University Calendar For 1982-83

Winter Quarter, 1982

January 4-5 (Monday-Tuesday)
January 6 (Wednesday)
February 1-5 (Monday-Friday)
February 9 (Tuesday)
March 16 (Tuesday)
March 19 (Friday)

Spring Quarter, 1982

March 25-26 (Thursday-Friday)
April 9-10 (Friday-Saturday)
May 3 (Monday)
May 24-28 (Monday-Friday)
June 8 (Tuesday)
June 11 (Friday)

Summer Quarter, 1982

June 17-18 (Thursday-Friday)
June 21 (Monday)
July 2 (Monday)
July 5 (Thursday)
July 8 (Thursday)
July 12 (Monday)
July 21-23 (Wednesday-Friday)
August 12 (Thursday)
August 25 (Wednesday)
August 28 (Saturday)

Fall Quarter, 1982

September 20-22 (Monday-Wednesday)
September 23 (Thursday)
October 27 (Wednesday)
October 29 (Friday)
November 1-5 (Monday-Friday)
November 6 (Saturday)
December 7 (Tuesday)
December 10 (Friday)

Winter Quarter, 1983

January 3-4 (Monday-Tuesday)
January 5 (Wednesday)
January 31-February 4 (Monday-Friday)
February 8 (Tuesday)
March 15 (Tuesday)
March 16 (Friday)

Registration
Classes Begin
Advance Registration for Spring 1982
Change of Registration Deadline
Classes End
Commencement

Registration
Classes Begin
Easter (No Classes)
Advance Registration for Summer 1982
Change of Registration Deadline
Advance Registration for Fall 1982
Classes End
Commencement

Registration
Classes Begin
Independence Day (No Classes)
Change of Registration Deadline, First Term
Classes End, First Term
Registration, Second Term
Change of Registration Deadline, Full Term
Classes Begin, Second Term
Advance Registration for Fall 1982
Change of Registration Deadline,
Second Term
Classes End
Commencement

Registration, First or Both Terms
Classes Begin
Advance Registration Deadline
Classes Begin
Independence Day (No Classes)
Advance Registration for Winter 1983
Homecoming (No Classes)
Classes End
Commencement

Classes Begin
Advance Registration for Winter 1983
Change of Registration Deadline
Classes End
Commencement

Registration
Classes Begin
Advance Registration for Spring 1983
Change of Registration Deadline
Classes End
Commencement

NOTE: Deadlines for degree requirements described on pp.
Contents

2 University Calendar for 1982-83
3 Where To Write
4 Campus Map
6 Graduate School Administration
Graduate Council
7 Board of Trustees
Administration
8 Majors and Degrees Available

The Graduate School
10 Introduction

Admission and Registration
10 Types of Admissions
11 Admission Procedures
12 Readmission
Registration Procedures
Family Educational Rights and Privacy Act
Student Identification Number

Fees, Residency Classification, and Financial Aid
12 University Fees
13 Residency Classification for Tuition Purposes
Academic Common Market
Financial Aid

General Regulations of The Graduate School
14 Advisor/Major Professor
Prerequisites
Explanation of Course Listings
Course Loads
Change of Registration
Grading System

Where To Write
The University of Tennessee, Knoxville
Knoxville, TN 37916
Office Hours: 8:00 a.m.-5:00 p.m.
Monday-Friday

The Graduate School
Diana C. Lopez, Director of Graduate Admissions
Clea J. Greenawalt, Assistant Director of Graduate Admissions
218 Student Services Building

Regulations Subject To Change
Any and all course offerings, academic requirements and other information contained in this publication are subject to change and/or revocation without notice. Anyone interested in the precise course offering, academic requirement at a given time, or other special information should make inquiry in advance.

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 for Planning and Administration, 525 Andy Holt Tower, 974-4391. Charges of violation of the above policy should also be directed to the Office of the Vice Chancellor for Planning and Administration.

Requirements for Advanced Degrees
18 Master's Degrees
19 Specialist in Education Degree
19 Doctoral Degrees
21-22 Summary of Procedures for Degrees

Colleges and Schools
23 Institute of Agriculture
33 College of Business Administration
45 College of Communications
49 College of Education
62 School of Health, Physical Education, and Recreation
67 College of Engineering
87 College of Home Economics
93 Intercollegiate Programs
97 College of Liberal Arts
143 College of Medicine-Knoxville Unit
144 College of Nursing
147 School of Architecture
148 School of Biomedical Sciences
151 School of Library and Information Science
153 School of Planning
155 School of Social Work
159 Index
The University of Tennessee, Knoxville

Main Campus

A — Ayres Hall (Liberal Arts)
AA — Art & Arch. Bldg.
ACC — Aconda Court (Personnel, Placement)
ACH — Arts & Crafts House (Laurel House)
AD — Holt Ave. Apartments
AH — Tyson Alumni House
AHT — Andy Holt Tower (Administration)
AP — Austin Peay Memorial Bldg. (Psych.)
APG — Administration Parking Garage
AQC — Student Aquatic Center
BCC — Black Cultural Center
BH — Berry Hall
BU — Buehler Hall
CI — Claxton Education Building
CAH — Carrick Hall (Residence)
CBT — Clarence Brown Proscenium Theatre

CLH — Clement Hall (Residence)
CN — College of Nursing
COM — Communications and University Extension Bldg.
CR — Craft House
CT — Carousel Theatre
CU — Credit Union
DAB — Dabney Hall
DES — Design House
DO — Dougherty Engineering Bldg.
DUH — Dunford Hall (Residence)
ESH — East Stadium Hall
EST — Estabrock Hall
EMP — UT Employment Office
FH — Fraternity House

Agricultural Campus

AE — Agricultural Engineering Bldgs.
AEL — Agricultural Engineering Lab
ASB — C.E. Brehm Animal Sciences Bldg.
CC — Corn-Cotton Bldg.
DP — Dairy Products Bldg.
FL — Fiber Research Laboratory
FOR — Tennessee Division of Forestry
FT — J.H. McLeod Food Technology Bldg.
GH — Greenhouses
MC — McCord Hall

MH — Morgan Hall
PB — Plot Barn
PO — Poultry Diagnostic Laboratory
PPL — Ag. Campus Power Plant
PR — Printing and Supply
PS — Ellington Hall—Plant Sciences
PSX — Plant Sciences Annex
SL — Spinning Lab
V — College of Veterinary Medicine (Clyde York Bldg.)

FLC — Family Life Center
G — Glocker Business Administration Bldg.
G&G — Geology and Geography Bldg.
GBH — Gibbs Hall (Residence)
GRH — Greve Hall (Residence)
GSP — Graduate School of Planning
GYM — Alumni Memorial Auditorium-Gymnasium
H — Hesler Biology Bldg.
H&S — Hearing & Speech Center
HE — Harris Home Economics Bldg.
HEH — Hess Hall (Residence)
HH — Henson Hall
HO — Hopecote
HPR — Health, Physical Education & Recreation Bldg.
HSS — Humanities and Social Sciences Bldg.
HUH — Humes Hall (Residence)
### The Graduate School Administration

L. Evans Roth, A.B., M.S., Ph.D., Vice Chancellor for Graduate Studies and Research  
Clarence W. Minkel, B.A., M.A., Ph.D., Dean for Graduate Studies  
Mary P. Richards, B.A., M.A., Ph.D., Assistant Dean for Graduate Studies  
Marla P. Peterson, B.A., M.A., Ph.D., Dean for Research  
Thomas L. Bell, B.A., M.A., Ph.D., Assistant Dean for Research  
Diana C. Lopez, B.S., M.S., Director, Graduate Admissions  
Ben Granger, B.A., M.S.W., M.P.A., Ph.D., Dean, School of Social Work  
Charles H. Weaver, 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  
Alexander Hollaender, A.B., A.M., Ph.D., Director, Archival Center for Radiation Biology  
David A. Johnson, B.A., M.C.P., Ph.D., 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  
Jerry D. Westbrook, B.E., M.S., Ph.D., Director, Nashville Graduate Engineering Program and Oak Ridge Resident Graduate Program  
Ann E. Prentice, A.B., M.L.S., D.L.S., Director, Graduate School of Library and Information Science  
Kenneth W. Heathington, B.S., M.S., Ph.D., Director, Transportation Center  
Edward Lumsdale, B.S., M.S., Ph.D., Director, Energy, Environment, and Resources Center

### The Graduate Council

Membership January 1, 1981

**Ex Officio Members**

- L. Evans Roth, Vice Chancellor  
- Clarence W. Minkel, Dean  
- Thomas Hood, Chairperson for Research Council  
- Pauline S. Bayne, President, Faculty Senate

**Appointed Members**

- Dr. Michael E. Gordon  
- Dr. David A. Johnson  
- Dr. Richard J. Courtney  
- Dr. Kenneth Heathington  
- Dr. Robert Bonovich  
- Dr. George W. Ayres  
- Dr. Maurice A. Wright

### College or Unit

<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. Jan R. Williams</td>
<td>Dec. 31, 1981</td>
<td>Dr. Gary N. Dicer</td>
</tr>
<tr>
<td></td>
<td>Dr. Charles B. Garrison</td>
<td>Dec. 31, 1982</td>
<td>Dr. Norman E. Dittrich</td>
</tr>
<tr>
<td>Col. of Communications</td>
<td>Dr. Alan D. Fletcher</td>
<td>Dec. 31, 1982</td>
<td>Dr. Kent M. Sidel</td>
</tr>
<tr>
<td>Col. of Education</td>
<td>Dr. John Peters</td>
<td>Dec. 31, 1981</td>
<td>Dr. Charles Ball</td>
</tr>
<tr>
<td></td>
<td>Dr. John Ray</td>
<td>Dec. 31, 1982</td>
<td>Dr. Charles Hargis</td>
</tr>
<tr>
<td></td>
<td>Dr. Schuyler Huck</td>
<td>Dec. 31, 1982</td>
<td>Dr. Estil Alexander</td>
</tr>
<tr>
<td></td>
<td>Dr. Lester Knight</td>
<td>Dec. 31, 1983</td>
<td>Dr. Gerald Ubben</td>
</tr>
<tr>
<td></td>
<td>Dr. John Lovell</td>
<td>Dec. 31, 1983</td>
<td>Dr. George Wiegers</td>
</tr>
<tr>
<td>Col. of Engineering</td>
<td>Dr. Bruce R. Dewey</td>
<td>Dec. 31, 1981</td>
<td>Dr. Peyton Z. Peebles</td>
</tr>
<tr>
<td></td>
<td>Dr. Mancil Milligan</td>
<td>Dec. 31, 1983</td>
<td>Dr. Jeffrey W. Hodgson</td>
</tr>
<tr>
<td>Col. of Home Economics</td>
<td>Dr. Imogene Ford</td>
<td>Dec. 31, 1983</td>
<td>Dr. John T. Smith</td>
</tr>
<tr>
<td>Col. of Liberal Arts</td>
<td>Dr. Patricia L. Waine</td>
<td>Dec. 31, 1981</td>
<td>Dr. Carl W. Cobb</td>
</tr>
<tr>
<td></td>
<td>Dr. John H. Fisher</td>
<td>Dec. 31, 1982</td>
<td>Dr. Anne H. Hopkins</td>
</tr>
<tr>
<td></td>
<td>Dr. T. McN. Simpson</td>
<td>Dec. 31, 1982</td>
<td>Dr. Thomas G. Hallam</td>
</tr>
<tr>
<td>Graduate Student Council</td>
<td>Mr. Kurt Steiner</td>
<td>Apr. 30, 1981</td>
<td>Dr. Mildred Fenske</td>
</tr>
<tr>
<td></td>
<td>Mr. Thomas L. Walden</td>
<td>Apr. 30, 1981</td>
<td>Dr. Robert Bonovich</td>
</tr>
<tr>
<td>Col. of Nursing</td>
<td>Dr. Sylvia E. Hart</td>
<td>Dec. 31, 1983</td>
<td>Dr. George W. Ayres</td>
</tr>
<tr>
<td>School of Social Work</td>
<td>Dr. Roger M. Nooe</td>
<td>Dec. 31, 1981</td>
<td>Dr. Maurice A. Wright</td>
</tr>
<tr>
<td>UT Space Institute</td>
<td>Dr. Robert L. Young</td>
<td>Dec. 31, 1982</td>
<td>Dr. R. G. Schaub</td>
</tr>
</tbody>
</table>
## The University of Tennessee

### Board of Trustees

<table>
<thead>
<tr>
<th>Ex Officio Members</th>
<th>From Congressional Districts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buford Goldstein,</td>
<td>District</td>
</tr>
<tr>
<td>Elizabeth</td>
<td>TERM EXPIRES</td>
</tr>
<tr>
<td>A. B. Long, Jr.,</td>
<td>First</td>
</tr>
<tr>
<td>Knoxville</td>
<td>June 1, 1984</td>
</tr>
<tr>
<td>Scott Probasco, Jr.</td>
<td>Second</td>
</tr>
<tr>
<td>Lookout Mountain</td>
<td>June 1, 1986</td>
</tr>
<tr>
<td>William M. Johnson,</td>
<td>Third</td>
</tr>
<tr>
<td>Sparta</td>
<td>June 1, 1988</td>
</tr>
<tr>
<td>Marcia A. Echols,</td>
<td>Fourth</td>
</tr>
<tr>
<td>Nashville</td>
<td>June 1, 1987</td>
</tr>
<tr>
<td>Ben S. Kimbrough,</td>
<td>Fifth</td>
</tr>
<tr>
<td>Clarksville</td>
<td>June 1, 1982</td>
</tr>
<tr>
<td>T. O. Lashlee,</td>
<td>Sixth</td>
</tr>
<tr>
<td>Humboldt</td>
<td>July 1, 1990</td>
</tr>
<tr>
<td>Tom Elam,</td>
<td>Seventh</td>
</tr>
<tr>
<td>Union City</td>
<td>June 1, 1988</td>
</tr>
<tr>
<td>R. Lee Winchester,</td>
<td>Eighth</td>
</tr>
<tr>
<td>Memphis</td>
<td>June 1, 1986</td>
</tr>
</tbody>
</table>

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

| From Anderson, Bedford, Coffee, Franklin, Lincoln, Moore, and Warren Counties |
|----------------------------------|----------------------|----------------------|
| Charlotte Parish                 | TERM EXPIRES         |
| June 1, 1988                     |                      |

### From Davidson County

<table>
<thead>
<tr>
<th>From Davidson County</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 1, 1984</td>
</tr>
</tbody>
</table>

### From Hamilton County

<table>
<thead>
<tr>
<th>From Hamilton County</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 1, 1987</td>
</tr>
</tbody>
</table>

### From Knox County

<table>
<thead>
<tr>
<th>From Knox County</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 1, 1989</td>
</tr>
</tbody>
</table>

### From Shelby County

<table>
<thead>
<tr>
<th>From Shelby County</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 1, 1990</td>
</tr>
</tbody>
</table>

### From Weakley County

<table>
<thead>
<tr>
<th>From Weakley County</th>
</tr>
</thead>
<tbody>
<tr>
<td>TERM EXPIRES</td>
</tr>
<tr>
<td>June 1, 1990</td>
</tr>
</tbody>
</table>

### Officers of the Board

<table>
<thead>
<tr>
<th>Officers of the Board</th>
</tr>
</thead>
<tbody>
<tr>
<td>Governor Lamar Alexander, Chairman</td>
</tr>
<tr>
<td>Ann Baker Furrow, Vice Chairman</td>
</tr>
<tr>
<td>Edward J. Boling, President</td>
</tr>
<tr>
<td>Brodie Baynes, Treasurer</td>
</tr>
<tr>
<td>Beauchamp Brogan, Secretary</td>
</tr>
<tr>
<td>Linda Logan, Assistant Secretary</td>
</tr>
</tbody>
</table>

### University Administration

<table>
<thead>
<tr>
<th>University Administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edward J. Boling, B.S., M.S., Ed.D., President of the University</td>
</tr>
<tr>
<td>Joseph E. Johnson, A.B., A.M., Ed.D., Executive Vice President and Vice President for Development</td>
</tr>
<tr>
<td>John W. Prados, B.S., M.S., Ph.D., Vice President for Academic Affairs</td>
</tr>
<tr>
<td>W. W. Armitstead, D.V.M., M.S., Ph.D., Vice President for Agriculture</td>
</tr>
<tr>
<td>Emerson H. Fly, B.S., C.P.A., Vice President for Business and Finance</td>
</tr>
<tr>
<td>Charles H. Weaver, B.S., M.S., Ph.D., Vice President for Continuing Education</td>
</tr>
<tr>
<td>James C. Hunt, A.B., M.S., M.D., Vice President for Health Affairs</td>
</tr>
<tr>
<td>Robert S. Hutchison, B.S., M.B.A., Vice President for Public Service</td>
</tr>
<tr>
<td>Beauchamp E. Brogan, B.S., LL.B., J.D., General Counsel, Secretary of Board of Trustees</td>
</tr>
<tr>
<td>Andrew J. Kozar, B.S., A.M., Ph.D., Executive Assistant to the President</td>
</tr>
<tr>
<td>Brodie Baynes, B.S., C.P.A., Treasurer</td>
</tr>
</tbody>
</table>

### UT, Knoxville Administration

<table>
<thead>
<tr>
<th>UT, Knoxville Administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jack E. Reese, A.B., A.M., Ph.D., Chancellor</td>
</tr>
<tr>
<td>Luke Ebersole, A.B., A.M., Ph.D., Vice Chancellor for Planning and Administration</td>
</tr>
<tr>
<td>Walter R. Herndon, B.S., M.S., Ph.D., Vice Chancellor for Academic Affairs</td>
</tr>
<tr>
<td>L. Evans Roth, A.B., M.S., Ph.D., Vice Chancellor for Graduate Studies and Research</td>
</tr>
<tr>
<td>Homer S. Fisher, B.S., M.B.A., Vice Chancellor for Business and Finance</td>
</tr>
<tr>
<td>Howard F. Aldmon, B.S., A.M., Ed.D., Vice Chancellor for Student Affairs</td>
</tr>
<tr>
<td>Clarence W. Minkel, B.A., M.A., Ph.D., Dean for Graduate Studies</td>
</tr>
<tr>
<td>Marla P. Peterson, B.A., M.A., Ph.D., Dean for Research</td>
</tr>
<tr>
<td>O. Glen Hall, B.S., M.S., Ph.D., Dean of the College of Agriculture</td>
</tr>
<tr>
<td>Roy F. Knight, B.A., M. Arch., Dip. D'Etudes, Dean of the School of Architecture</td>
</tr>
<tr>
<td>C. Warren Neel, B.S., M.B.A., D.B.A., Dean of the College of Business Administration</td>
</tr>
<tr>
<td>Donald G. Hileman, B.S., M.S., Ph.D., Dean of the College of Communications</td>
</tr>
<tr>
<td>William H. Coffield, B.S., M.A., Ph.D., Dean of the College of Education</td>
</tr>
<tr>
<td>Robert E. Weaver, B.S., Ch.e, M.S., M.A., Ph.D., Dean of the College of Engineering</td>
</tr>
<tr>
<td>Nancy H. Belick, B.S., M.S., Ph.D., Dean of the College of Home Economics</td>
</tr>
<tr>
<td>Kenneth L. Panegar, A.B., J.D., LL.M., Dean of the College of Law</td>
</tr>
<tr>
<td>Robert G. Landen, A.B., A.M., Ph.D., Dean of the College of Liberal Arts</td>
</tr>
<tr>
<td>Sylvia E. Hart, B.S.N., M.S.N., Ph.D., Dean of the College of Nursing</td>
</tr>
<tr>
<td>Hyram Kitchen, M.S., D.V.M., Ph.D., Dean of the College of Veterinary Medicine</td>
</tr>
<tr>
<td>Joseph P. Godard, B.S., M.S., Ed.D., Dean of the Division of Continuing Education</td>
</tr>
<tr>
<td>John J. McDow, B.S., M.S., Ph.D., Dean of Admissions (Undergraduate) and Records</td>
</tr>
<tr>
<td>Paul J. Kinser, B.S., M.A., Ph.D., Vice President for Academic Affairs</td>
</tr>
<tr>
<td>W. W. Armistead, D.V.M., M.S., Ph.D., Vice President for Agriculture</td>
</tr>
<tr>
<td>Emerson H. Fly, B.S., C.P.A., Vice President for Business and Finance</td>
</tr>
<tr>
<td>Charles H. Weaver, B.S., M.S., Ph.D., Vice President for Continuing Education</td>
</tr>
<tr>
<td>James C. Hunt, A.B., M.S., M.D., Vice President for Health Affairs</td>
</tr>
<tr>
<td>Robert S. Hutchison, B.S., M.B.A., Vice President for Public Service</td>
</tr>
<tr>
<td>Beauchamp E. Brogan, B.S., LL.B., J.D., General Counsel, Secretary of Board of Trustees</td>
</tr>
<tr>
<td>Andrew J. Kozar, B.S., A.M., Ph.D., Executive Assistant to the President</td>
</tr>
<tr>
<td>Brodie Baynes, B.S., C.P.A., Treasurer</td>
</tr>
</tbody>
</table>
### Majors and Degrees Available

