety Education and Service, 64
Scholarships, 3, 16
School Health Education, 65
Schools:
  Architecture, 151
  Biomedical Sciences, 152
  Library and Information Science, 154
  Planning, 156
  Social Work, 158
Science Education, 53
Seniors, Admission of, 11
Services, Facilities and, 16
Services Fee, 12
Services to the Physically Disabled, 16
Single Student Housing, 3, 16
Social Science Education, 53
Social Security Number, 12
Social Work, School of, 18, 158
Sociology, 142
Space Institute, 18
Spanish, 142, 144
Special Education, 60
Special Programs, 144
Specialist in Education, 8-9, 19, 21, 51, 54, 57, 58, 62, 65
Specialist in Education Committee, 19
Speech and Hearing Science, 107, 144
Speech and Theatre, 144
Speech Pathology, 145
Statistics, 46
Student Employment, 14
Student Identification Number, 12
Student Loans, 14
Summary of Procedures for Degrees, 21-22
Summer Quarter Fees and Expenses, 13
Termination, 16
Test of English as a Foreign Language, 11, 15
Textiles and Clothing, 92
Theatre, 145
Thesis and Dissertation, 16, 19-20
Thesis, 19
Thesis Registration, 19
Time Limit, 19-20
Timetable of Classes, 3
Traffic Rules, 16
Transcripts, 3, 10, 11
Transfer Credits, 15
Transient Admission, 11
Transportation and Logistics, 45
Transportation Center, 18
Trustees, Board of, 7
Tuition, 12
Unclassified Graduate Student, 10
University Administration, 7
University Calendar, 2
University Fees, 12-13
University International House, 17
University Library, 17
University Programs and Services Fee, 12
Urban Practice, 33
Vehicle Operation, 16
Veterans' Benefits, 3, 14
Veterinary Medicine, 11, 31
Veterinary Medicine, College of, 31
Animal Science—Veterinary Medicine, 33
Environmental Practice, 33
Microbiology—Veterinary Medicine, 33
Pathobiology, 33
Rural Practice, 34
Urban Practice, 34
Veterinary Medicine, 34
Veterinary Medicine Students, 11, 31
Vocational Rehabilitation Counseling, 60
Vocational-Technical Education, 62
Waiver of Fees, 13
Water Resources Research Center, 18
Where to Write, 3
Wildlife and Fisheries Science, 29
Withdrawal, 13, 14
Work-Study, 3, 13
Written Examination, 19-20
Zoology, 145