<table>
<thead>
<tr>
<th>MAJOR</th>
<th>DEGREE</th>
<th>ADMISSION TEST REQUIRED</th>
<th>ADDITIONAL REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>College of Agriculture</td>
<td><strong>Agricultural Economics</strong></td>
<td>MS, PhD</td>
<td>GRE</td>
</tr>
<tr>
<td></td>
<td><strong>Agricultural Engineering</strong></td>
<td>MS, PhD</td>
<td>GRE</td>
</tr>
<tr>
<td></td>
<td><strong>Agricultural Extension</strong></td>
<td>MS</td>
<td>GMAT</td>
</tr>
<tr>
<td></td>
<td><strong>Agricultural Mechanization</strong></td>
<td>MS</td>
<td>GMAT</td>
</tr>
<tr>
<td></td>
<td><strong>Animal Science</strong></td>
<td>MS, PhD</td>
<td>Dept. Application&lt;sup&gt;11&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td><strong>Entomology and Plant Pathology</strong></td>
<td>MS, PhD</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Food Technology and Science</strong></td>
<td>MS, PhD</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Forestry</strong></td>
<td>MS</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Ornamental Horticulture</strong></td>
<td>MS, PhD</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Plant and Soil Science</strong></td>
<td>MS, PhD</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Wildlife and Fisheries Science</strong></td>
<td>MS</td>
<td>X</td>
</tr>
<tr>
<td>College of Business Administration</td>
<td><strong>Accounting</strong></td>
<td>MBA, DBA</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Business Administration</strong></td>
<td>MBA, DBA, Ph.D.</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Economics</strong></td>
<td>MA, MS, MACT, Ph.D.</td>
<td>X or X</td>
</tr>
<tr>
<td></td>
<td><strong>Management Science</strong></td>
<td>PhD</td>
<td>X or X</td>
</tr>
<tr>
<td></td>
<td><strong>Statistics</strong></td>
<td>MS</td>
<td>X or X</td>
</tr>
<tr>
<td>College of Communications</td>
<td><strong>Communications</strong></td>
<td>MS, PhD</td>
<td>X</td>
</tr>
<tr>
<td>College of Education</td>
<td><strong>Adult Education</strong></td>
<td>MS</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Agricultural Education</strong></td>
<td>MS</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Art Education</strong></td>
<td>MS</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Business Education</strong></td>
<td>MS, MACT</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>College Student Personnel</strong></td>
<td>MS</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Curriculum</strong></td>
<td>MS</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Curriculum and Instruction</strong></td>
<td>MS, EdD, EdD</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Distributive Education</strong></td>
<td>MS</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Education</strong></td>
<td>PhD</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Educational Administration</strong></td>
<td>MS, EdD, EdD</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Educational Psychology</strong></td>
<td>MS</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Educational Psychology and Guidance</strong></td>
<td>MS, EdD, EdD</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Elementary Education</strong></td>
<td>MS</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>English Education</strong></td>
<td>MS</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Foreign Language Education</strong></td>
<td>MS</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Guidance</strong></td>
<td>MS</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Health Education</strong></td>
<td>MS, EdD, PhD</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Instructional Media</strong></td>
<td>MS</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Mathematics Education</strong></td>
<td>MS</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Music Education</strong></td>
<td>MS</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Physical Education</strong></td>
<td>MS, EdD</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Public Health</strong></td>
<td>MPH</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Reading Education</strong></td>
<td>MS</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Recreation</strong></td>
<td>MS</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Safety Education and Service</strong></td>
<td>MS, EdD</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>School Health Education</strong></td>
<td>MS</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Science Education</strong></td>
<td>MS</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Social Science Education</strong></td>
<td>MS</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Special Education</strong></td>
<td>MS</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Vocational Rehabilitation Counseling</strong></td>
<td>MS</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Vocational-Technical Education</strong></td>
<td>MS, EdD, EdD</td>
<td>X&lt;sup&gt;4&lt;/sup&gt;</td>
</tr>
<tr>
<td>College of Engineering</td>
<td><strong>Aerospace Engineering</strong></td>
<td>MS, MS, PhD</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Chemical Engineering</strong></td>
<td>MS, PhD</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Civil Engineering</strong></td>
<td>MS, MS, PhD</td>
<td>X&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td><strong>Electrical Engineering</strong></td>
<td>MS, MS, PhD</td>
<td>X&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td><strong>Engineering Science</strong></td>
<td>MS, PhD</td>
<td>X&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td><strong>Environmental Engineering</strong></td>
<td>MS, PhD</td>
<td>X&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td><strong>Industrial Engineering</strong></td>
<td>MS, MS</td>
<td>X&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td><strong>Mechanical Engineering</strong></td>
<td>MS, MS, PhD</td>
<td>X&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td><strong>Metallurgical Engineering</strong></td>
<td>MS, PhD</td>
<td>X&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td><strong>Nuclear Engineering</strong></td>
<td>MS, MS, PhD</td>
<td>X&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td><strong>Polymer Engineering</strong></td>
<td>MS, PhD</td>
<td>X&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>College of Home Economics</td>
<td><strong>Child and Family Studies</strong></td>
<td>MS</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Consumer Studies and Housing</strong></td>
<td>MS</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Public Policy</strong></td>
<td>MS</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Food Science</strong></td>
<td>MS</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Food Systems Administration</strong></td>
<td>MS</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Home Economics</strong></td>
<td>PhD&lt;sup&gt;7&lt;/sup&gt;</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Interior Design and Housing</strong></td>
<td>MS</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Nutrition</strong></td>
<td>MS&lt;sup&gt;8&lt;/sup&gt;</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td><strong>Textiles and Clothing</strong></td>
<td>MS</td>
<td>X</td>
</tr>
<tr>
<td>MAJOR</td>
<td>DEGREE</td>
<td>ADMISSION TEST REQUIRED</td>
<td>ADDITIONAL REQUIREMENTS</td>
</tr>
<tr>
<td>-------</td>
<td>--------</td>
<td>--------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GRE</td>
<td>ADV</td>
</tr>
<tr>
<td>Intercollegiate</td>
<td>Aviation Systems</td>
<td>MS</td>
<td>X</td>
</tr>
<tr>
<td>*Comparative and Experimental Medicine</td>
<td>MS, PhD</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>*Ecology</td>
<td>MS, PhD</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>*Industrial and Organizational Psychology</td>
<td>MS, PhD</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>*Life Sciences</td>
<td>MS, PhD</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>*Management Science</td>
<td>MS</td>
<td>X</td>
<td>or X</td>
</tr>
<tr>
<td>College of Liberal Arts</td>
<td>*Anthropology</td>
<td>MA, PhD</td>
<td></td>
</tr>
<tr>
<td>*Art</td>
<td>MA, MFA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Audiology</td>
<td>MA</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>*Biochemistry</td>
<td>MS, PhD</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>*Botany</td>
<td>MS, PhD</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>*Chemistry</td>
<td>MS, PhD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer Science</td>
<td>MS</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>*English</td>
<td>MACT, MA, PhD</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>French</td>
<td>MA</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Geography</td>
<td>MS, PhD</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>*Geology</td>
<td>MS, PhD</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>*German</td>
<td>MACT, MA</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>German Language and Literature</td>
<td>PhD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>History</td>
<td>MACT, MA, PhD</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Mathematics</td>
<td>MM</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Microbiology</td>
<td>MS, PhD</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>*Music</td>
<td>MM, MA</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Philosophy</td>
<td>MA, PhD</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Physics</td>
<td>MACT, MS, PhD</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>*Political Science</td>
<td>MA, PhD</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>*Psychology</td>
<td>MA, PhD</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>*Public Administration</td>
<td>MPA</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Sociology</td>
<td>MACT, MA, PhD</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Spanish</td>
<td>MA, PhD</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>*Speech and Hearing Science</td>
<td>PhD</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>*Speech Pathology</td>
<td>MA</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Speech and Theatre</td>
<td>MA</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>*Theatre</td>
<td>MFA</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Zoology</td>
<td>MS, PhD</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>College of Nursing</td>
<td>*Nursing</td>
<td>MSN</td>
<td>X</td>
</tr>
<tr>
<td>School of Biomedical Sciences</td>
<td>*Biomedical Sciences</td>
<td>MS, PhD</td>
<td>X</td>
</tr>
<tr>
<td>School of Library and Information Science</td>
<td>*Library Science</td>
<td>MSLS</td>
<td>X</td>
</tr>
<tr>
<td>School of Planning</td>
<td>*Planning</td>
<td>MSP</td>
<td></td>
</tr>
<tr>
<td>School of Social Work</td>
<td>*Social Work</td>
<td>MSSW</td>
<td></td>
</tr>
</tbody>
</table>

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

1American applicants only.
2International applicants only.
3EdS applicants only.
4EdD applicants only.
5PhD applicants only.
6Department doctoral option offered under the major of home economics.
7Interdisciplinary option offered in each department.
8Offered at UT Space Institute.
9G.S. Rating Form submitted to Graduate Office.
10G.S. Rating Form submitted to Department.
11Lists obtained from & returned to Department.
12For Financial Assistance only.
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 119 fields of specialization and doctoral work in 49. Approximately 6,500 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 for Graduate Studies. 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 off-campus. The Graduate School brings together faculty and graduate students as a community of scholars with a common interest in creative work and advanced study. Graduate 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'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 made 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 members appointed by the Vice Chancellor for Graduate Studies and Research. Ex-officio members include the Vice Chancellor, the Dean for Graduate Studies, the Assistant Deans for Graduate Studies, and the Chair of the Research Council. The Graduate Office develops procedures to carry out the policies made 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 Graduate Office 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 Graduate Office.

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 insure 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, he/she must repeat the application process.

Types of Admissions

Admission to a Graduate Degree Program: Admission to a degree program requires a minimum grade point average of 2.5 out of a possible 4.0, or a 3.0 during the senior year. However, many departments require a higher average. A minimum B average is required for international students.

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. 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 graduate studies, and similar evidence of scholarly achievement.

Refer to pages 8-9 and to description 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 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. 15, for instructions);
2. file a Plan of Study form with the Graduate Office for approval to continue taking courses in non-degree status. The plan of study must include a stated educational objective and a list of courses proposed to achieve that objective.

A maximum of 18 graduate hours taken before acceptance into a degree program may
be applied toward a graduate degree, if approved by the student's committee. Courses applied toward any graduate degree must fall within the time limit specified for the degree.

The graduate application, $10 application fee, and two (2) official transcripts from each institution previously attended are required for consideration as a non-degree student. The minimum requirements are a Bachelor's degree with a 2.5 grade point average on a 4.0 scale (or a 3.0 the senior year) from a college or university accredited by the appropriate regional accrediting agency.

A major area does not have to be declared, but some departments will not permit non-degree students to register for graduate courses. (See pages 8-9 for information on restricted programs.) Applicants should contact the Graduate Office or the department concerning registration for specific courses. Permission for registration in courses allowed may be obtained from the department or from The Graduate School.

Admission to the non-degree status does not assure admission to a degree program. The student who hopes to enter a degree program will be directed to the appropriate department. Students must maintain a 3.0 grade point average in all course work for admission to the Graduate School.

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

**Provisional Admission:** Applicants may be admitted as provisional students for one quarter or, for one course in each of two quarters who, for example:

1. desire graduate credit for a limited number of courses;
2. do not meet the minimum grade point average required for admission to the graduate program;
3. wish to register for graduate courses while meeting any additional requirements for the non-degree status.

The graduate application, $10 application fee, and proof of a Bachelor's degree from a college or university accredited by the appropriate regional accrediting agency are required. Copies of official proof are acceptable.

A major area does not have to be declared, but some departments do not permit provisional students to register for graduate courses. (See pages 8-9 for information on restricted programs.) Applicants should contact the Graduate Office or the department concerning registration for specific courses. Permission to register in courses allowed may be obtained from the department or from The Graduate School.

Any student admitted to the provisional status must receive permission from The Graduate School to register for a second or succeeding quarter if admission to the non-degree or degree status has not been obtained. In order to be admitted to the non-degree or degree status, the student must earn at least a 3.0 grade average in all course work (graduate and undergraduate) taken in provisional status, to include at least six hours of graduate work. The Graduate Office will process the revision to non-degree status if all requirements are met. To apply for a specific degree program, the student must submit the Request for Revision of Graduate Program form to the Graduate Office.

Provisional admission does not assure admission to the non-degree or degree program. A student who hopes to enter a graduate 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. All course work required of the transcripts showing the course work taken, 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 can accept only students who have outstanding records. An international student must have the equivalent of at least a B average on undergraduate course work if a major area does not have a graduate work. On various grading scales, this would indicate:

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

Other grading systems will be evaluated upon receipt of transcript.

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 (or, in the case of international students, the Graduate Office must be notified if a change in the admission date occurs.

An applicant must present:

1. (1) official school or university records, with certified translations if the records are not in English. (Notarized copies are not acceptable.);
2. documented evidence of financial resources sufficient to support the student with at least U.S. $8,800 per calendar year during the period of registration as a student; and
3. certification of English proficiency. Every student whose native language is not English must either submit a score of at least 525 on the Test of English as a Foreign Language (TOEFL), taken within the last two years, or have received a degree from an accredited U.S. institution in order to gain admission.

The application, $10 application fee, official transcripts, and other documents required by the specific program (if any) must be submitted to the Graduate Office at least six months in advance of the quarter in which the applicant desires entrance. Admission must be granted, and financial documentation must be received by August 1 for the fall quarter and May 1 for the summer quarter in order to begin the Graduate Office to the 120 or IAP-66 needed to obtain a visa. The University will not enroll any student who has not been approved initially or for transfer by the Immigration and Naturalization Services (INS) to attend UTK.

An international student may apply only for the summer or fall quarters. No action can be 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.

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 test 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 Graduate Office 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 the institution. The student will be notified by the Graduate School when action has been taken. A student who is permitted to enroll and is subsequently denied readmission will receive credit for courses completed successfully. Future registration will not be allowed until readmission is granted.

Registration Procedures
Dates of registration are listed in the University Calendar (front of Catalog). To register, students should:
1. Report to the Graduate Office to obtain registration materials (scan form and Timetable of Classes).
2. Confer with an advisor assigned by the department to obtain approval of a schedule of courses and to have the scan form signed.
3. Return scan form to the Graduate Office or alternate location designated in Timetable.
4. Consult Timetable to complete registration.

Non-degree or provisional students in unclassified programs (see pages 8-9) may obtain permission to register from the Graduate Office.

A preregistration period is scheduled each quarter for a subsequent quarter (see University Calendar). Any graduate student who has applied for admission can preregister. Information can be obtained from the Graduate Office. A student who participates in preregistration should obtain the computerized class schedule and pay fees on the first day of registration. Failure to pay tuition and fees before the deadline listed each quarter in the Timetable of Classes will result in the assessment of a late registration fee. Retroactive registration is not permitted.

Family Educational Rights and Privacy Act
This act provides for confidentiality of student records; however, it also provides for basic identification of all students at UTK. Release of information to third parties includes directory information such as contained in the campus telephone book and sports brochures. Such information may include name, address, telephone number, date and place of birth, major, dates of attendance, honor roll, degree and awards, the most recent previous educational agency or institution attended, participation in school activities and sports, and weight and height (for special activities).

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

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

In-State $38 per quarter hour or fraction thereof; minimum charge $114.
Out-of-State $89 per quarter hour or fraction thereof; minimum charge $264.

UNIVERSITY PROGRAMS AND SERVICES FEE: PER QUARTER $36

All graduate students taking more than 8 quarter hours per quarter will be assessed a University programs and services fee of $36 per quarter. Part-time students taking fewer than 9 quarter hours will be assessed at the rate of $1 per quarter hour or fraction thereof; minimum charge $3.

The fee for the summer quarter will be $29. Part-time students taking fewer than 9 quarter hours will be assessed at the rate of $1 per quarter hour or fraction thereof; minimum charge $3.

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

Students enrolled exclusively in Evening School or at off-campus centers will be exempt from the programs and services fee. Knoxville campus students taking a course load of 6-8 hours may elect to pay the full programs and services fee. Knoxville campus day students taking a course load of 3-8 hours may elect to pay the $11 student health fee plus the appropriate part-time programs and services fee. The student health fee is included in the full $36 programs and services fee. This fee is not refundable.

LATE REGISTRATION FEE:
All students are required to have a validated fee 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 $55. 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 $46

There is no additional charge for dissertation 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:**

Withdrawal from school for the quarter after receiving a schedule of classes may be made at any time 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 student resides on campus. Withdrawal between the 8th and 28th calendar days following regular registration permits a 30 percent fee refund. The above refund policy 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 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 90 percent fee refund. Withdrawal between 8 and 14 calendar days following regular registration permits a 70 percent fee refund. Withdrawal between 15 and 21 calendar days following regular registration permits a 50 percent fee refund. Withdrawal between 22 and 28 calendar days following regular registration permits a 30 percent fee refund. The above refund policy does not apply to the off-campus Graduate Centers. At the Centers, no refund is made after the first 14 days. Refunds, in accordance with the withdrawal refund policy, will be made after the drop deadline.

Part-time students may pay fees computed at the appropriate quarter-hour rate as indicated above. No charge is made for courses dropped during the first 5 calendar days following regular registration, 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 appropriate quarter-hour rate for the hours continued plus the percentage assessed for the hours dropped results in an amount less than that paid. A course on a student's schedule is officially dropped and becomes effective on the date that the 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.

When a student withdraws, rental charges and adjustments will be determined by the Office of Residence Halls in accordance with the terms of the housing agreement or contract.

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

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

**Residency Classification for Tuition Purposes**

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

A student who is classified out-of-state and (1) resides in Tennessee, (2) works full-time in the state or at Fort Campbell, Kentucky, and (3) desires to attend UTK on a part-time basis (maximum 6 hours of course work per quarter), is eligible for a waiver of out-of-state tuition. The student must apply for the waiver prior to the date of registration each quarter. Forms are available from the Residency Clerk at the Graduate Office.

A student wishing to appeal a residency classification should contact the Residency Clerk in the Graduate Office, who will provide an application for reconsideration and a copy of the State regulations. The application should be submitted on or before the last day of registration for a given quarter, if the student is to be considered for recategorization that 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 qualify for admission to enroll in 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. Several dozen and fifteen Master’s programs at UTK are approved by the Academic Common Market. Residency classification of these various states to enroll at in-state tuition rates.

Residents of one of the member states who would like further information should contact the Residency Office at the Graduate Office 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 can apply.

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

The Hilton A. Smith Graduate Fellowships for full-time study at UTK are awarded on the basis of scholarly performance as evidenced by grades and faculty recommendations. Candidates from any field of study are invited to apply if they have a 3.4 grade point average or above in all previous academic work. The fellowships include monthly stipends and a tuition waiver. Application packets are available from the Graduate Office after November. Completed applications, including all supporting materials, must be submitted to the Assistant Director of Graduate Admissions by January 15. Offers of awards will be announced by March 15.

**Employment:** Three sources of student employment are coordinated by the Financial Aid Office staff. (1) The federally-sponsored College Work-Study Program provides students having demonstrated financial need with part-time jobs. (2) Job Location and Development Office lists off-campus, part-time, and full-time job opportunities with agencies and companies throughout the Knoxville area. Job interviews and minimal processing are required. (3) On-campus part-time job opportunities are listed by the Student Employment Service. This listing of part-time jobs is based upon requests from on-campus agencies. Referrals are made in accordance with a student’s skills and interests.

Students needing either part-time or full-time employment are urged to contact the
Job Location and Development Office. The Financial Aid Office will endeavor to obtain job opportunities for every interested student.

**Loans:** Three types of loans are administered by the Financial Aid Office: (1) National Direct Student Loans; (2) The University of Tennessee Student Loans; (3) Guaranteed Student Loans, financed by certain banks and credit unions. The student should allow for three months' lead processing time when applying for a loan.

Financial aid programs, policies and procedures are subject to change. Students interested in applying for employment or loans should refer to the current Student Financial Aid Handbook and A Student Consumer's Guide to Federal Financial Aid Programs. Information and applications can be obtained from the Financial Aid Office.

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

**Aid Handbook and A Student Consumer's Guide to Federal Financial Aid Programs.**

Information and applications can be obtained from the Financial Aid Office.

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

**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 acts as a channel of communication within the major department, to other departments and to The Graduate School. The advisor must approve the student's program before each registration and also must approve any changes in it. Many departments assign a temporary advisor to assist the entering student's work during the period in which the student is becoming acquainted with the institution and departmental focal points of interest. In the department, a judgment concerning the candidate's promise as a scholar. As early as appropriate the instructor(s) and advisor as 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 F. After the change of registration deadline, a student withdrawing from a course or from the University will receive a grade of F unless the student can demonstrate that the request for withdrawal is based on circumstances beyond the student's control. In the latter case, a grade of W will be entered on the permanent record.

**Change of Registration**

To change registration in any way after the deadline, a student must present the request, together with documentary evidence of extenuating circumstances, to the Graduate Office. In addition, he/she must complete a change of registration form and questionnaire signed by the instructor(s) and advisor as 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 F. After the change of registration deadline, a student withdrawing from a course or from the University will receive a grade of F unless the student can demonstrate that the request for withdrawal is based on circumstances beyond the student's control. In the latter case, a grade of W will be entered on the permanent record.

**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 Catalog 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.

**Explanation of Course Listings**

Each course listing in the Graduate Catalog contains information in an abbreviated form. The course number indicates the level at which the course is taught. All 5000-6000 level courses are graduate courses. The 3000-4000 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, the minimum and maximum are shown (e.g. 2-3). The credit hours are followed by a course description indicating the content to be covered.

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

Some courses may be repeated for a maximum number of hours allowable toward a degree program. This number is stated for each repeatable course with the exception of Thesis 5000 and Dissertation 6000. Courses may be cross-listed with two or more departments, an arrangement that is indicated by a parenthetical statement: (Same as Psychology 5432). 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
- **Su-** Summer
- **W-Winter**
- **E-** Every quarter
- **Sp-Spring**
- **A-** Alternate years

These codes are indicated only for Knoxville campus classes and are subject to change without notice. The Timetable of Classes, published several weeks prior to each quarter, is the 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, and 9 to 12 hours is considered a full load. Students receiving financial assistance should consult with the department/program head concerning appropriate course loads. Courses audited do not count towards minimum graduate hours required for financial assistance. Registration for more than 15 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.
unsatisfactory performance and cannot be used to satisfy degree requirements. (no quality points), a temporary grade indicating that the student has performed satisfactorily in the course, but due to unforeseen circumstances, has been unable to finish all requirements. An I is not given to enable the student to do additional work to raise a deficient grade. All incompletes must be removed within two quarters, excluding the summer quarter. If a supplementary grade report has not been received in the Graduate Office at the end of the second quarter, the I will be changed to an F. The course will not be counted in the cumulative grade average until a final grade is assigned. No student may graduate with an I on the record.

S/NC (carries credit hours, but no quality points), S is equivalent to a grade of B or better, and NC means no credit earned. Courses where NC is received may be repeated for a grade of S. S/NC grading is allowed only where indicated in the course description in the Graduate Catalog. The number of S/NC courses in a student's program is limited to one-fourth of the total credit hours required.

P/NP (carries credit hours, but no quality points), P indicates progress toward completion of a thesis or dissertation. NP indicates no progress.

W (carries no credit hours or quality points), indicates that the student withdrew from the course. No graduate student may repeat a course for the purpose of raising a grade already received, with the exception of NC.

Proficiency Examinations
A proficiency examination may be given in academic courses offered for graduate credit. Applications for proficiency examinations are available in the Office of the Registrar, 209 Student Services Building. To be eligible, a student must be admitted to The Graduate School. The request for examination must be approved by the head of the department offering the course. Students applying for this privilege must present evidence to the department head that they have the knowledge and abilities expected of graduate students who have taken the same course. Upon passing such an examination with a minimum grade of B, the students will receive graduate credit. A maximum of one-fourth of the total credit hours in a Master's degree program may be earned by this method, subject to approval by 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 taken at 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 he/she has received a Bachelor's or Master's degree from an accredited institution in the United States. Some departments will 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 English Department) for undergraduate credit and pass with a grade of C or better. A student may not take more than 6 additional hours of course work while enrolled in English 1221. Those students whose scores indicate 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
Law courses are not available for graduate credit. However, a graduate student may take up to 6 semester hours of law courses and apply them toward a degree, upon approval of the College of Law and the student's major professor. The graduate student must register for law courses during the registration period at the College of Law and request an S/NC grade. If the student earns a 2.0 or better, an S will be recorded on the transcript. Below 2.0, an NC will be recorded and the course cannot be used toward meeting degree requirements. Grades for law courses will not be reflected in the cumulative grade-point average. Different rules apply to students enrolled in the Dual J.D.-MBA program. Grades must be earned according to the grading system of the respective colleges, e.g. numerical grades for law courses, letter grades for graduate courses. The administration is acceptable to meet degree requirements. Only one cumulative GPA (law or graduate) will be carried on the student’s transcript until graduation, at which time both the graduate and law cumulatives will be added to the permanent record.

A student enrolled in the DBA program may use 6 semester hours or more of law courses for the supporting area under the arrangement described on p. 36.

Auditors
Persons who wish to attend certain classes regularly, without taking examinations or receiving grades or credit, may do so by completing a graduate application, paying the application fee, registering as auditors, and paying regular fees.

Correspondence Study
No graduate credit is accepted at UTK for work done by correspondence study at any university.

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

1. be taken for graduate credit;
2. carry a grade of B or better;
3. be a part of a graduate program in which the student had a B average,
4. not have been used for a previous degree; and
5. be approved by the student's graduate committee and the Vice Chancellor for Graduate Studies and Research on the Administration to Candidacy form.

Courses transferred into any graduate program will not affect the minimum residence requirements for the program, nor will they be counted in determining the student's grade point average. Credits transferred into any graduate program must be used to meet the 5000- or 6000-level course work requirements. Credit for extension courses taken from other institutions is not transferrable.

Master's degree: A maximum of 9 quarter hours (or 6 semester hours) taken from institutions other than the University of Tennessee may be transferred into a student's Master's program. In addition, the student may transfer courses taken at other campuses of The University of Tennessee. The total transfer courses may not exceed one-half of the student's full program of course work. Transferred courses must have been completed within the six-year period prior to receipt of the degree. They will be placed on the student's UTK transcript only after admission to candidacy.

Ed. S. degree: A maximum of 9 quarter hours of course work beyond the Master's degree may be transferred into an Ed. S. program. Transferred courses in the last 45 hours taken for the degree must have been completed within the six-year period prior to the receipt of the degree. They will be placed on the student's UTK transcript only after admission to candidacy.

Doctoral degree: The number of hours the student may transfer into a doctoral program will be determined by the student's doctoral committee. Although the courses transferred toward the degree, they will not be placed on the student's UTK transcript.

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

Residence Requirements
Residence is defined as full-time registration for a given quarter on the campus where the program is located. The summer quarter is included in this period.
Master's degree: no general Graduate School residence requirement.
Ed.S. degree: one quarter of residence if the student has a Master's degree; two consecutive quarters of residence if the student lacks a Master's degree.
Doctoral degree: minimum of three consecutive quarters of residence. Individual doctoral programs may have additional residence requirements.

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

The student and major professor together share the responsibility for the accuracy and professionalism of the final product of the student's research. The student should confer with the Thesis Consultant regarding problems and questions in advance of preparing the final copy. The UT Thesis and Dissertation Manual is the guide to correct format for the thesis or dissertation. A Thesis Workshop is held each fall and summer 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 grading but also objective evaluations such as the cumulative grade point average, performance on comprehensive examinations, and acceptance of the thesis or dissertation, but also the subjective appraisal by the faculty of the student's progress and potential. Continuation in a program is determined by the consideration of all these points by the faculty and the department head.

Departments 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 of all disciplinary regulations and procedures. Normally grievances should be handled at the departmental level through the student's advisor or the department or program head. Further appeal may be made to the Dean for Graduate Studies, the Vice Chancellor for Graduate Studies and Research, the Graduate Council, and the Chancellor. The By-Laws of the University (Article V, section 7) provide that any individual may ultimately appeal to the Board of Trustees, through the President. A copy of the Appeals Procedure is available in the Graduate Office.

Facilities and Services

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

A limited number of assistant head resident positions are available for single graduate students. The assistant head resident assists the head resident in coordinating and supervising 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 has provided excellent apartment facilities in several locations on campus. 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 being operated by students and staff. However, areas available for parking are necessarily limited. To reduce the 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 must register that vehicle with the traffic section of the Security Department. A University Traffic and Parking Authority determines the parking policy, traffic regulations, and fees. This information is published each year in the "University Traffic and Parking Regulations" and is available at registration or at the Security Building, 1115 UT Drive.

Services to the Physically Disabled
Services to 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 ensure that attendance at UTK is as convenient as possible for students with physical disabilities.

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

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

The Office of Handicapped Student Services, 900 Volunteer Boulevard (Ground Floor—Student Counseling) offers academic support services and functions in an advocacy capacity for disabled students. The services include interpreters for hearing impaired students and readers for sight and other impaired persons. Also, the office assists with ordering recorded or Braille textbooks. As the needs of disabled students vary, the office seeks to individualize assistance to accommodate them. Further information is available in the Handicapped Student Services brochure and directory.

The University Library
The University of Tennessee, Knoxville Library owns approximately 1,400,000 volumes, more than 2,000,000 manuscripts, 58,000 microfilm reels and 1,150,000 items of other microtext, plus recordings, tapes, United States and United Nations documents, and more than 20,000 periodicals and other serial titles, which are received annually. The library's membership in the Association of Research Libraries reflects the University's emphasis on research and graduate instruction at the doctoral level and the support of large, comprehensive collections of library materials on a permanent basis.

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

The Special Collections section in the Main Library is a repository of regional and local materials, Tennesseana, and other specialties, including legislative papers and memories of many of Tennessee's 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 on-line access to 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; all libraries of The University of Tennessee are 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 maintains close contact with the 11,000 students and the 6,000 faculty members of the University by supporting research and instructional users with professional computer staff.

UTCC is principally located in the Stokely Management Center and in Andy Holt Tower. From the Stokely location, UTCC supplies computing services to all campuses in the UT System through job entry stations located on each campus. At UTK, UTCC maintains seven job entry stations for batch work and eight sites for interactive computer work. UTCC maintains a graphics center with two digitizing tablets, a graphics plotter and nine terminals, four storage and five refresh. Another digitizing tablet, plotter, and storage terminal are available at SMCC M-1.

UTCC's computers at Stokely Management Center are two IBM 370/3031s and a DECsystem-10, which are used in research, instruction and administrative work. UTCC also has an IBM 360/40 used exclusively for administrative work. Each IBM 370/3031 has four million bytes of memory. The DECsystem-10 is a 1090 configuration with 512 words of storage.

UTCC supports remote job entry stations with the IBM 370/3031-DECsystem-10 combination and CalComp plotter. The IBM 370/3031 runs under SVS with NASPI. The DECsystem-10 runs under TOPS-10. Time sharing features include VM/CMS and Coursewriter III on the 370/3031s, and APL, FORTRAN, BASIC, COBOL, MACRO, and other special purpose application programs on the DECsystem-10.

UTCC publishes a User's Guide which describes the use of the IBM 370/3031s 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 of several days duration in computer utilization on the IBM 370/3031s and the DECsystem-10. These seminars are primarily for faculty, staff and graduate students who use or plan to use UTCC facilities. UTCC offers non-credit short courses each 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.

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

The office maintains the student's official immigration records and handles questions regarding immigration regulations. It coordinates such projects as a community volunteer program for international students, 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 them.

The International House is located near the campus, at 1601 West Clinch Avenue. Provided by UT and operated by the staff of the Office of International Student Affairs, the House is a social and recreational center where domestic and international students meet to relax and discuss matters of mutual interest. The small library at "I" House contains books and periodicals from all over the world. University faculty is open during vacation periods.

International students applying for admission should write to The Graduate School.

Ombudsman Office
Personnel of the Ombudsman Office in the University Center assist students in the resolution of problems encountered with any aspect of the University. The office is open during the regular working day and students are welcome to drop in at their convenience. Problems are treated confidentially and are dealt with expeditiously. The office does not replace existing structures but helps to insure their responsiveness to student needs.

Graduate Research Centers and Institutes

Energy, Environment, and Resources Center

The University of Tennessee

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

Current research includes environmental and human costs of coal production, 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:
K. W. Heathington, Ph.D., Northwestern, P.E.

Associate Director:
M. S. Bronzini, Ph.D. Pennsylvania State, P.E.

Assistant Directors:
D. H. Jones, M.S. Tennessee
P. R. Tut, M.S. Texas A&M

The Transportation Center, utilizing an interdisciplinary approach to transportation research, brings together both 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 both undergraduate and graduate students 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 the research that ultimately leads to the solution of the nation's transportation problems.

The Center's contribution to the field and its success in meeting the challenges of contemporary transportation research is predicated on the philosophy that education and research, being equal members of a partnership, go hand-in-hand. In addition to education and research, the Transportation Center has played a leadership role in workshops, seminars, and short courses concerned with such diverse but related topics as benefit/cost analysis in state rail planning, highway rail grade crossing safety, noise assessment, remote sensing, urban public transportation management, ridesharing, transportation brokerage, and transportation planning, child passenger safety, traffic engineering, transportation safety, urban transportation modeling, research management, and other areas of transportation interests.

The University of Tennessee
Space Institute

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

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

The Water Resources Research Center is a federally-designated institute for the conduct of water research for the state. The purposes of the Center are: (1) to assist and support all the academic institutions of the state, public and private, in pursuing water resources research programs addressed to areas of concern to the general public, and (2) to promote education in fields relating to water resources and to encourage the entry of promising students into careers in these fields.

**For complete information concerning the School of Social Work, with programs in Nashville, Knoxville, and Memphis.**

**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 course work. 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.S.W. A complete listing is found under "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 procedures for the degrees.

**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. In thesis options, 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 may be distributed to include one or two minor 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 combination that include not fewer than 9 nor more than 18 hours of graduate credit.

At least one-half of the total hours in a Master's degree program must be taken at UTK in courses numbered at or above the 5000 level. Only 9 thesis 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 ensure 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 Graduate Office 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

**Water Resources Research Center**

W. F. Brander, 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 addressed to areas of concern to the general public, and (2) 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 set by the Graduate Council of UTK and is coordinated with the graduate and undergraduate programs of East Tennessee State University.

Students who enroll in this program must be admitted to The Graduate School of UTK. Information and appropriate application forms may be obtained from Marvin K. Goodman, Director, Kingsport University Center, The University of Tennessee, University Boulevard, Kingsport, Tennessee 37660.

**Oak Ridge Resident Graduate Program:** 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 and the Union Carbide Corporation, Nuclear Division.

This program is supported under a subcontract with Oak Ridge Associated Universities with principal support coming from Union Carbide Nuclear Division. UT is one of the forty-three colleges and universities which sponsor ORAU, a nonprofit education and research management corporation.

Information and applications to the Graduate School may be obtained by writing to Director, UT-Oak Ridge Graduate School, Post Office Box 117, Oak Ridge, Tennessee 37830.

**Tullahoma Graduate Engineering Program:** Opportunities for graduate study leading to the degree of Master of Science in Civil Engineering and Industrial Engineering are offered by UTK.

Students who enroll in these programs 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.

**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.

**Martin Graduate Education Program:** UTK offers a graduate program in education leading to the Specialist in Education degree 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, 109 Gooch Hall, UTM, Martin, Tennessee 38238.

**Graduate School of Biomedical Sciences:**

The University provides programs leading to the M.S. and Ph.D. degrees in various areas of biomedical sciences. Graduate students have the opportunity to study and to do research in conjunction with the Biology Division of the Oak Ridge National Laboratory. For complete information concerning the program see page 149.

**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 Nashville, Knoxville, and Memphis.

For complete information concerning the program see page 155.
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 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, which must be scheduled through the Graduate Office, shall be held at least three weeks before the final date for approval and acceptance of theses by The Graduate School. The final draft of the thesis must be distributed to all committee members at least two weeks prior to the date of the final examination. In case of failure, the candidate may not apply for reexamination until the following quarter. The result of the second examination is final.

**Thesis:** The thesis represents the culmination of an original research project completed by the student. It must be prepared according to the UT Thesis and Dissertation Manual. Two copies of the thesis must be approved and accepted by The Graduate School on or before the deadline specified each quarter 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 using University facilities or faculty time must be registered for course 5002. Students may not be registered for other courses. This applies to students removing incomplete 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 Graduate Office in accordance with the deadlines specified in the Graduate School News and will be conducted by the Master's Committee. Students taking the final examination but not otherwise using University facilities may pay 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 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," page 6. For additional program requirements, consult individual program descriptions listed by college and department in this Catalog. See also the chart, page 22, for the summary of program requirements modified upon admission to candidacy.

**Doctoral Committee:** 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. At least one member must be from a department other than that of the student's major field. Additional work taken for S/NC grading may comprise up to one-fourth of the student's total graduate hours.

**Course Requirements:** Each doctoral student must take an appropriate number of 6000-level courses, usually a minimum of 9 quarter hours of 6000-level courses, exclusive of thesis or dissertation work, graded A-F, plus the minimum 36 hours of dissertation work beyond the Master's degree, graded A-F, plus the minimum 36 hours of dissertation work. Additional work taken for S/NC grading may comprise up to one-fourth of the student's total graduate hours.

**Doctoral Council:** The student and the major professor identify a doctoral council, composed of at least four faculty members, three of whom, including the chair, must be approved by the Graduate Council to direct doctoral research. At least one member must be from a department other than that of the student's major field. This committee is nominated by the department head or college dean, and approved by The Graduate School.

The committee should be formed during the student's first year of doctoral study. Subject to Graduate Council policies and individual program requirements, the committee must approve all course work applied toward the degree, certify that the student masters the major field and any collateral fields, direct the research, and recommend the dissertation for
Continuous Registration: The student must register continuously for course 6000 (minimum of 3 hours) from the time that the doctoral research proposal is approved, admission to candidacy is accepted, or registration for course 6000 is begun, whichever comes first, including summer quarters and the quarter in which the dissertation is approved by The Graduate School. A minimum total of 36 hours of course 6000 is required before the dissertation will be accepted. A student who will not be using faculty services and/or university facilities for a period of time may request leaves of absence from dissertation research up to a maximum of eight quarters. The request will be considered by The Graduate School upon recommendation of the department head.

Doctoral Examinations: Departments may, at their option, administer diagnostic and/or qualifying examinations in the early stages of the student's doctoral program. Successful completion of a comprehensive examination and a final examination is required for all doctoral degrees.

1. Diagnostic or placement examinations, which can be written or oral, may be given to students on admission to the doctoral program to help determine the student's level of preparation, areas of 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 study at UTK.

2. 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 fitness to continue with the more specialized aspects of the doctoral program.

3. The comprehensive examination (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 its speciality, 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.

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

4. A final examination (oral, oral and written) on the student's dissertation, 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 distributed to the committee at least two weeks before the examination. The examination is announced publicly and is open to all faculty members.

Language Requirements: Candidates for the Ph.D. degree may be required to demonstrate a reading knowledge of at least one foreign language in which there exists a significant body of literature relevant to their major field of study. Refer to the descriptions of individual programs. The doctoral committee will 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 a language examination, he/she should complete an Application for Doctoral Language Examination at the Graduate Office 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. This course cannot be repeated to satisfy the language requirement.

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 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. Each student is responsible for filing the admission to candidacy, which must be signed by the doctoral committee and the department head, and approved by the Vice Chancellor for Graduate Studies and Research.

Dissertation: The dissertation represents the culmination of an original major research project completed by the student. The organization, method of presentation, and subject matter of the dissertation are important in conveying to others the results of such research. A student should be registered for the number of dissertation hours representing the fraction of effort devoted to this phase of the candidate's program. Thus, a student working full time on the dissertation should register for 12 hours of 6000 per quarter. Two copies of the dissertation (prepared according to the regulations in the UT Thesis and Dissertation Manual) 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 Vice Chancellor for Graduate Studies and Research that they have examined the final copy and found that its form and content demonstrate scholarly achievement. Doctoral forms and a thesis card are also submitted at this time. The student should check with the department head concerning additional required copies of the dissertation.

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

<table>
<thead>
<tr>
<th>PROCEDURE</th>
<th>UNDER DIRECTION OF</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admission as a potential degree candidate</td>
<td>Graduate Office and Major department</td>
<td>Prior to completing 18 hours of graduate courses</td>
</tr>
<tr>
<td>Formation of Master's/Ed.S. committee</td>
<td>Advisor/Major professor</td>
<td>Prior to application for admission to candidacy</td>
</tr>
<tr>
<td>Submission of application for admission to candidacy</td>
<td>Master's/Ed.S. committee</td>
<td>At least one quarter prior to graduation*</td>
</tr>
<tr>
<td>Approval of admission to candidacy</td>
<td>Vice Chancellor for Graduate Studies and Research</td>
<td>Prior to graduation</td>
</tr>
</tbody>
</table>

## GRADUATION REQUIREMENTS FOR NON-THESIS OPTION

<table>
<thead>
<tr>
<th>PROCEDURE</th>
<th>UNDER DIRECTION OF</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Placement of name on graduation list</td>
<td>Student</td>
<td>Indicate on registration materials</td>
</tr>
<tr>
<td>Application for diploma</td>
<td>Graduate Office</td>
<td>Deadline available at registration*</td>
</tr>
<tr>
<td>Scheduling of final examination</td>
<td>Graduate Office</td>
<td>Not later than one week prior to final examination*</td>
</tr>
<tr>
<td>Final examination(s)</td>
<td>Master's/Ed.S. committee</td>
<td>Not later than three weeks prior to Commencement*</td>
</tr>
<tr>
<td>Removal of incomplete(s)</td>
<td>Instructor of course</td>
<td>Not later than one week prior to Commencement*</td>
</tr>
</tbody>
</table>

## GRADUATION REQUIREMENTS FOR THESIS/PROBLEMS OPTION

<table>
<thead>
<tr>
<th>PROCEDURE</th>
<th>UNDER DIRECTION OF</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Placement of name on graduation list</td>
<td>Student</td>
<td>Indicate on registration materials</td>
</tr>
<tr>
<td>Application for diploma</td>
<td>Graduate Office</td>
<td>Deadline available at registration*</td>
</tr>
<tr>
<td>Submission of thesis/problems to Master's/Ed.S. committee</td>
<td>Student</td>
<td>At least two weeks prior to final examination</td>
</tr>
<tr>
<td>Scheduling of final examination</td>
<td>Graduate Office</td>
<td>Not later than one week prior to final examination*</td>
</tr>
<tr>
<td>Final examination(s)</td>
<td>Master's/Ed.S. committee</td>
<td>Not later than three weeks prior to thesis deadline*</td>
</tr>
<tr>
<td>Approval and acceptance of final copy of thesis and thesis card</td>
<td>Master's/Ed.S. committee and The Graduate School</td>
<td>After final examination and not later than two weeks prior to Commencement*</td>
</tr>
<tr>
<td>Removal of incomplete(s)</td>
<td>Instructor of course</td>
<td>Not later than one week prior to Commencement*</td>
</tr>
</tbody>
</table>

*Deadlines are printed in the Graduate School News 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>Graduate Office and Major department</td>
<td>Prior to completing 18 hours of graduate courses</td>
</tr>
<tr>
<td>*Appointment of doctoral committee</td>
<td>Assistant Dean for Graduate Studies on recommendation of department head</td>
<td>Preferably during the first year of graduate study, 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>Graduate Office</td>
<td>Prior to admission to candidacy</td>
</tr>
<tr>
<td>Submission and approval of application for admission to candidacy (Forms at Graduate Office)</td>
<td>Doctoral committee and Vice Chancellor for Graduate Studies and Research</td>
<td>At least three quarters prior to graduation***</td>
</tr>
</tbody>
</table>

**GRADUATION REQUIREMENTS**

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

*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 mechanic arts for the first time. Since 1869, agricultural programs at the University have been expanded to include research for the development of new knowledge and extension for dissemination of such knowledge to rural people. Thus the Institute of Agriculture has come to include the work of three main divisions: Agricultural Experiment Station, Agricultural Extension Service, and College of Agriculture.

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

Agricultural Experiment Station

D. M. Gossett, Dean
T. J. Whatley, Associate Dean
J. L. 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 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. P. 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 ninety-five 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 information fields by a specialist staff, members of which are stationed either in Knoxville, Nashville, or Jackson.

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

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

College of Agriculture

O. Glen Hall, Dean

Graduate programs of the College of Agriculture are designed to prepare men and women for positions of leadership in industry, state and federal government, teaching, research, and extension. The graduate student is expected to demonstrate a thorough knowledge of the subject matter in his/her specialized field of study and its relationship to the sociological, economic, and environmental impact on society. The student must demonstrate the ability to plan, conduct, analyze, and report original research. More importantly, emphasis is given to intellectual growth and to the development of scholarly habits of study, reasoning and analysis to the end that the graduate will continue to grow and develop professionally throughout his/her career.

MASTER OF SCIENCE PROGRAMS

Programs of graduate study leading to the Master of Science degree are offered through all departments 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, and other areas.
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 from the Departments of Agricultural 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. The student shall select a major field, minor areas of study in the chosen field. Prerequisite courses may be required when the student's preparation is deemed to be inadequate.

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

Course Requirements: A minimum of 108 quarter hours credit beyond the Bachelor's degree, exclusive of credit for Master's research, is required in the doctoral program. Of this total, 36 hours in doctoral research and dissertation are required. At least 30 hours of course work shall be in agricultural economics and 15 hours in economics. Excluding the dissertation, a minimum of 21 hours in agricultural economics and 36 hours in agricultural economics and economics combined must be in courses numbered 5000 and above.

Agricultural Engineering

Candidates pursuing the Doctor of Philosophy degree in Agricultural Engineering may specialize in one of the following areas:
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 for the degree are:
1. Minimum of 108 quarter hours credit beyond the Bachelor's degree, exclusive of the credit for the Master's thesis. Of this number, students are required to complete a minimum of 36 quarter hours in 6000 Doctoral Research and Dissertation.
2. A minimum of 30 quarter hours credit will be in courses numbered 5000 and 6000, exclusive of Doctoral Research and Dissertation.
3. The program of each candidate shall consist of a major and supporting studies in one or more additional areas. The major shall consist of a minimum of 24 quarter hours exclusive of dissertation. A minimum of 24 quarter hours shall be taken in departments outside of the Department of Agricultural Engineering.

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

Food Technology and Science

The Department of Food Technology and Science offers programs leading to the Doctor of Philosophy degree in the following areas of specialization:
1. Food products
2. Food chemistry
3. Food microbiology
Supporting studies will be 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 specific requirements for the Doctor of Philosophy degree in Food Technology and Science include:
1. A minimum of 108 quarter hours credit beyond the bachelor's degree exclusive of the Master's thesis. Of this number, students will be required to complete 36 quarter hours in Doctoral Research and Dissertation.
2. At least 36 quarter hours credit in courses at the 5000 and 6000 level, excluding Doctoral Research and Dissertation. At least 9 of the 36 hours must be in 6000-level courses.
3. A minimum of 9 hours of courses for graduate credit outside of the Department of Food Technology and Science.

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

Plant and Soil Science

The Department of Plant and Soil Science
Department of Agriculture

**Agricultural Economics and Rural Sociology**

**MAJOR DEGREES**

**Agricultural Economics**

M.S., Ph.D.

Professors:
- J. A. Martin (Head), Ph.D. Minnesota
- M. B. Badenhop, Ph.D. Purdue
- J. R. Brooker, Ph.D. Florida
- D. W. Brown, Ph.D. Iowa State
- M. B. Badenhop, Ph.D. Purdue
- J. R. Brooker, Ph.D. Florida
- D. W. Brown, Ph.D. Iowa State

**Associate Professors**
- C. M. Usavage, Ph.D. Michigan State
- D. L. McLemore, Ph.D. Clemson
- S. D. Mund, Ph.D. Arkansas
- J. D. Tennesse, Ph.D. Tennessee
- D. J. Teves, Ph.D. Tennessee
- O. D. Walker, Ph.D. Oklahoma State

**Assistant Professors**
- W. H. Park, Ph.D. Virginia Polytechnic Institute
- G. D. Whitmore, 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**

- 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 action programs. Case examples from the U.S. and other countries. Prereq: Agriculture 1110 and Economics 2120, or consent of instructor. F
- 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, Sp
- 4320 Agricultural Policies (3) Meaning of agricultural policy in democratic society; relationship of farm groups to public policy; problems giving rise to policy; agricultural policy and appraisal of results; policy problems. Prereq: Agriculture 1110 and Economics 2120, Sp
- 4330 Land Economics (3) Problems and policies of land use, conservation, development, taxation, and tenure; population growth and demand for land; principles and theories of rent, property, value, and income. Prereq: Agriculture 1110 and Economics 2120, F
- 4610 Management of Farm Supply and Marketing Firms (3) Operation of firms selling farm supplies and merchandising agricultural products. Emphasis on accounting and economic theories for decision making. Prereq: Agriculture 1110 and Economics 2120, F
- 5000 Thesis (1-15) E
- 5002 Non-Thesis Graduation Completion (3-15) F 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 Special Problems in Lieu of Thesis (3) F
- 5120 Agricultural Price Analysis (3) Analysis and interpretation of factors affecting agricultural prices; price trends and cycles; application of economic theory and statistical techniques to agricultural price analysis. Prereq: 3120 and Statistics 4310 or equivalent. W
- 5130 Advanced Agricultural Production Economics (3) Theory and empirical concepts of agricultural resource allocation problems under conditions of uncertainty. Prereq: 4140 or equivalent. Sp
- 5210 Seminar: Agricultural Policies (3) Sp
- 5220 Seminar: Methodology of Research (3) F
- 5230 Seminar: Adjustments to Industrialization (3) F
- 5310 Research (3) Special research problems in agricultural economics and rural sociology. Gathering, tabulating and interpreting data and report writing. May be repeated. Maximum 9 hrs. S/NC only. E
- 5410 Agricultural Marketing Analysis (3) Application of tools of economic analysis and measurement to problems at all levels of marketing system for agriculture commodities. Prereq: 4530 or equivalent. Sp
- 5420 Advanced Land Economics (3) Problems in land tenure, land use, and conservation in United States and selected foreign countries. Prereq: 4330 or equivalent. F
- 5440 The Economics of Agricultural Development (3) The role of agriculture in overall economic development; economic nature of traditional agricultural development, and analysis of causal forces and structural interdependence of agricultural development under conditions of economic change. Prereq: 4240 or consent of instructor. W
- 5510 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 mathematical programming and estimation techniques using computer and interpretation of results. Prereq: Statistics 3410 or Economics 5510 or consent of instructor. W
- 5710 Quantitative Methods in Agricultural Economics (3) Linear programming technique with empirical applications, made to problems of maximizing profit, minimizing cost, firm growth, transportation, and location. Input-output analysis, recursive programming, game theory, and nonlinear programming. Prereq: Economics 4180 or consent of instructor. Sp
- 6000 Doctoral Research and Dissertation (3-15) E
- 6120-30 Seminars in Agricultural Economics (3) Topics selected from the areas of economic production, consumption and distribution in agriculture and related industries and public policies concerned with agriculture and related industries. F, Sp
- 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 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 aggregation over time, time series regression, production functions, linear programming, simulation and farm growth models with emphasis on correspondence between theoretical concepts and model attributes. Prereq: 5130 or consent of instructor. F
- 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. Wastes management in marketing systems to conserve resources and environment. Prereq: 5410 or consent of instructor. W

**Rural Sociology**

- 3420 Rural Sociology (3) Nature of rural society, social systems concept, rural-urban differences; nature of social relations; population characteristics and movement; rural groups in society, rural farm labor, health, services, educational facilities, churches, local government; impact of industrialization. F, W, Sp
- 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 two-step flow hypothesis. Prereq: 3420 or consent of instructor. Sp
- 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
- 5343 Seminar in Rural Sociology (3) Current rural sociological literature and research; relevance of general sociological theory and methodological techniques. Prereq: 4340 or equivalent. F
- 5450 Advanced Rural Sociology (3) Application of sociological concepts to analyzing changing structure and function of rural life, rural social values, attitudes, and norms as they influence the family, formal and informal groups, population shifts and changing farm technology. Prereq: 4340 or equivalent. W
- 5470 Research Problems in Rural Communities (3) A seminar in research methods and techniques for re- search in rural areas. Sampling procedures, questionnaire construction, interviewer selection, training, control, and legitimization needs. Prereq: 4343 and course in statistics. Sp
Agricultural Engineering

MAJORS

Agricultural Engineering

DEGREES

M.S., Ph.D.

Agricultural Mechanization

M.S.

Professors:

D. H. Luttrell (Head), Ph.D. Iowa State;

L. B. Bledsoe, Ph.D. Oklahoma State, P.E.;

J. J. McCow, Ph.D. Michigan State, P.E.;

J. L. Sowell, Ph.D. North Carolina State, P.E.;

C. H. Shelton, M.S. Virginia Polytechnic Institute.

Associate Professors:


F. D. Tompkin, Ph.D. Tennessee, P.E.;

L. R. Wilhelm, Ph.D. Tennesssee, P.E.;

L. M. Safely, Jr., Ph.D. Cornell.

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.

4610 Design of Water Control and Waste Utilization Systems

(3) Earth dams, irrigation, drainage, land grading, hydraulic transport of wastes, and applications of water structures. Prereq: 3610 or consent of instructor. 1 hr and 2 labs. W

4620 Design of Structures for Production, Processing and Environmental Control

(3) Functional planning and structural development of agricultural buildings; emphasis on complete design of structure or system, functional, 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. F

4640 Design of Agricultural Machinery

(3) Functional requirements of agricultural machinery. Elements of machine component 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)

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 plants and animals. Prereq: Agricultural Mechanization 3220, Mechanical Engineering 3110 or consent of instructor. 2 hrs and 1 lab. Sp

5340 Hydrology of Agricultural and Forest Lands

(3) Analytical approach to problems involving water surplus, deficiency and time distribution as related to agricultural and forest land. Prereq: 3610, introductory hydrology, Forestry 4020, or consent of instructor. 2 hrs and 1 lab. F

5440 Instrumentation in Agricultural Systems

(3) Analysis of specific instrumentation needs in agricultural industry and research problems; principles and design in utilization of specialized instrumentation. Prereq: Engineering electronics or consent of instructor. 2 hrs and 1 lab. Sp

5540 Engineering Properties of Agricultural Materials and Products

(3) Fundamental engineering properties of agricultural products and materials related to handling, processing, and utilization. Prereq: Processing and materials handling systems and Engineering Science and Mechanics 3311. 2 hrs and 1 lab Sp A

5640 Research Problems in Agricultural Engineering

(3) Theoretical and experimental studies relating to current problems in agricultural engineering. May be repeated. Maximum 9 hrs.

5710-20 Similitude in Design and Research

(3, 3) Dimensional analysis in development of models: theory and types of models, prediction equations; interpretation of data: applications to machinery, soil and water structures, agricultural buildings, and other agricultural engineering-related problems. Prereq: Engineering Science and Mechanics 3130 and 3311. 2 hrs and 1 lab. F; W; A

6000 Doctoral Research and Dissertation

(3-15) E

6110 Seminar

(1) Current research and literature related to engineering in agriculture. May be repeated. Maximum 1 hr.

6310 Engineering Systems Analysis in Agriculture

(3) Systems approach to design of engineering experiments and applications to include linear programming, computer applications, statistical evaluations, and feedback control in agricultural problems. Prereq: Mathematics 4550 or 4710. Coreq: 3710 or equivalent. 2 hrs and 1 lab. F

6510 Selected Topics in Agricultural Engineering

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

Agricultural Mechanization

4160 Agricultural Waste Utilization and Disposal

(3) Techniques, equipment, and structures for utilizing, treating, and disposing of agricultural wastes by land spreading, landgaging, and processing. 2 hrs and 1 lab. F

4170 Small Engines

(3) Concepts and mechanics of small gasoline engines; selection, operation, adjustment, and repair of single cylinder engines. 2 hrs and 1 lab. W

4180 Equipment and Techniques for Application of Agricultural Chemicals

(3) Equipment for application of liquid, solid, and gaseous chemicals; system components; operational characteristics; safety considerations; calibration; selection and management; materials handling and disposal methods. 2 hrs and 1 lab. Sp

4210 Agricultural Machinery and Tractors

(4) Agricultural machinery and power units; adaptation to agricultural practices; field efficiencies, capacities, adjustment and servicing. Prereq: Mathematics 1560. 3 hrs and 1 lab. W

5000 Thesis (1-15)

E

5110 Research Problems in Agricultural Mechanization

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

5210 Electromechanical Systems in Agriculture

(3) Integration of electric power, mechanical equipment, structures, and environmental systems to plant and animal production, crop processing, and materials handling. Prereq: 3220 and 3510. 2 hrs and 1 lab. F

5410 Agricultural Machinery Systems Analysis

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

5610 Selected Topics in Agricultural Mechanization

(3) Lecture, group discussion, and individual study on specialized developments in agriculture and mechanization. May be repeated. Maximum 9 hrs. F

Agricultural Extension Education

MAJOR

DEGREES

M.S.

Agricultural Extension

Professors:

R. D. Dotson (Head), Ph.D. Pennsylvania State;

L. H. Dickson, Ed. D. Cornell.

Associate Professor:

C. E. Carter, Jr., Ph.D. Ohio State.

3110 Introduction to Agricultural Extension

(3) History, philosophy, organization: teaching methods, relationships with other educational agencies. Graduate credit for non-majors only.

4110-20 Field Studies

(3, 3) Supervised work experience with county extension agents in a designated county. Prereq: 3110 and consent of instructor. Requires living off-campus for a specified time.

5000 Thesis (1-15)

E

5100 Special Problems in Agricultural Extension

(1-6) May be repeated. Maximum 9 hrs.

5210 Long-range Extension Program Planning

(3) Development of county extension program based on effective interpretation of physical, social, economic characteristics of areas. Prereq: 3110 or consent of instructor.

5220 Seminar

(3) Review of literature and developments in agricultural extension methods. Prereq: 3110 or consent of instructor.

5230 Evaluation in Programs of Agricultural Extension

(3) Principles and procedures in development of volunteer leadership for small groups in rural communities through agricultural extension programs. Emphasis on analysis of place and importance of volunteer leadership functions, training, its origin, legislation and growth and nature of present day objectives and programs. Prereq: 3110 or consent of instructor.

5310 History, Philosophy and Objectives

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

5320 Volunteer Leadership in Agricultural Extension Programs

(3) Theory, principles and procedures in development of volunteer leadership for small groups in rural communities through agricultural extension programs. Emphasis on the role of the extension service, its origin, legislation and growth and nature of present day objectives and programs. Prereq: 3110 or consent of instructor.

5330 Supervision of Agricultural Extension Programs and Personnel

(3) Theories of human effectiveness; principles of successful supervision applied to various parts of county, district and other extension programs; and planning for effective office management. Prereq: 5210 or 5220 or consent of instructor.

Animal Science

MAJOR

DEGREES

M.S., Ph.D.

Animal Science

Professors:

D. O. Richardson, (Acting Head), Ph.D. Ohio State;

K. M. Barrow, Ph.D. Rutgers; M. C. Bell, Ph.D. Oklahoma State;

J. K. Bliemez (Emeritus), Ph.D. Ohio State;

D. B. Bratton, D.V.M., Ph.D. Texas A&M;

W. T. Butts, Ph.D. Tennessee; C. C. Chamberlain, Ph.D. Iowa State;

J. H. Garway, Seas. Des., Des Moines;

H. M. Jamison, Ph.D. Tennessee; R. Johnson, Ph.D. Ohio State;

F. J. McLane, Ph.D. Auburn; G. M. Merriman (Emeritus), D.V.M. Michigan State;

M. Montgomery, Ph.D. Nebraska;

R. L. Murphree, Ph.D. Wisconsin; R. Schaeb, Ph.D. Washington State;

H. V. Shirley, Ph.D. Illinois.
4230 Applied Reproduction in Farm Animals (3) Application of methods and techniques in collecting, evaluating, processing, and preserving semen; in- semination; artificial insemination; pregnancy and gestation and parturition. Male and female infertility. Prereq: 3200 1 hr and 2 labs. F, Sp

4330 Feeding Applications for Farm Animals (3) Detailed application of feeding principles designed to allow students to discover and explore feeding op- tions available to producers through problem solv- ing. Prereq: 3330. 1 hr and 2 labs. Sp

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

4410 Applied Animal Breeding (3) Principles studied in 3420. Team taught by specialists in breeding of dairy cattle, meat animals, and poultry. Prereq: 3420. 2 hrs and 1 lab.

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

4830 Pork Production and Management (4) Integra- tion of principles of selection, nutrition, breed- ing, physiology and marketing in a complete pork production and management program. Struc- ture of industry, enterprise establishment, systems of production, production practices and herd improvement programs. Prereq: Completion of animal science sophomore and junior core courses or consent of instructor. 3 hrs and 1 lab. W, Sp

4850 Light Horse Production and Management (4) Introduction to the history and management of the light horse. Prereq: Completion of animal science sophomore and junior core courses or consent of instructor. 3 hrs and 1 lab. W

4900 Seminar (1) Current developments and litera- ture in animal science. Prereq: Consent of instructor. 2 hrs and 1 lab. W, A

5210 Endocrine Relations in Animal Production (4) Endocrine glands related to growth and reproduc- tion; hormone preparation for altering growth and repro- duction rate of farm animals. Prereq: 3210 or con- sent of instructor. 2 hrs and 1 lab. W, A

5230 Advances in Mammalian Reproduction (3) Germ cell development, maturation, transport meta- bolism, and preservation; fertilization and embryonic morphologic development. Prereq: 3220 or 3420. 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 main- tenance of lactation. Prereq: 4210. 2 hrs and 1 lab. Sp, A

5311 Analytical Techniques in Animal Nutrition (3) Physical and chemical analyses of feeds, ingre- dients and biological fluids associated with nutrition research. 1 hr and 2 labs. F, Su

5322 Advanced Experimental Animal Nutrition (3) Animal experimental techniques for digestion, absorption, nutrient balances and radioisotope frac- tion techniques. Prereq: 3311. 1 hr and 2 labs. Sp

5333 Nonruminant Animal Nutrition (4) Physiolo- gical development and changes in digestive system of nonruminant animal during the life cycle. Con- cepts and methodology concerning nutrient require- ments, interrelationships, availability and deficien- cies of nutrients. Nonnutritive additives, toxins, poisons, and diseases affecting animals. Prereq: 3210, 3330 or consent of instruc- tor. 3 hrs and 1 lab. W

5434 Ruminant Animal Nutrition (3) Digestive phys- iology of the ruminant stomach, rumen fermenta- tion, determination of nutrient requirements, and feed intake regulations of ruminant animals. Prereq: 3330. F

5450 Genetics of Animal Populations (3) Popula- tion and individual, gene and zygotic frequencies; statistical descriptions of populations; forces in- fluencing genetic changes; application to animal breeding. Prereq: 3210 or consent of instructor. 2 hrs and 1 lab. F, A

5510-20 Advanced Animal Physiology (5, 5) Adv- anced animal physiology (primarily mammalian phys- iology); 5510—Membrane neuron, central nervous system, muscular, cardiovascular system, and control mechanisms. 5520—Respiratory, renal, gastrointes- tinal, 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 Bioche- mistry 5110 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 ex- periments in animal science based upon such statis- tical procedures as analysis of variance, covariance, linear regression and correlation, and multiple re- gression. Prereq: Statistics 5211 or equivalent. 2 hrs and 1 lab. W

5720 Design and Interpretation of Experiments in Animal Science (3) Review of principles of ex- perimental 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. W


6000 Doctoral Research and Dissertation (3-15) E

6150 Topics in Milk Constituents (3) Properties of milk constituents and relationship to milk and dairy products. Prereq: 6160

6160 Topics in Dairy Microbiology (3) Microbiolo- gical problems related to various phases of the dairy industry.
Entomology and Plant Pathology

MAJOR DEGREE
Entomology and Plant Pathology M.S.

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

Associate Professors:

Assistant Professor:
M. R. McLaughlin, Ph.D. Illinois.

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

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

5000 Thesis (1-15) E

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

5110 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 pests. Prereq: 3210 or Zoology 3110.

5210 Plant Parasitic Nematodes (4) Morphology, physiology, taxonomy, and ecology of plant parasitic nematodes with emphasis on host-parasite relationships. Prereq: 6 hrs biological science or consent of instructor. (Same as Zoology 5210.) 2 hrs and 2 labs. W, A.

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

5230 Field Crop and Vegetable Insects (3) Taxonomy, biology, and control of insects affecting field and vegetable crops. Prereq: 3210 or equivalent course in applied entomology. 2 hrs and 1 lab. F, A.

5240 Plant Virology (4) Symptomatology, cytology and epidemiology of plant virus diseases. Prereq: 3210 or equivalent. 3 hrs and 1 lab. W.

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, A.

5260 Insect Pest Management (4) Principles and applications of biological, cultural, genetic, behaviorial, 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.

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 DEGREE
Food Technology and Science M.S., Ph.D.

Professors:
J. T. Miles (Head), Ph.D. Wisconsin; J. L. Collins, Ph.D. Maryland; H. O. Jaynes, Ph.D. Illinois; C. D. Mellon, Ph.D. Kansas State; W. W. Overcast, Emeritus, Ph.D. Kansas State.

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

Assistant Professors:
M. P. Davidson, Ph.D. Washington State; D. A. Drauglis, Ph.D. Georgia; J. R. Mount, Ph.D. Ohio State.

3020 Dairy Products I (4) Procurement, processing and distribution of fluid milk. Manufacture of frozen and condensed dairy products. 3 hrs and 1 lab. W.

3480 Meat Science (3) Processing methods, carcass characteristics of meat animals, slaughter, cutting, selection, curing, freezing and cookery. 2 hrs and 1 lab. F, W, Sp.


4030 Dairy Products II (4) Principles in the manufacture of butter, cheese and special dairy products. Prereq: 3020; 3 hrs and 1 lab. F.

4130 Food Chemistry I (3) Minerals, fats, oils and vitamins in food as affected by processing and storage. Prereq: Nutrition 3320 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 brewing reactions. Effects of storage and processing on proteins and carbohydrates with emphasis on nutritional value and functionality. Prereq: Nutrition 3320 or equivalent. 2 hrs and 1 lab. F.

4200 Food Processing II (4) Prevention of deterioration and spoilage of foods. Methods of preservation and packaging. Prereq: 2200 and Agricultural Mechanization 3510. 3 hrs and 1 lab. F.

4210 Food Additives (3) Substances used in food manufacturing with emphasis on properties and functions. Prereq: Nutrition 3320 or equivalent. S.

4200 Food Processing III (3) Sanitation, sanitation and waste control in food industry. Prereq: Agriculture 1150 and Microbiology 2910-19 or equivalent. W.

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

4220 Bakery Products (3) Baking ingredients and their interactions during production and storage of bakery products. Prereq: 4130 and Chemistry 2230 or equivalent. 2 hrs and 1 lab. Sp.

4810 Microbiology in Food Manufacturing (3) Reactions of microorganisms in food processing in fermentative and enzymatic changes occurring during processing and manufacturing of foods. Prereq: Microbiology 2910-19 or equivalent. 1 hr and 2 labs. F.

4820 Fermented Foods (3) Role of microorganisms in preparing foods with emphasis on development of certain desirable characteristics, flavor, aroma, texture, and keeping quality. Prereq: Microbiology 3810. 2 hrs and 1 lab. Sp.

4840 Meat Products Manufacturing (3) Prepared meat products with emphasis on sausage making and information related to cost controls, inspection, and meat 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) E

5100 Seminar (1) 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 3320. 2 hrs and 1 lab. W.


5140 Food Flavors (3) Food flavor maintenance and improvement. Natural and synthetic compounds in manufacture of foods with predictable consumer
Forestry, Wildlife and Fisheries

**MAJORS**
- Forestry
- Wildlife and Fisheries Science

**DEGREES**
- M.S.
- Ph.D.

**Professors:**
- Schneider (Head), Ph.D., M.D., Ph.D.
- Barrett (Emeritus), Ph.D., Ph.D.
- Core (Emeritus), Ph.D., Ph.D.
- Sylvis (Emeritus), Ph.D., Ph.D.
- MacKintosh, Ph.D., Ph.D.
- W. Woods, Ph.D.
- W. Woods, Ph.D.
- Tennessee.

**Associate Professors:**
- Buckner (Emeritus), Ph.D., Ph.D.
- Byford, Ph.D., Ph.D.
- Aurburn, B. L., Ph.D.
- Ballard, Ph.D., Ph.D.
- Hay, Ph.D., Ph.D.
- Duke, Ph.D., Ph.D.
- Johnson (Adjunct), Ph.D., Ph.D.
- L. Little, Ph.D., Ph.D., Ph.D.
- North Carolina State University.
- North Carolina State University.
- Schell, Ph.D., Ph.D.
- Duke, Ph.D., Ph.D.
- B. L., Ph.D.
- W. Woods, Ph.D.
- Tennessee.

**Assistant Professors:**
- Hunter, Ph.D., Ph.D.
- Strategic, Ph.D., Ph.D.
- Sigma, Ph.D., Ph.D.
- Oregon State University.

**Forestry**

*3020 Field Forest Environments and Ecology (3) Environments and ecology of forests and associated land; emphasis on the application of ecological principles to contemporary problems. Prereq: 8 hrs of biology, botany, or zoology.

*3040 Dendrology and Silvics of Woody Angiosperms (3) Classification, nomenclature, identification, and silvical characteristics of the more common woody angiosperms native to North America; native

ranges, distribution patterns, and habitat requirements; regeneration requirements and life history, place in regional significance and commercial importance. Weekly field trips during scheduled lab period plus one weekend field trip. Prereq: 4 hrs basic biology or botany. 2 hrs and 1 lab.

*3050 Dendrology and Silvics of Gymnosperms (3) Classification, nomenclature, identification, and silvical characteristics of the major North American coniferous species, and other important conifers; emphasis on the similarities and differences between gymnosperms and angiosperms in association relationships including classification, life history, regeneration requirements, place in succession, and importance. 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 and Computer Science 1410 or equivalent. 3 hrs and 1 lab.

*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.

*3210 Forest Resource Economics (4) Allocations of forest resources and natural ecosystems. Application of economic tools to forest resource decision making in private and public sector. Prereq: Economics 2120.

*3220 Forest Products and Utilization (3) Harvesting, processing, product development, and marketing, intermediate and harvest cuts. Prereq: 3120.

*3520 Principles of Silviculture (3) Influence of site factors on reproduction, growth, development, and character of forest vegetation; classification of forest structure; silvicultural laws. Prereq: 3020, 3040, Plant and Soil Science 230.

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

4002 Utilization (3) Wood-working industries; processing forest products—sawmills, tree-log, timber grading; pulping operations, flooring, plants, treating plants, layout, flow diagrams. Prereq: 3120.

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

4004 Forest Practice (3) Management of forest land and use management of multiple use concept as it influences management decisions; impact of public pressure for outdoor recreation on management decisions; management prescriptions. Prereq: 4006. S/NC only.

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

4020 Forest Watershed Management (5) Water as a forest resource; role of forests in the hydrologic cycle; controlling, maintaining, quantity, quality, and regimen; watershed planning. Prereq: 3320 or consent of instructor. Two overnight field trips.

4120 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.

4220 Forest-Resource Management (4) The forest as an ecosystem; management of multiple use concepts; valuation of forest resources for decision making, planning, and budgeting; taxation of forest firm. Prereq: 4210.

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; development of multiple use concept; a complete plan based on optimizing forest uses. Prereq: 4210.

4240 Interpreting Forest Resources (3) Principles and practices of interpreting forest resources; emphasis on the importance of environmental interpretation to management of forest resources; development and administration of interpretable forest; introduction to field trip required. Prereq: 3240 or equivalent. 2 hrs and 1 lab.

4330 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 resource organizations in public and private sectors. Prereq: 4004.

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

4420 Forest Tree Improvement (3) Forest tree improvement related to silviculture, nature and purpose of tree improvement and forest genetics; principles of tree use and population genetics; importance of seed source, variation, selection of superior progeny and development of seed orchards; hybridization; seed production and quality control. 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.

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.

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

4540 Wood Drying and Preservation (3) Concepts of wood drying including wood-moisture relations, specific gravity, moisture content, density, and shrinkage. Concepts of wood drying practices. Relations of wood moisture content to attack by wood destroying fungi, and insects. Methods and materials used in commercial drying treatments. Prereq: 3120, Mathematics 1581, Physics 1220, or consent of instructor.

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Recommended for the non-thesis student not otherwise registered during any quarter when such a student requires University facilities and/or faculty time before registering during any quarter when such a student requires University facilities and/or faculty time before registration.

5011 Problem Analysis in Forest Resources (3) Problem identification, analysis and solution in forest resources management. Identify, analyze, and pre-
5210 Seminar in Wildlife Conservation (3) Current studies, problems and issues in wildlife agencies and organizations and their programs. Prereq: 3230 or consent of instructor. W, A

5310 Seminar (1) Current developments in wildlife and fishery conservation. Required of each graduate student in residence Winter Quarter. May be repeated. Maximum 6 hrs. Sp

5400 Advanced Topics in Wildlife Science (3) Recent advances and concepts, research techniques, and analysis of current problems. Prereq: 4450 and 4460 or consent of instructor. May be repeated. Maximum 6 hrs. Sp, A

5450 Wildlife Diseases (3) Necropsy of birds and mammals. Recognition of various diseases and methods of preparing pathological materials in the field and lab. Investigative procedures concerning wildlife diseases. Prereq: 1 yr zoology, 1 qr microanatomy, physiology, pathology or parasitology, 4450 or 4460, or consent of instructor. 2 hrs and 1 lab. W, A

5450 Predator Ecology (3) Dynamics of terrestrial vertebrate predator populations in human-altered and relatively unaltered environments. Principles of predator biology and management. Prereq: 4450 and 4460 or equivalent and Zoology 4240. W, A

5500 Advanced Topics in Fishery Science (3) Recent advances in fishery science, research techniques, and analysis of current problems. Prereq: 4520 or consent of instructor. May be repeated. Maximum 6 hrs. Sp, A

5550 Fish Physiology (3) Mechanisms of circulatory, respiratory, endocrine, osmoregulatory, and nervous and hormonal control of these systems in fishes. Practical applications of fish physiology in water pollution assessment, fish culture and fish management. Prereq: Consent of instructor. 2 hrs and 1 lab. W

5690 Independent Study (1-15) E

5710 Graduate Thesis (1-15) E

Ornamental Horticulture and Landscape Design

MAJOR

Ornamental Horticulture and Landscape Design

M.S.

Professors:

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

Associate Professors:


Assistant Professor:

D. T. Kendall, MLA Louisiana State.

*3300 Plant Propagation (3) Physiology, methodology, and environmental requirements for propa- gation.

*3110 Greenhouse Management (3) Factors involved in the 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, Sp

3620 Intermediate Landscape Design (4) Application of drafting skills acquired in 3610 to a variety of landscape projects. Refinement of graphic skills. History of landscape design relates to contemporary applications. Technical aspects of planting design and implementation. Use of plant materials in the design of small and moderate scale landscape situations. Prereq: 3610, 3610 or equivalent. 1 hr and 2-3 hrs. W, F

3630 Landscape Construction and Contracting (4) Construction methods and materials of landscape installation and contracting. Site layout procedures, earthwork and drainage, street and road design, landscape construction materials; application through detail design drawings and smaller scale projects. Landscape construction specifications and bidding procedures. Prereq: 3310, 3610; Agricultural Mechanization 2130 recommended. 1 hr and 2-3 hrs. Sp

4100 Golf Course Design, Development, and Management (4) Principles and applications in design, development, and implementation of golf courses. Selection and utilization of grass varieties and other plant materials and development of specifications for production recommendations for golf courses. Prereq: 4220 and consent of instructor. 2 hrs and 2 labs. Sp

4220 Advanced Turfgrass Management (3) 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: 3210, 3 hrs and 1 lab. W

4320 Specialty Floriculture (3) Specific practices in production of minor cut flower and potted plant crops. Prereq: 4220 and consent of instructor. 2 hrs and 2 labs. W

5000 Thesis (1-15) E

5100 Thesis (1-15) E

5210 Golf Course Design, Development, and Management (4) Principles and applications in design, development, and implementation of golf courses. Selection and utilization of grass varieties and other plant materials and development of specifications for production recommendations for golf courses. Prereq: 4220 and consent of instructor. 2 hrs and 2 labs. Sp


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

5500 Seminar (1) Current literature and development trends in ornamental horticulture and landscape design. May be repeated. Maximum 3 hrs. F, Sp

5610 Advanced Nursery Production (4) Preparation and use of growing media for woody ornamental plants; nutrition of ornamental plants including di-
Plant and Soil Science

MAJOR

Phytochemistry 1310
Plant and Soil Science 3140, 3160

DEGREES

M.S., Ph.D.

Professors:

L. F. Seifritz (Head), Ph.D. North Dakota State; J. F. Bell (Emeritus), Ph.D. Iowa State; D. C. Coffey, Ph.D. Purdue; J. A. B. Czaja, Ph.D. Washington State; H. A. Fribourg, Ph.D. Iowa State; L. M. Josephson (Emeritus), Ph.D. Wisconsin; W. L. Parks, Ph.D. Purdue; J. H. Reynolds, Ph.D. Wisconsin; L. N. Skold, M.S. Kansas State; M. E. Springer (Emeritus), Ph.D. California (Berkeley); H. D. Swingler (Emeritus), Ph.D. Louisiana State.

Associate Professors:


Assistant Professors:

D. E. Deyton, Ph.D. North Carolina State; W. C. Micro, Ph.D. North Carolina State; R. J. Miles, Ph.D. Texas A & M; D. R. West, Ph.D. Nebraska; J. D. Wood, Ph.D. Auburn.

3020 Crop Ecology (3) Crops and environment, geographic location; site, light, heat, water and interaction relationships as a basis for judgment of cultural practices used to modify environmental factors. Prereq: 8 hrs biological science. 2 hrs and 1 lab.

3040 Crop Physiology (3) Physiology of crop plants; growth phenomena related to crop production; use of general theories of physiology; effects of soil moisture, light, heat, air, minerals, and water. Prereq: 8 hrs biological science. 2 hrs and 1 lab.

3110 Soil Fertility and Fertilizers (4) Properties of soils in relation to a 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.

3120 Grain and Oil Crops (3) Distribution, improvement, morphology, culture, harvesting, and utilization of corn, small grains, grain sorghum, soybeans and related crops. Prereq: 2130. 8 hrs biological science. 2 hrs and 1 lab.

3140 Forage Crops (4) Characteristics, adaptation, improvement, management, and utilization of grasses and legumes for pastures, hay, and silage. Prereq: 2130. 8 hrs biological science. 3 hrs and 1 lab.

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.

3180 Fruit Crops Management (4) Soils, planting, cultivation, development of fruit crops; plantations, pest control, harvesting, packing, storage, and processing. Prereq: Entomology and Plant Pathology 3130 and 3510. 2 hrs and 1 lab.

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

3250 Soils in Forestry (3) Soils as a medium for tree growth; relation of physical, chemical, and biological properties of soils to tree growth and management of forest lands; application of properties of important soil series, soil survey, recreational development, and watershed management. Prereq: 2130, Forestry 3520. 2 hrs and 1 lab.

3510 Commercial Production of Cool Season Vegetables (3) Characteristics, economic importance, adaptability, and production for fresh and processed market; emphasis on peppers, squash, cole, root, bulb crops, perennials, and other vegetables. Prereq: 8 hrs biological science. 2 hrs and 1 lab.

3520 Commercial Production of Warm Season Vegetables (3) Characteristics, economic importance, adaptability, and production for fresh and processed market; emphasis on sweet potatoes, beans, tomatoes, pepper, cucurbits, sweet corn, and okra. Prereq: 8 hrs biological science. Prereq: 8 hrs biological science. 2 hrs and 1 lab.

3610 Interpretation of Agricultural Research (3) Aspects as applied to agriculture. Statistical methods in interpretation of research results. Prereq: Mathematics 1550, F, W.

3710 Principles of Weed Science (4) Basic principles of weed science, history, ecology, economic losses, means of control, types of herbicides, and specific recommendations for various crop and noncrop uses. Prereq: 8 hrs biological science and 3 hrs organic chemistry. 3 hrs and 1 lab.

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

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

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

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

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

5000 Thesis (1-15) E

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

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

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

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

5310 Design and Interpretation of Experiments (4) Experimental design and procedures; effect of different variables on precision of experiments; problems dealing with the analysis of data. Prereq: 3610 or equivalent. 3 hrs lecture. 1 hr rec. and 1 hr rec. 1 hr disc. W.

5340 Soil Physics (3) Chemical and physical relationships among solid, liquid, and gaseous phases of soil mass; relation to plant growth and soil management. Prereq: 4110. 2 hrs and 1 lab. W, A.

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

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

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

5710 Advanced Plant Genetics (3) Mutation systems: controlling elements, induced mutations, genome organization, polyplody, tetrasomics, inheritance, extrachromosomal inheritance, apomixis, infertility, compatibility systems, and genetic engineering of higher plants. Prereq: Basics genetics or consent of instructor. F, A.

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

5750 Advanced Plant Breeding (4) Historical development of plant breeding concepts and methods, effects of heterosis, inbreeding, hybridization and selection. Improvement of self- and cross-pollinated crops. Prereq: 5710. 3 hrs and 1 lab.

5810 Crop Climatology (4) Meteorological factors affecting crop plants; crop distribution and centers of origin; general and specific climatic, weather and vegetative systems; microclimatic influences on plant growth. Prereq: 3020. 3400. Botany 3210, 4310 or consent of instructor. 3 hrs and 1 lab.

5820 Advanced Crop Physiology and Ecology (4) Historical development of research in crop physiology, introduction of action, degradation, and environmental impact of chemicals used in agriculture, forestry, and related areas with emphasis on agricultural pesticides; environmental safeguards imposed by federal and state regulations on chemical development and use. Prereq: 1 yr biological science and 1 yr chemistry. 3 hrs and 1 lab.

5830 Mechanisms of Herbicide Action (3) Principles of the uptake, translocation, mode of action and basis of selectivity of herbicides. Effects of herbicides on plant morphology, metabolic systems and enzymatic activities. Prereq: Botany 3210 and Biochemistry 4110 or consent of instructor. Sp, A.

6000 Doctoral Research and Dissertation (3-15) E

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

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

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

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

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

6600 Seminar (1) May be repeated. Maximum 3 hrs.

College of Veterinary Medicine

H. Kitchen, Dean
C. F. Feed, Associate Dean
W. H. Grau, Jr., Associate Dean

The College of Veterinary Medicine, established in 1974, is organized into six academic departments: Animal Science (jointly Plant and College of Agriculture), Institute of Agriculture 31
Environmental Practice, Microbiology (jointly with the College of Liberal Arts), Pathobiology, Rural Practice and Urban Practice. The College administers a professional curriculum leading to the degree of Doctor of Veterinary Medicine (see the General Catalog) and a graduate program involving all departments and leading to the Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees. The instructional program of the College also includes internship and residency training programs in various clinical specialties in the departments of Environmental Practice, Urban Practice, Rural Practice and Pathobiology. (For details write the Director of Residencies and Internships, College of Veterinary Medicine.) 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

Environmental Practice


5000 Thesis (1-15) E

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

5811-12 Pharmacology (1,2) Theories of transport across membranes. Introduction to principles of drug action and distribution. Receptor theory, adverse drug reactions; correlated with Animal Science 8240-50. Prereq: Consent of instructor.

6000 Doctoral Research and Dissertation (3-15) E

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.

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

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.

Veterinary Medicine

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

5382 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.

Microbiology

Professors: A. Brown (Head), Ph.D. Chicago; R. W. Beck, Ph.D. Wisconsin; B. T. Rouse, Ph.D. Guelph; J. M. Woodward, Ph.D. Kansas.

Associate Professor: D. A. Brian, D.V.M., Ph.D. Michigan.

For specific course listings please see College of Agriculture, Department of Animal Science, and College of Liberal Arts, Department of Microbiology.
College of Business Administration

C. Warren Neei, Dean
John R. Moore, Associate Dean
Francis A. Chamblin, Assistant Dean for
Graduate Programs
John A. Bachmann, Assistant Dean for
External Affairs, Director, Management
Development Programs
David A. Hake, Director, Center for Business
and Economic Research

Graduate programs of the College of Business Administration are designed to prepare men and women to assume executive, managerial and professional positions in the increasingly complex world of domestic and international business and industry, teaching and research, government and institutional management.

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

Graduate Programs

The College of Business Administration offers programs leading to seven advanced degrees: the Doctor of Business Administration, the Doctor of Philosophy with majors in Economics and in Management Science, the Master of Arts and the Master of Business Administration, the Master of Accountancy, and the Master of Business Administration. The Department of Management and the Department of Psychology in the College of Liberal Arts jointly offer an intercollegiate program in Industrial and Organizational Psychology leading to the Master of Science and Doctor of Philosophy degrees. (See page 95). Also, the Department of Management Science offers an intercollegiate program leading to the Master of Science degree. (See page 96).

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.

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 part-time student carries two courses per term in classes scheduled in the evening hours.

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, but there are no specific course prerequisites required to begin the program except college level mathematics through at least one course in calculus. 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 34.)

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 5010; Marketing 5010, 5020; Mathematics 5052; Office Administration 5050; Statistics 5010, 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 41).

3See notation under the heading "MBA Concentration" in the Statistics Department section (page 44).
### Prerequisite Relationships of MBA Core Courses

Read across table to identify prerequisites/corequisites for courses listed in left column

- **X** Prerequisite
- **=** Prerequisite or corequisite
- **°** Prerequisite to a prerequisite or corequisite

<table>
<thead>
<tr>
<th>B Law 5010</th>
<th>Acct 5010</th>
<th>Econ 5010</th>
<th>Mgmt 5010</th>
<th>OAAdm 5050</th>
<th>Math Prep°</th>
<th>Math 5052</th>
<th>Stat 5010</th>
<th>Stat 5020</th>
<th>MSci 5010</th>
<th>Acct 5020</th>
<th>Econ 5020</th>
<th>Acct 5030</th>
<th>Econ 5030</th>
<th>Mktg 5010</th>
<th>Fin 5010</th>
<th>Mktg 5020</th>
<th>Fin 5020</th>
<th>Mktg 5030</th>
<th>Fin 5030</th>
<th>Fin 5050</th>
<th>Mktg 5050</th>
<th>Fin 5050</th>
<th>OAAdm 5310</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>B Law 5010</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acct 5010</td>
<td><strong>X</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Econ 5010</td>
<td></td>
<td><strong>X</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mgmt 5010</td>
<td></td>
<td></td>
<td><strong>X</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OAAdm 5050</td>
<td></td>
<td></td>
<td></td>
<td><strong>X</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math Prep°</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>X</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math 5052</td>
<td><strong>X</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stat 5010</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stat 5020</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSci 5010</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acct 5020</td>
<td><strong>X</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Econ 5020</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acct 5030</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Econ 5030</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mktg 5010</td>
<td><strong>X</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fin 5010</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mktg 5020</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fin 5020</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mgmt 5020</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BAdm 5310</td>
<td><strong>X</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

°UTK Math 1550, 5051 or equivalent.

### 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 course work. 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 Graduate Business Programs office for approval.

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
- Governmental Financial Administration
- Management
- Marketing
- Real Estate and Urban Development
- Statistics
- Transportation and Logistics

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

### 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 C or higher at a regionally accredited institution. "Recently completed" means, for mathematics, completion of the last course or regular use of math tools within three to four years of matriculation, and for other areas within five to six 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)

Office Administration 5050 (3 quarter hours, introductory course in computer science with programming).

In addition to the above, a graduate of an AACSB accredited undergraduate business program may request exemption from one or both of the core courses in the area of 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.

1Not available to students whose undergraduate major was accounting. Such students should choose another area or apply for admission to the Master of Accountancy program. (See page 37).

2Available to residents of West Virginia under terms of the Academic Common Market. (See page 33).
and a grade average of 3.0 or higher (on a 4.0 scale) was earned for all courses in the major. Students requesting such an exemption must petition the appropriate department head. The department may require the student to pass a proficiency examination over any course for which exemption is requested. (See page 15).

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 elective course approved by the student’s advisor 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 12 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 Assistant 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 courses, 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, fall, and winter quarters. There are no admissions for spring quarter. All applicants may be considered for fall quarter entry (cold-season); the MBA spring quarter entry (mid-June) is for students whose programs will include all core courses. Only undergraduate business majors and those who are exempted from Accounting 5010, Business Law 5010, Economics 5010, and Mathematics 5051 (or equivalent) may begin the program in the winter quarter (early January).

Part-time (evening) program students whose programs include Accounting 5010 and Economics 5010 must begin in the fall quarter. Others may begin either fall or winter, or in the summer if the schedule includes one or two courses for which they are eligible.

There are four rounds of admission decision actions during the year as indicated in the table below. These dates are coordinated with the scheduled receipt of the latest Graduate Management Admission Test (GMAT) score reports. To be considered at one of the four admission sessions, the applicant's file must be complete. A completed file includes the Graduate School application, transcripts of prior college work, the MBA program application, two applicant 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 Graduate Business Programs office by the deadline date.

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

Dual J.D.-MBA Program

The College of Business Administration and the College of Law offer a coordinated dual program leading to the conferment of both Doctor of Jurisprudence and the Master of Business Administration degrees.

Admissions. Applicants for the J.D.-MBA program must make separate application to, and be competitively and independently accepted by, the College of Law for the J.D. degree and The Graduate School and College of Business Administration for the MBA degree, and by the Dual Degree Committee. Students who have been accepted by both colleges may apply for approval to pursue the dual program anytime prior to, or after, matriculation in either or both colleges. Such approval will be granted if it is determined 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 the other 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 8 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 any Law course 6590—Legal Accounting.

The College of Business Administration will award up to 12 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.

Except while completing the first year courses in the College of Law, students are encouraged to maximize the number of dual program courses in both colleges each quarter.

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

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

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

Foundation Requirements. Although the program is designed for students who have completed an accredited MBA (or equivalent) degree program, those with outstanding undergraduate records in any area may be admitted directly to the DBA program and may earn the MBA degree in a coordinated program of study. Program prerequisites include at least one year of college mathematics to include a course in calculus, a course in statistics, knowledge of computer applications, and intermediate economic theory (micro and macro). See page 34 for MBA degree requirements. Entering students deficient in any of these areas may enroll in courses designed to meet these requirements.

Course Requirements for the DBA Program. Each student must demonstrate, by passing appropriate graduate level courses and/or by examination, an understanding of the business functional areas, the basic disciplines underlying the study of business administration, the student’s concentration area and a supporting area. Following are the requirements for each area.

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

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

- Economics: Economics 5110, 5120.
- Behavioral Science: Management 5610, 5620.
- Quantitative Science: 12 quarter hours in one or a combination of two of the following areas: statistics, management science, econometrics, or computer science. Approval of student’s committee is required.

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

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

D. Supporting Area. A minimum of 12 quarter hours of graduate course work is required in an area outside, but complementary to, the concentration area. The student may choose the supporting area from one of the following: one of the basic functional areas, other disciplines in one of the basic disciplines or a related area in another school or college of the University. The program of study should be arranged with an advisor in the discipline chosen and must be approved by the student’s committee.

Comprehensive Examinations. Comprehensive written examinations over the concentration and supporting areas are required of each person seeking candidacy for the DBA degree. The comprehensive examination area examination is administered in two sessions of approximately four hours each and the supporting area examination in one session of approximately three hours. The examining committee may, if it deems advisable, supplement the written examinations with oral examinations and may accept the results of only an oral examination for a supporting area in the College of Law. Scheduling of comprehensive examinations will be determined by the examining committee in each of the five concentration areas in coordination with the Assistant Dean for Graduate Programs. The committee must designate two periods during the calendar year and announce the dates at least 90 days in advance. A student may sit for examinations in both areas at one examining period or take them in two consecutive periods. A student who fails an examination on the first attempt must repeat the examination over that area at the next examining period, the results of which shall be final.

Admission to Candidacy. A student may apply for admission to candidacy for the DBA degree after maintenance of at least a B average in course work, successful completion of comprehensive examinations and acceptance of a research proposal for the dissertation by his/her faculty committee. Admission to candidacy must be approved at least three quarters prior to the date the degree is conferred. Admission in the fall quarter permits graduation in the following spring quarter. See sections headed “Doctoral Committee” and “Admission to Candidacy,” page 34.

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 supporting area). Graduate courses accepted from other institutions must be included. Under “Other Requirements” indicate date of acceptance of the research proposal by the Faculty committee. The application must be approved by the student’s faculty committee and the Assistant Dean for Graduate Programs in the College of Business Administration before submission to the Graduate School.

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

Other Requirements. For information concerning program admission requirements, academic performance standards, fellowships and assistantships, and general rules and regulations of The Graduate School, see other parts of the College of Business Administration section and the first section of the catalog, “The Graduate School.” Also see “Academic Common Market,” page 36.

Minimum Academic Performance Standards
A graduate student in the College of Business Administration whose grade point average at any point after 12 hours is below 3.0 shall be placed on probation. A student on probation shall be dropped from the program unless his/her cumulative grade point average is 3.0 or higher at the end of the probationary period. The probationary period is defined as the next 12 quarter hours of course work attempted which is specified in the student’s degree program. Exclusions to this policy may be made only with the approval of the Assistant Dean for Graduate Programs of The College of Business Administration upon recommendation of the student’s faculty committee.

Admission Requirements

General admission requirements for The Graduate School are stated on pages M.Acc., MBA, and DBA applicants are required to take 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) and performance on the admission test. 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 37-38), 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.

**Management Development Programs**

The Management Development Programs Department offers a wide variety of programs ranging from two- to three-day public seminars and customized "in-plant" programs to the four-week Tennessee Executive Development Program. The Tennessee Executive Development Program (TEDP) is designed to provide continuing educational opportunities for executives from firms and organizations throughout the state, region, and the nation. The major objective of the program is to prepare and develop executives for increasingly higher levels of management responsibility and to sharpen existing executive skills needed for comprehensive decision making and leadership. Other major aims of the TEDP are to teach the fundamentals of analytical thinking and the use of the decision tools, and to examine the economic, political, technological and other environmental factors affecting the firm's operations.

The TEDP limits enrollment to thirty-six participants who live on campus for a total of four weeks spread over a three-month period. This arrangement provides executives with extensive opportunities to exchange ideas and operational concepts with contemporaries in other business areas and with TEDP faculty as well.

The faculty for the TEDP consists of senior professors who teach business-related subjects in the University's graduate programs and nationally recognized professors of other institutions. Each participating faculty member has extensive experience in either consultation with or actual operation in business and industry. The TEDP faculty is augmented by outstanding practitioners in their fields of business and industry.

**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 Graduate Programs Office of the College of Business Administration.

**Assistantships.** A limited number of teaching assistantships and assistantships that range 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 merit and performance on the admission test. Application forms may be obtained in any of the departments or from the Office of the Assistant Dean for Graduate Programs. Applications must be received by March 1 for consideration of assistantships to be awarded for the following fall term.

**Center for Business and Economic Research**

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

**Departments of Instruction**

**Accounting and Business Law**

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

**Accounting**

<table>
<thead>
<tr>
<th>MAJOR</th>
<th>DEGREE</th>
<th>Professors</th>
</tr>
</thead>
</table>
Other Requirements. To qualify for the degree, the student must achieve a B average (3.0) in the business core courses and also a B average in the accounting courses. Each student must pass a final written examination during the final quarter of study for the degree. M.B.A. Concentration: Accounting

DBA Concentration: Accounting

Minimum Course Requirements for M.B.A.

Concentration: Accounting 5110, 5120, 5210, 5420, and two of the following: 5320, 5330, 5340.

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

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

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

5030 Managerial Accounting (3) Analysis of accounting model as a vehicle for planning and controlling activities. Attention to development of cost data appropriate to managerial decision models. Prereq: 5020. Economics 5010, Prereq or coreq: Management Science 5010, Statistics 5020. W, Sp


5120 Seminar in Advanced 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 in an area of significant interest. May be repeated. 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 issues, and responsibilities. Prereq: 5230 or consent of instructor.

5220 Budgetary Planning and Control Systems (3) Analysis and application of the organizing of planning and control systems to meet organization's needs and objectives. Control systems and corporate structure, hierarchical 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 4410, 5630, or equivalent. (May be taken concurrently.)

5320 Advanced Auditing (3) Case-oriented, including audit of specific asset, liability, revenue and expenses. 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 Consolodations 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 tax research utilizing tax service, tax periodicals, legal cases and other available sources. 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 taxpayer objectives. Prereq: 5420.

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

5510 Not-for-Profit Accounting (3) Theory and practice of budgetary and fund accounting, financial reporting, measures of output and accomplishment, of study and methods of financial and performance auditing for nonprofit entities. Prereq: 9 hrs of accounting and consent of instructor.

5630 Accounting Systems and EDP Concepts and Control (3) Elements and operation of computer in business environment. Analysis, design, implementation, documentation, and control of accounting systems. Prereq: 2130 and knowledge of a computer programming language.

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: 4620 or equivalent.

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

5980 Seminar in Accounting Research (3) Integration of areas of financial, managerial, tax, and auditing, including directed problem-oriented research in selected topics. Prereq: 5120, 5210, 5420. (Not available to MBA students.)

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

6000 Doctoral Research and Dissertation (3-15) E

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

Business Law


5610 Legal and Social Environment of Business (3) Survey of legal and quasi-legal institutions with emphasis on those which have particular significance to business, basic legal notions and principles that pertain to business management. Not available to students with credit for 4110-20 or equivalent. F, W, S

5130 Administrative Regulation of Business (3) Federal Register System and Administrative Procedure Act and their relationship to business. How a regulation is made and enforced. Other legal controls of administrative agencies. Not available to students with credit for 4130 or equivalent. Prereq: 4120 or 5110 or consent of instructor.

Business Administration

DEGREES

Business Administration, M.B.A., DBA

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

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

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

Business Education

See College of Education

Economics

MAJOR

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

Professors: P. D. Quale (Head), Ph.D. California (Berkeley); R. W. Tovey, Ph.D. Texas; L. Carroll, Ph.D. Harvard; W. E. Cole, Ph.D. Texas; G. R. Feiwel, Ph.D. McGill; C. B. Garrison, Ph.D. Kentucky; J. F. Holly (Emeritus), Ph.D. Clark; H. E. Jensen, Ph.D. Texas; F. Y. Lee, Ph.D. Michigan State; A. Mayhew, Ph.D. Texas; J. R. Moore, Ph.D. Cornell; W. Neale, Ph.D. London School of Economics; G. A. Spiva, Ph.D. Texas.

Associate Professors: H. S. Chang, Ph.D. Vanderbilt; E. Glustoff, Ph.D. Stanford; H. W. Hoor, Ph.D. Maryland; D. L. Kaserman, Ph.D. Florida; K. E. Philips, Ph.D. Washington (Seattle); A. M. Schlootman, Ph.D. Washington (St. Louis).

Assistant Professors: D. P. Clark, Ph.D. Michigan State; C. B. Donn, Ph.D. Massachusetts Institute of Technology; R. A. Hofher, B.A. Old Dominion; J. W. Mayo, M.A. Washington (Seattle); C. B. Donn, Ph.D. Florida; K. L. Murphy, Ph.D. Michigan State; H. Thompson, Ph.D. Houston; E. D. Wicham (part-time), Ph.D. Rochester.

THE MASTER'S PROGRAM

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

(1) Economics 5111-12 and 5121-22 (2) An additional 9 hours in Economics at the 5000 level or above, (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 5121-22, or (2) 5111 and 5121-22, or (3) with

* Alumni Distinguished Service Professor
the consent of the head of the economics department, an alternative sequence of 9 hours to meet unusual conditions.

MAJOR OF ARTS IN COLLEGE TEACHING DEGREE

The requirements for the MACT degree are listed on page 41. A thesis is required.

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 successful completion of Economics 6111 and 6121.
   b. Economic history: 6 hours of economic history at the 5000 level or above.
   c. History of economics: Economics 5150 and 3 hours at the 6000 level.
   d. Mathematical and quantitative methods: Economics 5180, 5190, and 5510. The 5510 requirements 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 any 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, at least two of which must be selected from the following: economic development; economics of centrally planned economies; industrial organization; international economics; regional and urban economics; a field, as agreed to by the department, combining two or three of the above.

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.

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

5000 Thesis (1-15) E

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

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

5090 Workshop in Economics (3-9) Special topics in economic education. Not available for credit in any College of Business Administration degree program. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

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

6000 Doctoral Research and Dissertation (3-15) E

ECONOMIC THEORY

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

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

4150 History of Economic Thought (3) Development of economic thought, tools of analysis, and economics as a social science, together with an analysis of the theoretical propositions which influenced this development. Period covered: 1776 through 1936. Prereq: 1 yr of principles of economics and/or economics of labor.

4170-80 Introduction to Mathematical Economics (3, 3) Application of mathematical methods in theoretical study of micro- and macroeconomic phenomena. Designed for beginning graduate students who have limited training in analytic geometry and calculus. Must be taken in sequence. Prereq: 3110 and college algebra, calculus, and analytic geometry, or equivalent. F, W

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

5020 Managerial Economics (3) Application of economic concepts to business decision making. Analysis and forecasting of demand, cost analysis, pricing behavior, and optimizing techniques. Prereq: 5010 or equivalent. Prereq or coreq: Statistics 5020 or equivalent. F, W

5030 Economic Fluctuations, Forecasting, and Stabilization (3) Macroeconomic environment of the firm. Determination of level of output, employment and prices for economy as a whole. Implications of aggregate fluctuations for individual firm. Role of forecasting techniques and stabilization policies. Prereq: 5010 or equivalent. F, W

5110 Fundamentals of Microeconomics (3) Verbal arguments and geometric and algebraic techniques. Theory of consumer behavior and demand theory; theory of production and cost, long and short run theories of profit maximizing firm in both perfectly competitive and monopolistic environments; theory of derived demand. For students whose major is other than economics. Not available for students with credit for 5111. Prereq: 5110 or equivalent. F, W

5111-12 Microeconomic Theory I, II, (3, 3) Theory of consumer choice and demand; theory of the firm; theory of production and costs; market structures; derived demand, 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) Derivation of income, demand for currency, and prices for economy as a whole; relationships between interest rates, price expectations, productivity, and quantity of money; speculative and transactions demand for money, monetary policy; money demand. For students whose major is other than economics. Not available for students with credit for 5121. Prereq: 3120 or equivalent. W

5121-22 Macroeconomic Theory I, II, (3, 3) Monetary 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 tradition.

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

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 fluctuations, macroeconomic applications. Should not be taken by students who contemplate taking Economics 6170-80-90. Sp

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

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

5740 Seminar in Public Finance (3) (Same as Finance 5740). Sp

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

5820 Monetary Theory and Policy (3) (Same as Finance 5820). F

5830 Commercial Bank Management (3) (Same as Finance 5830). F, Sp

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) Topics in macroeconomic theory and policy. Prereq: 5122 or equivalent. W

6150-60 History of Economic Doctrines (3, 3) Important ideas of economic thinkers from Middle Ages to present. W

6170-80-90 Econometric Models (3, 3, 3) Theory and techniques of statistical testing of economic hypotheses and construction and estimation of economic models. Review of classical least squares regression model, extensions of least squares regression model, and approaches to simultaneous equation models with applications to current econometric research. Prereq: 5180-90 and 5510 or equivalent. F, W, Sp

6710-20 Seminar: Fiscal Theory and Public Finance (3, 3) (Same as Finance 6710-20).

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: 3510 or 3320. W

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

4232 The Political Economy of Asian Development (3) Description, analysis, and comparison of major economic problems and policies of India, China and other Asian countries. W
4260 Economics of Resources and Environmental Policy (3) Economic analysis of environmental policies and the valuation of resources. Benefits and costs of development of natural resources and impacts of growth on environment. Prereq: 2130 W.
5210 Seminar in International Trade Theory (3) Pure theory of international trade. F.
5220 Seminar in Economic Development (3) Economic problems of developing countries. F.
5250 Economic History of Europe (3) Nature and functioning of economic systems and policies in history of western civilization; examination of some major issues of method and interpretation. F.
5260 Economic History of the U.S. (3) Interpretation of American economic structure and policies from colonial times. W.
5610 Location and Regional Development Theory (3) Theory of industrial, agricultural, and residential location; economic basis for land use patterns and central places; examination of regional inequalities and national assistance for regional economic development. F.
5620 Methods of Regional Analysis (3) Theory of regional structure and growth. Examination of regional models for impact analysis and economic forecasting. Methods of analysis include regional demand and supply analysis, and potential criteria for regional income and product accounts, shift and share analysis, economic base studies, and regional input-output, linear programming, and econometric models. W.
6231-32, 6241-42 Seminar in Economic Development (3, 3, 3, 3) Development and application of analytical tools to problems of economic policy faced by developing regions and countries. W, A, Sp, F.
6250 Seminar in Economic Growth Theory (3) Selected topics in economic growth theory. Prereq: Consent of instructor. May be repeated with consent of department.
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 societies other than those of Western Europe and England, including North America. Prereq: Consent of instructor. May be repeated with consent of department. F, A.
6510 Seminar in Regional Analysis (3) Selected topics in regional economic theory and analysis. May be repeated. Maximum 6 hrs. Sp, A.
6600 Regional Economics Workshop (3) Selected topics in applied regional research. Emphasis on student participation in model design and estimation, computer simulation, and mathematical and computer programming. May be repeated. Maximum 6 hrs. Sp, A.
INDUSTRIAL ORGANIZATION
4350 Industrial Organization Analysis (3) Monopoly and competition in the United States economy; market structure, business behavior, and economic significance of monopolistic and competitive markets. Prereq: 4 hrs of introductory economics W.
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. W.
5331 Theory and Practice of Economic Planning (3) Leading issues in imperative and indicative planning. Prereq: Consent of instructor. May be repeated with consent of department. F.
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 and training, poverty and income redistribution, discrimination based on sex or ethnicity, or others. Prereq: 3410.
5410 Seminar in Economics of Human Resources (3) Selected topics in literature of human resource development: problems, analysis, and possible solutions. Prereq: Consent of instructor. F.
5420 Seminar in Wage and Employment Theory (3) Structure and performance of employment, wage determination. Prereq: Consent of instructor. W.
6411-12, 6421-22 Seminar in Labor Economics (3, 3, 3) Selected problems chosen for their current interest of continuing significance—development and application of problems and techniques. W, Sp. A; W, Sp, A.
Finance
Professors:
R. M. Duvall (Head), Ph.D. North Carolina;
Associate Professors:
L. Aswut, Ph.D. Iowa; W. F. Fox, Ph.D. Ohio State; J. C. Golden, Ph.D. George Washington; W. C. Goolsby, Ph.D. Wisconsin (Milwaukee); J. M. Wachowicz, Jr., Ph.D. Illinois (Champaign-Urbana).
Assistant Professors:
T. P. Boehm, Ph.D. Washington (St. Louis); D. Choi, Ph.D. Pennsylvania State; B. E. Schone, Ph.D. California (Los Angeles), V. H. Melham, Ph.D. Tennessee.
MBA Concentrations: Finance; Governmental Financial Administration; Real Estate and Urban Development.
DBA Concentration: Finance.
MINIMUM COURSE REQUIREMENTS FOR MBA CONCENTRATIONS
Finance—For the Financial Management area: 5120, 5130, 5140; for the Investments Area: 5420, 5430, 5440; and for the Banking and Financial Institutions area: 5810, 5820, 5830.
1Alumni Distinguished Service Professor.
2Honary National Bank Professor of Finance.
3C. H. Butcher, Sr. Professor of Banking and Finance.
5002 Non-Thesis Graduate Completion (3-15) Required for the non-thesis student not otherwise registered during the academic year in which the thesis is written. No credit is allowed for courses for which a student is registered in anoff-campus program. Prereq: Consent of instructor.
6000 Doctoral Research and Dissertation (3-15) E.
5120 Quantitative Techniques in Financial Management (3) Applications of mathematics, probability, and statistics to model building and testing in finance. Prereq: 5020; Statistics 5010. F, W.
5130 Financial Administration (3) Cases and readings within firm; refined techniques of analysis; optimal financial decision-making; capital cost measurement; utilization of capital markets; general corporate financial theory. Prereq: 5020. W, Sp.
5140 Seminar: Managerial Finance (3) Applications of theory and quantitative techniques to solution of management problems in corporate finance. Prereq: 5120 or 5130. F.
5420-30 Investments (3, 3) Investment decision process, factors influencing portfolio policies and security prices, financial statement analysis, stock-price valuation models. Must be taken in sequence. F, W, W.
5440 Commodity Futures and Stock Options (3) Trading in commodity futures markets and in 'put and call' stock options; factors influencing commodity and options prices; option valuation models. Prereq: 5420.
5990 Research in Finance (3) Directed research on topics of mutual interest to the student and faculty member. Prereq: 5620. May be repeated. Maximum 6 hrs.
6410-20 Seminar in Theory of Finance (3, 3) Theory of financial decision making under conditions of certainty and uncertainty. Application of economic theory of choice to allocation of resources over time and under uncertainty with reference to investment and mutual fund decision making.
8510 Seminar in Financial Management (3) Employment of quantitative techniques in formulation and solution of financial management problems. W
5620 Seminar in Capital Markets (3) Theory of analysis of asset values in efficient and inefficient markets. Prereq: 6410. W

MONETARY POLICY AND FINANCIAL INSTITUTIONS

5810 Financial Markets and Intermediaries (3) Capital formation and allocation of capital in U.S. economy; institution of saving, partial institutionalization of these savings, investments of financial intermediaries, efficiency of allocation process, control of money, and impact of financial institutions on financial markets. (Same as Economics 5910: W)

5820 Monetary Theory and Policy (3) Relationship of money, credit, and liquidity to income, interest rates, employment and prices as well as examination of effect of monetary policy on economic activity. Prereq: Economics 5020 or equivalent. (Same as Economics 5820: F)

5830 Commercial Bank Management (3) Bank management decision-making analysis of changes in banking environment and structure; acquisition and management of funds; current banking problems. Prereq: Consent of instructor. (Same as Economics 5830: F, Sp)

6110-20 Seminar: Monetary Theory (3, 3) Study of money, credit, and liquidity as related to income, interest rates, employment, output, and prices. (Same as Economics 5830: F, Sp)

6810 Financial Institutions and Markets (3) Theory of financial markets, role of financial institutions, and analysis of market efficiency.

GOVERNMENTAL FINANCIAL ADMINISTRATION

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

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

5730 Finance Administration of Government (3) Budgeting and cash management in public sector. Prereq: Economics 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. (Same as Economics 5740: Sp)

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

INSURANCE

5110 Theory of Risk Management (3) For students with no background in risk and insurance.) Risk management and manageable risks facing individual and firm. Analysis of risk management techniques with emphasis on insurance as a tool. W

REAL ESTATE AND URBAN DEVELOPMENT

5110 Urban Economic Analysis (3) Urban economics. Land value and use. Analysis of current urban problems in United States. Prereq: Economics 5010 or growth of public sector, public goods and, be

5120 Real Estate Analysis (3) Analysis of real property investment, real estate finance and appraisal theory. Prereq: Finance 5610 or Planning 5465 or consent of instructor.

5130 Housing and Urban Land Markets (3) Analysis of housing demand, supply and location. Segregation and housing discrimination. Impact of urban renewal and public policy on housing markets. Prereq: 5110 or consent of instructor. Sp

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

Management


Associate Professors: F. A. Chamblin, MBA Indiana; O. S. Fowler, Ph.D. Georgia; R. C. Studebaker, Ph.D. Texas; C. W. Neel, Ph.D. Alabama; M. C. Rush, Ph.D. Akron.

Assistant Professors: J. A. Bachmann, Ph.D. Virginia Polytechnic Institute; K. C. Gilbert (Visiting), Ph.D. Tennessee; R. T. Ladd, Ph.D. Georgia; G. B. Roberts, MBA Georgia State; C. R. Wollam, Ph.D. Texas Tech.

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 Management—5280, 5270.

5600 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-19) 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 Organization Theory and Behavior (3) Basic concepts in organization theory, organizational behavior and management processes.

5020 Operations Management (3) Management processes of planning, operating and control of production systems. Management concepts and quantitative techniques to develop and design of systems. Prereq: 5100; Management Science 5010; Statistics 5200, F, Sp, Su

5110 Organization Theory (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


5170-80-90 Seminar in Contemporary Management Issues (3, 3, 3) Progress in contemporary management. Topics in current management issues. May be repeated. E, W

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

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

5230 Human Problems in Administration (3) Re- view and critique of research in industrial human re- lations. (Same as Psychology 5450.)

5250-60 Industrial and Organizational Psychology (1-3, 1-3) Readings in industrial and organization- al psychology not available only by arrangement with supervising faculty member. May be repeated. Maximum 6 hrs. S/NC or letter grade. E

5260 Independent Study, Project or Research in Management (1-3) Topic of mutual interest to stu- dent and instructor only by arrangement with supervising faculty member. May be repeated. Maximum 6 hrs. S/NC or letter grade.

5810 Energy Management: Theory and Practice (3) Energy management of energy resources in operating systems: decision making, system analysis, energy audits, technical parameters, conserva- tion methods, worldwide energy supply and demand, new energy technologies.

5600 Doctoral Research and Dissertation (1-15) E

6110 History of Management Thought (3) Signifi- cant historical ideas leading to present state of art of management.

6120 Advanced Organizational Theory (3) Analy- sis of functioning of complex organizations: struc- ture, culture, and adaptation.

6130 Seminar in Contemporary Management Issues (3) Complex contemporary management issues. May be repeated. E

6250-60-70 Seminar in Industrial and Organiza- tional 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) Field experience for graduate students. One credit hr for each 30 hrs of such practice. Maximum 15 credits. (Same as Psychology 6900.) E

Management Science

MAJOR

DEGREE

Management Science

Ph.D.

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

Associate Professors: J. K. Ho, Ph.D. Stanford; R. E. Rosenthal, Ph.D. Georgia Institute of Technology.

Management Science Committees:

Members of the Management Science faculty and in addition: R. W. Boiling, Management, J. S. Bradley, Mathematics, E. Glustaf, Economics; W. J. Morse, Accounting; R. E. Shires, Finance; C. C. Thigpen, Statistics; M. G. Thomason, Computer Science; C. R. Woolam, Management.

MBA CONCENTRATIONS

For students whose MBA concentration area is Management Science, the MBA Core is revised as follows: substitute Management Sequence S310 for 5010 and, with approval of student's advisor, substitute Statistics S512 for 5020. The
concentration area must include Management Science 5330 and 5340.

MASTER OF SCIENCE PROGRAM
See page 96 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 management positions, research, and teaching related to the application of mathematical tools in the administration of complex organizations. Three primary objectives of the program are:

(1) to provide, through management science coursework, a thorough knowledge of common Management Science/Operations Research mathematical models and their uses;

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

(3) to develop in the student, through coursework in mathematics, statistics, and computer science, a high degree of mathematical maturity 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 19.

Course work. 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 credit hours of course work in the applied concentration area.

Qualifying 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 course work must be demonstrated by passing a written qualifying examination. Topics normally include numerical analysis (either Mathematics 4225, 4245, 4060, and 5655, or Mathematics 5655-65-75) and real analysis (Mathematics 4510-20-30). Other options may be approved. In exceptional cases the faculty will consider waiving the mathematics and/or statistics qualifying examinations.

There is no foreign language requirement.

These requirements generally are completed by the end of the first year of the program.

Comprehensive Examination. Prior to admission to candidacy for the degree, and normally after completion of the second year of the program, the student must pass a written comprehensive examination covering the theory of deterministic and stochastic management science models. Topics included in this examination are determined on an individual basis. Students will be expected to demonstrate an integrative ability that goes beyond knowledge and proficiency 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. An 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 Management Science Program is interdisciplinary and students in other degree programs are encouraged to enroll in management science courses. Course prerequisites are designed to indicate the level at which courses are taught. Interested students whose prior course work does not match the prerequisites are encouraged to seek the instructor's guidance and consent to enroll.

5000 Thesis (1-15) E

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


5310-20-30 Management Science Methods (3, 3, 3) 5310—Linear programming procedures and sensitivity analysis; transportation problem and introduction to network analysis. Prereq: Fundamentals of matrix algebra and differential calculus; proficiency in a computer language. 5320—Dynamic, integer, and nonlinear programming problems; linear and network optimization techniques to problems of optimal location of new facilities. Prereq: 5310 or equivalent. A

5335 Mathematical Programming Computational Systems (2) Practical aspects of using state-of-the-art mathematical programming systems. Students will write compatible matrix generation and report writing software for specific applications. Sp

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


6210-20 Network Flows (3, 3) In-depth treatment of widely applied network optimization algorithms including branch and bound, cutting plane, and group theoretic algorithms. Prereq: 5310 or equivalent. A

6310 Integer Programming (3) Theoretical and computational aspects of linear programming with integer variables. Prereq: 5310 or equivalent. A

6410 Large Scale Mathematical Programming (3) Development of solution strategies for linear programming problems that have many constraints, many variables or extremely sparse constraint matrices. Prereq: 5310 or equivalent. A

6510 Nonlinear Optimization (3) Solution of constrained and unconstrained nonlinear optimization problems focusing on algorithms that have performed well in recent practice. Prereq: 5310 or equivalent. A

6510 Markovian Decision Models (3) Formulation and analysis of Markovian chain models, Markovian models which incorporate decisions-their formulation, application and solution through policy iteration. Stochastic dynamic programming models in continuous time. Prereq: 5330. F

6620 Queuing Models (3) Application and mathematical analysis of models of congestion. Basic birth-death process models, other Markovian models, non-Markovian models for systems with general service or arrival patterns, priority customers or other complicating assumptions. Prereq: 5330. F, W, Sp.

6700 Location Models (3) Application of linear, nonlinear and network optimization techniques to problems of optimal location of new facilities. Prereq: 5310 or equivalent. A

6810 Special Topics (3) Prereq: 5310-20-30 and consent of instructor. May be repeated. Maximum 9 hrs.


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

Marketing
Professors:
D. J. Barnaby, Ph.D. Purdue. E. O. Dille (Emeritus), Ph.D. Ohio State; E. P. Castron (Emeritus), M.D. Woodruff, R. McMillan, Ph.D. Ohio State; G. E. Hult, DBA Indiana; R. B. Woodruff, DBA Indiana.

Associate Professors:
R. L. Spiro, Ph.D. Illinois; R. J. Jenkis, Ph.D. Ohio State; J. R. McMillan, Ph.D. Ohio State; R. C. Reizenstein, Ph.D. Cornell, G. D. Sentell, DBA Indiana; D. Sentell, Ph.D. Georgia.

Assistant Professors:
F. A. Barbour, Ph.D. Illinois; J. R. Duftus, Ph.D. Purdue.

MBA Concentration: Marketing.

DBA Concentration: Marketing.

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


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. Preor coreq: Economics 5020; Statistics 5010. F, W

5210 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. Conceptual framework for forecasting, territory design, and routing. Prereq: 5020. F

5220 Promotion Management (3) Management of promotional activities within firm: advertising, publicity, personal selling, sales promotion. Emphasis on advertising, soft advertising, budgeting, segmentation, media selection, and evaluation of effectiveness. Prereq: 5020. Sp

5230 Analysis and Design of Marketing Systems (3) Macrotissue approach to marketing system. Conceptual framework for examining marketing agency and channel interactions, public policy, cost and efficiency, and innovation in marketing from viewpoint of decision maker. Prereg: 5020. 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, W

5350 Buyer Behavior Analysis for Marketing (3) Buyer behavior patterns with emphasis on implications of the marketer's viewpoint and exchange role. Marketing and behavioral sciences. Prereq: 5020, F, Su

5400 Analyzing Market Opportunity for Marketing Decision (3) Analysis of opportunity within markets, framework for identifying and organizing information required to assess market opportunity. Approaches to analyzing buyers in markets, forecasting extent of demand, analyzing industry/channel/competitor service. Emphasis on applying market opportunity analysis results to marketing decision making. 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. Sp

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. W

5990 Research in Marketing (3) Directed research on problems of interest to student and staff member. Prereq: 5020 and 5300. May be repeated. Maximum 6 hrs.

6000 Doctoral Research and Dissertation (3-15) E

6050 Macro/Methodological Foundations of Marketing (3) Fundamental nature and history of marketing processes. Review of major theories, and developing marketing discipline and in research process. Environmental public policy dimensions 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) Application of multivariate research tools 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

6250 Selected Problems in Consumer Behavior (3) Information search processes, attitude models, altitudes, and consumer satisfaction. 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, macro-environmental issues, market segmentation, children's television advertising, international marketing issues, marketing channels, and related issues. Prereq: Consent of instructor.

Transportation and Logistics

MBA Concentration: Transportation and Logistics

DBA Concentration: Transportation and Logistics

Minimum Course Requirements for MBA Concentration: 18 credit hours required including 5010, 5101, 5130, 5220.

5020 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.


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

5130 Carrier Transportation Management (3) Analysis of major transportation modes and their managerial strategies. Consideration of how social, technical, legal, and financial environment affects top level decision making. Application of general business, marketing, finance, and statistical decision processes to transportation decision making in uncertain environment.

5320 Logistics Systems Management (3) Development of strategy for management of logistical systems. Emphasis on executive level integration of logistics operations with marketing, production, and other decision areas. Practical applications through a case approach and simulation game. Prereq: Management 5020. W

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 urban transportation concepts.

5810 International Transportation Policy (3) Comparative analysis of transport systems in other countries. Analysis of U.S. policy relative to international transportation.

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.

6000 Doctoral Research and Dissertation (3-15) 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 or equivalent.

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

Office Administration

J. Stallard, Program Director

5000 Business Report Writing (3) Principles, practices, and mechanics of effective business letters and memoranda; principles applied by solving communication cases, emphasis placed on letters and memos as initial sources of ideas in communications system of the business firm.

5420 Business Report Writing (3) Basic principles and procedures of originating and disseminating business reports, both formal and informal in style; writing techniques for short and long reports; graphic presentation and interpretation; use of primary and secondary data for reports.

5440 Advanced Transcription (3) Improvement of ability to transcribe to a high level of accuracy, interpretation, and transcription. Preparation of reports and correspondence with special emphasis on the development of professional and technical correspondence.

5500 Seminar in Business Administration (3) Application of previously developed knowledge and skills to the solution of problems of contemporary importance. May be repeated. Maximum 6 hrs.

5510 Seminar in Business Administration (3) Analysis of contemporary business problems and relate them to major historical and theoretical developments in business. May be repeated. Maximum 6 hrs.

5520 Seminar in Business Administration (3) Analysis of major business problems, their causes, and their solution. May be repeated. Maximum 6 hrs.

5910 Seminar in Business Administration (3) Analysis of major business problems, their causes, and their solution. May be repeated. Maximum 6 hrs.

5990 Independent Study in Business Administration (3) Directed study in major field of interest. May be repeated. Maximum 6 hrs.

6000 Doctoral Research and Dissertation (3-15) E

6110 Seminar in Business Administration (3) Critical analysis of contemporary issues in business administration. May be repeated. Maximum 6 hrs.

6210 Seminar in Business Administration (3) Analysis of contemporary issues in business administration. May be repeated. Maximum 6 hrs.

6220 Research Methodology in Business Administration (3) Philosophy and design of research in business administration.

Office Administration

J. Stallard, Program Director

5000 Business Report Writing (3) Principles, practices, and mechanics of effective business letters and memoranda; principles applied by solving communication cases, emphasis placed on letters and memos as initial sources of ideas in communications system of the business firm.

5420 Business Report Writing (3) Basic principles and procedures of originating and disseminating business reports, both formal and informal in style; writing techniques for short and long reports; graphic presentation and interpretation; use of primary and secondary data for reports.

5440 Advanced Transcription (3) Improvement of ability to transcribe to a high level of accuracy, interpretation, and transcription. Preparation of reports and correspondence with special emphasis on the development of professional and technical correspondence.

5500 Seminar in Business Administration (3) Application of previously developed knowledge and skills to the solution of problems of contemporary importance. May be repeated. Maximum 6 hrs.

5510 Seminar in Business Administration (3) Analysis of contemporary business problems and relate them to major historical and theoretical developments in business. May be repeated. Maximum 6 hrs.

5520 Seminar in Business Administration (3) Analysis of major business problems, their causes, and their solution. May be repeated. Maximum 6 hrs.

5910 Seminar in Business Administration (3) Analysis of major business problems, their causes, and their solution. May be repeated. Maximum 6 hrs.

5990 Independent Study in Business Administration (3) Directed study in major field of interest. May be repeated. Maximum 6 hrs.

6000 Doctoral Research and Dissertation (3-15) E

6110 Seminar in Business Administration (3) Critical analysis of contemporary issues in business administration. May be repeated. Maximum 6 hrs.

6210 Seminar in Business Administration (3) Analysis of contemporary issues in business administration. May be repeated. Maximum 6 hrs.

6220 Research Methodology in Business Administration (3) Philosophy and design of research in business administration.
Statistics

MAJOR
Statistics

DEGREE
M.S.

Professors:
C. C. Thigpen (Head), Ph.D. Virginia Polytechnic Institute; 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; R. D. Sanders, Ph.D. Texas; D. J. Wheeler, Ph.D. Southern Methodist; M. S. Younger, Ph.D. Virginia Polytechnic Institute.

Assistant Professors:

THE MASTER'S PROGRAM

The M.S. program in Statistics is designed to provide students a basic foundation in theoretical and applied statistics for meaningful careers as consulting and practicing statisticians. A candidate should possess an undergraduate degree with a strong background in calculus, but no restrictions are imposed regarding an undergraduate major. The typical Master of Science degree program in Statistics is as follows:

Statistics Major Area

Quarter Hours

Probability theory 
Theory of statistical inference 
Additional coursework in statistics as approved by the student's committee 
Additional coursework as approved by the student's committee 

Minor Area

Selected with the approval of both the Department of Statistics and the department in which the work is to be taken 
Thesis* 
Total minimum hours

**MBA CONCENTRATION**

For students whose concentration area is Statistics, the MBA Core is revised to substitute Statistics 5110 for 5010. The concentration area must include 5120 and 5130. Normally, Statistics 5250-60-70 are also included which require 3450 as a prerequisite.

Statistics courses numbered 4000 and above possess 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.

3450 Statistics for Engineering (3) Survey of statistical methods with special application for engineering students; frequency distributions, selected sampling distributions, some tests of significance. Cannot be taken for credit concurrently with 2100. Prereq: Mathematics 2840. E

4250 Nonparametric Methods (3) Measures of association, two-sample tests, analysis of variance with ranked data, paired and multiple comparisons in preference testing; questionnaire evaluation. Sp

4310 Regression Analysis (3) Linear regression and correlation, multiple regression, stepwise methods, polynomial regression, use of dummy vari-

*Twelve hours of approved course work, to include Statistics 5610, may be substituted for the thesis requirement.

4410 Design of Experiments (3) Principles and procedures for efficient experimental design. Randomization, choice of size and number of experimental units, utilization of blocking arrangements. Interpretation of experimental data. W, Su

4415 Sampling Techniques and 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. F, W, Sp

5000 Thesis (1-15) E

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

5010 Probability and Statistical Inference (3) Fundamentals of probability, discrete and continuous probability distributions, mathematical expectation, and inference concerning means. Prereq: Mathematics 5052 or equivalent and a computer programming course. May not be taken for credit by students who receive credit for 5110. F, W

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

5050-60-70 Statistical Analysis for the Behavior Sciences (3, 3, 3) 5050—Probability distributions, sampling distributions, estimation and hypothesis testing. Parametric and nonparametric procedures. Prereq: 1 yr college mathematics and one course in statistics. 5050—Linear and multiple correlation methods, correlation for ranked and grouped data. Continuation of 5050. 5070—Analysis of variance and covariance; design of experiments. Parametric procedures. A continuation of 5050. F; 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 distributions, estimation, and hypothesis testing. Emphasis on interpretation and decision making. Not available for credit in any College of Business Administration degree program. F, Su


5610 Special Topics in Statistics (3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

6050 Applied Multivariate Analysis (3) Canonical correlation; discriminant analysis for several groups, and for equal and unequal covariance matrices; principal component analysis; Hotelling's T², multivariate analysis of variance and covariance. Prereq: 1 yr applied statistics including analysis of variance and multiple regression analysis. W

6070 Factor Analysis (3) Principal component analysis and principal factor analysis; estimates of communalities; methods of rotation; interpretation of factors; cluster analysis. Prereq: 5600. Sp

6210 Stochastic Processes II (3) Special analysis, time series, linear and nonlinear systems. Prereq: 5210.
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. 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 intended to prepare students interested in subsequent careers 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 prospective student who is interested in obtaining a career in the mass media and the social role of the mass media.

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

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

- The academic track is designed for the student who wishes to emphasize advanced study of the theory and effects of communications. A minimum of 45 hours of approved graduate work is required:
  - 12 hours of core courses:
    Communications 5100, 5120, 5140 and 6100, the first three of which must be taken during the first two quarters of the student's program, except with written approval of the Assistant Dean for Graduate Studies for the College. In addition, students who earned their Bachelor's degrees outside the field of Communications will normally be required to add Communications 5130 to their core;
  - 24 hours of selected courses within the College, including at least 9 hours at the 5000 level;
  - 9 hours of thesis work (Communications 5000).

- The professional track is designed for the student who desires the graduate degree but wishes to emphasize a particular professional area, such as advertising, broadcasting, journalism, or public relations. A minimum of 45 hours of approved graduate course work is required:
  - 9 hours of core courses:
    Communications 5100, 5120 and 5140, which must be taken during the first two quarters of the student's program, except with written approval of the Assistant Dean for Graduate Studies for the College;
  - 15 hours in a major area within the College, including at least 6 hours at the 5000 level;
  - 9 hours of thesis work (Communications 5000);
  - at least 12 hours in a minor area approved by the major advisor, of which at least 6 hours must be at the 5000 level.

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

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

Communications majors in the M.S. program must demonstrate ability to use a typewriter proficiently within their first quarter in residence.

DOCTOR OF PHILOSOPHY

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

The program is interdisciplinary, consisting of a required core curriculum and recommended emphasis outside the College in the related social and behavioral sciences.
College of Communications

The program is flexible and will accommodate a wide variety of career goals in communications. The Master's degree is not required for entry into or completion of the doctoral program. Program planning, however, will permit the Master's degree to be earned if desired. Students lacking academic or professional experience in communications will be required to take prerequisite courses. In general, however, the program may be completed within three academic years of full-time study beyond the Bachelor's degree. The following are normally minimal requirements for admission to full potential candidate status: (a) a 3.0 (4.0 system) grade point average in undergraduate studies, or 3.5 for graduate work if applicant holds a Master's degree; (b) above the fifteenth percentile in verbal and quantitative aptitude on the Graduate Record Examination; (c) completion of the California Psychological Inventory; (d) endorsement by at least three former teachers or professional colleagues chosen by the Ph.D. Admissions Committee; (e) a statement of the applicant's goals and reasons for pursuing the doctorate. Personal interviews with members of the Graduate Committee may be required. Professional experience in some field of communications is a highly desirable criterion for admission.

The following program represents work normally required for an individual without the Bachelor's degree and no technical competence: (a) prerequisite courses offered by the College of Communications and approved by the major advisor for applicants lacking the necessary academic and/or professional background; (b) core curriculum: 33 hours of course work; (c) primary concentration in communications: 15-18 hours of course work; (d) secondary concentration in a cognate minor subject normally outside communications: 12 hours of course work; (e) technical competence area in either teaching, research, or administration: 15-18 hours of course work and, for those who lack appropriate professional experience, an internship the equivalent of 9 credit hours; (f) research tool: 12 hours of course work; e.g., statistics, foreign language, or computer science; (g) dissertation: 36 hours of Communications 6000. The following courses represent the required core curriculum (beyond the Bachelor's degree): Communications 5100, 5120, 5140, 6100, 6200.

One of the following: Communications 6300, 6310, 6320. For the teaching or administrative technical competence area: a one-week, non-credit computer program course and Statistics 5211, or Sociology 5320 and Statistics 4250; for the research technical competence area: Statistics 5010 and 5020.

Continuing and Higher Education 5450.

Two courses in organizational theory from a group approved by the Graduate Studies Committee.

Admission to candidacy must be attained at least three semesters of full-time study and requires successful completion of a comprehensive examination.

REQUIRED SCHOLASTIC AVERAGE

A student in the College of Communications whose grade point average, not including incomplete grades, is below 3.0 at any time after the end of 12 hours of graduate credit will be placed on probation. A student on probation will be dropped from the program unless his or her cumulative graduate grade point average is 3.0 or higher at the end of the probationary period. The probationary period is defined as the next 12 quarters 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 on the quality 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.

Department of Instruction

Planned course offerings in the College of Communications 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:


Associate Professors:

G. A. Everett, Ph.D. Iowa; M. W. Singley, Ph.D. Southern Illinois.

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. No credit 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. Su, F.

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

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

5140 Mass Communication Theory (3) Critical appraisal of selected hypotheses and theoretical orientations in research literature of mass media. Introduction to theoretical conceptualization and its relationship to research methodology. Application of these orientations to contemporary mass communication problems. Prereq. 5100. Recommended prereq: 5120. F, W

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

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

6000 Doctoral Research and Dissertation (3-15) E

6100 Seminar in Communications Theory (3) In-depth analysis of selected theories and supporting research data dealing with source, media, receiver, or situational variables in process of communication. Prereq. 5140.

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

6300 Survey Research Methods in Communications (3) Surveys: research design and application. Prereq: 5120 or consent of instructor. May be repeated. Prereq or consent of instructor.

6310 Experimental Research Methods in Communications (3) Experimental methods applied to research problems. Causal inferences through research designs. Control, single-factor, and multifactor experimental designs. Laboratory and field experiment situations. Prereq: 5120 or consent of instructor. Prereq or coreq: Basic statistics.

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

Advertising

Professors:

R. Joel (Head), M.A. Wisconsin; A. D. Fletcher, Ph.D. Illinois, D. G. Hileman, Ph.D. Illinois.

Assistant Professor:


3630 Advertising Copy and Layout (4) Ideas and their translation into persuasive words and pictures. Principles and techniques of copy and layout. Lectures and labs. Prereq: 3000 with grade of "C" or better or consent of instructor. F, W, Sp

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

4360 Advertising Media (3) Media, markets, and audiences. Evaluation of media in relationship to communication needs of advertisers. Prereq: 3000 with grade of "C" or better or consent of instructor. 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 communication problems and allocation of budgets. Choice of appeals and
approaches; media selection; preparation of advertise-
ments. Prereq: 3650, 4000 and 4360 with grade of "C" or better or consent of instructor. F, W, Sp

5310 Current Issues in Advertising (3) Current socioeconomic, legal, ethical, and cultural issues in advertising and communication to determine adver-
siting role and responsibility toward society. Emphasis on both marketing and behavioral science aspects of advertising. Consideration of creativity, media, research, presentations, and evaluation of television and radio broadcasting for educational purposes. Sp

5510 Creative Projects (3) For students having spe-
cialized broadcasting interests or those who wish ex-
tensive directed study in creative writing or produc-
tion projects. May be repeated. E

5610 Public Affairs Broadcasting (3) News and public affairs function in broadcasting stations and networks, including management, economics, per-
sontal utilization, sources of program materials, ethical and legal aspects. Public affairs program de-
velopment, particularly press conferences, inter-
views, and news specials. Prereq: 3610 or consent of instructor. W

5620 Broadcast Law and Regulations (3) Socio-
political control of broadcasting; effect of laws, regula-
tions, and public pressures upon station operations. Emphasis on unique situation of broadcasting among media in terms of regulation. Prereq: Journal-
ism 4410 or 5210 or consent of instructor. F

5630 Broadcast Documentary Writing (3) Role of documen-
tary in radio and television. Research, writ-
ing, and critique of documentary programs. Sp

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

5970 Independent Study (3) E

Broadcasting

Professors: D. W. Holt (Head), Ph.D. Northwestern; H. H. Howard, Ph.D. Ohio.

Associate Professor: J. G. Simpson, M.S. Syracuse.

Assistant Professors: F. A. Lester, M.A. Tennessee; B. A. Moore, Ph.D. Ohio; R. A. Shirley, M.A. Tennessee; M. K. Sidel, Ph.D.


3360 Television and Radio Advertising (3) Prin-
ciples of successful radio-television advertising; emphasis on media research, rate structure, pro-
gramming, creativity; television commercials. W, Sp

3650 Radio-Television Writing (3) Theory and tech-
niques of writing broadcasting scripts except news and dramas. Special events, interviews, mu-
iscal scripts, radio talks, documentaries, and promotion material. F, W

4010 Speech for Broadcasting (3) Fundamental broadcast conditions affecting the announcing; pro-
nunciation and oral interpretation of general Ameri-
can speech. Spanish, Italian, German, and French pronunciation. Prereq: Speech 2511. F, W

4020 Radio Production (3) Study of radio produc-
tions, past and present. Familiarization with produc-
tion techniques. Group and individual produc-
tion activities. Prereq: 2750 or consent of instruc-
tor. Cannot be taken for graduate credit by com-
munications majors. E

4030 Television Production (3) Overview of ele-
ments of television production: cameras, sound, light-
ing, film, videotape recording, optics, and studio center controls. 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, produc-
ing, directing and performing with orientation to the professional broadcast student. Prereq: 4030 or con-
sent of instructor. F, W

4610 Broadcast News Operation (3) Theory and prac-
tice in covering local news and public affairs events for radio and television. Gathering and pro-
duction of news broadcasts, using tools of broadcast newsperson. 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. De-
partments and 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, pricing, and other areas of sales management. Prereq: 2750 or consent of instructor. Sp

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

5510 Creative Projects (3) For students having spe-
cialized broadcasting interests or those who wish ex-
tensive directed study in creative writing or produc-
tion projects. May be repeated. E

5610 Public Affairs Broadcasting (3) News and public affairs function in broadcasting stations and networks, including management, economics, per-
sontal utilization, sources of program materials, ethical and legal aspects. Public affairs program de-
velopment, particularly press conferences, inter-
views, and news specials. Prereq: 3610 or consent of instructor. W

5620 Broadcast Law and Regulations (3) Socio-
political control of broadcasting; effect of laws, regula-
tions, and public pressures upon station operations. Emphasis on unique situation of broadcasting among media in terms of regulation. Prereq: Journal-
ism 4410 or 5210 or consent of instructor. F

5630 Broadcast Documentary Writing (3) Role of documen-
tary in radio and television. Research, writ-
ing, and critique of documentary programs. Sp

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

5970 Independent Study (3) E

School of Journalism

Professors: J. A. Crook (Director), Ph.D. Iowa State; J. B. Haskins, Ph.D. Minnesota; B. K. Leiter, Ph.D. Southern Illinois; D. D. Nimmo, Ph.D. Vanderbilt.


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

3410 Communications Law (3) Statutory law and judicial precedents affecting mass communications media. Libel, contempt of court, invasion of privacy, copyright. Broadcasting, advertising and postal reg-
ulations. E

3710 Public Relations (3) Theories and principles of public relations. Overview of PR as a management tool of business, government, institutions, and orga-
nizations. Cannot be taken for graduate credit by com-
munications majors. E

3720 Advanced Public Relations (3) Preparation of communications materials to gain support from va-
rious publics; planning public relations programs. Prereq: 3710. F, Sp

3810 Specialized Publications (3) Editorial and de-
sign considerations for company publications and small magazines. Prereq: 2230 and 3310 or consent of instructor. W, Sp

3990 Journalism Research Methods (3) Use of so-
cial science research methods in journalism with emphasis on inquiry, methodology, interpretation and communication of research findings to public. W, Sp

4130 Editorial Writing (3) Analysis of editorial poli-
cies, practices, pages. Writing of editorials and col-
umns 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.

4310 Reporting Public Affairs (3) Reporting news of courts, politics, and government. State, county and local coverage. Prereq: 2230 and senior standing. W, Sp

4410 Government and the Press (3) Historic and cur-
current problems in the relations of executive, judi-
cial, legislative, and regulatory segments of govern-
ment and press. Prereq: 3110 or consent of instruc-
tor. W

4560 Investigative Reporting (3) Investigative and inter-
pretive reporting of complex or specialized sub-
jects to place news in perspective or to clarify situa-
tions. Emphasis on writing for publication. Prereq: 2220. W

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

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

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

4950 International Communications (3) Com-
munication 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.

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

5210 Government and the Press (3) Historic and cur-
current problems in the relations of executive, judi-
cial, legislative, and regulatory segments of govern-
ment and press. Prereq: 3110 or consent of instruc-
tor. W

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

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

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

5710 Studies In Public Relations Communica-
tions (3) Problems of communication between in-
stitutions and organizations and their publics. Case histories and evaluations of programs. Prereq: 3710 or consent of instructor.

5810 Magazine Editing and Production (3) Anal-
sis of editorial and production problems of general, regional, and specialized publications. Reader inter-
pretation, individual editorial projects. Prereq: Consent of instructor. F

College of Communications 47
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)
The College of Education

William H. Coffield, 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 College Teaching, the Master of Science degree, the Specialist in Education degree, the Doctor of Education, and the Doctor of Philosophy degrees.

MASTER 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 with a major in Education 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>Educational Psychology and Guidance, in Curriculum and Instruction, in Safety Education and Service, or in Vocational-Technical Education.</td>
<td>9 Hours</td>
</tr>
<tr>
<td>the College in addition to the designated research courses</td>
<td>36 Hours</td>
</tr>
<tr>
<td>Dissertation</td>
<td>Minimum</td>
</tr>
</tbody>
</table>

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 Superintendency
- 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

hours selected from outside
- 9 Hours
- 36 Hours
- Minimum
- Minimum
Counseling Theory, Research, and Practice

describes in-service educational

development of research proposals in the

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.

Bureau of Educational Research and Service

Counseling Theory, Research, and Practice

activities such as in-service educational content and instrumental methodology.

Physiological Factors Related to Fitness and Performance

Student Personnel Work

Training and Supervision of Counselors

Option V. Foundations of Human Movement

Factors Influencing the Learning of Motor Skills

Philosophical and Sociological Foundations of Sport 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.

Bureau of Educational Research and Service

Counseling Theory, Research, and Practice

activities such as in-service educational content and instrumental methodology.

Physiological Factors Related to Fitness and Performance

Student Personnel Work

Training and Supervision of Counselors

Option V. Foundations of Human Movement

Factors Influencing the Learning of Motor Skills

Philosophical and Sociological Foundations of Sport 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.

Bureau of Educational Research and Service

Counseling Theory, Research, and Practice

activities such as in-service educational content and instrumental methodology.

Physiological Factors Related to Fitness and Performance

Student Personnel Work

Training and Supervision of Counselors

Option V. Foundations of Human Movement

Factors Influencing the Learning of Motor Skills

Philosophical and Sociological Foundations of Sport 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.

Bureau of Educational Research and Service

Counseling Theory, Research, and Practice

activities such as in-service educational content and instrumental methodology.

Physiological Factors Related to Fitness and Performance

Student Personnel Work

Training and Supervision of Counselors

Option V. Foundations of Human Movement

Factors Influencing the Learning of Motor Skills

Philosophical and Sociological Foundations of Sport 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.

Bureau of Educational Research and Service

Counseling Theory, Research, and Practice

activities such as in-service educational content and instrumental methodology.

Physiological Factors Related to Fitness and Performance

Student Personnel Work

Training and Supervision of Counselors

Option V. Foundations of Human Movement

Factors Influencing the Learning of Motor Skills

Philosophical and Sociological Foundations of Sport 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.

Bureau of Educational Research and Service

Counseling Theory, Research, and Practice

activities such as in-service educational content and instrumental methodology.

Physiological Factors Related to Fitness and Performance

Student Personnel Work

Training and Supervision of Counselors

Option V. Foundations of Human Movement

Factors Influencing the Learning of Motor Skills

Philosophical and Sociological Foundations of Sport 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.

Bureau of Educational Research and Service

Counseling Theory, Research, and Practice

activities such as in-service educational content and instrumental methodology.

Physiological Factors Related to Fitness and Performance

Student Personnel Work

Training and Supervision of Counselors

Option V. Foundations of Human Movement

Factors Influencing the Learning of Motor Skills

Philosophical and Sociological Foundations of Sport 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.

Bureau of Educational Research and Service

Counseling Theory, Research, and Practice

activities such as in-service educational content and instrumental methodology.

Physiological Factors Related to Fitness and Performance

Student Personnel Work

Training and Supervision of Counselors

Option V. Foundations of Human Movement

Factors Influencing the Learning of Motor Skills

Philosophical and Sociological Foundations of Sport 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.

Bureau of Educational Research and Service

Counseling Theory, Research, and Practice

activities such as in-service educational content and instrumental methodology.

Physiological Factors Related to Fitness and Performance

Student Personnel Work

Training and Supervision of Counselors

Option V. Foundations of Human Movement

Factors Influencing the Learning of Motor Skills

Philosophical and Sociological Foundations of Sport 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.

Bureau of Educational Research and Service

Counseling Theory, Research, and Practice

activities such as in-service educational content and instrumental methodology.

Physiological Factors Related to Fitness and Performance

Student Personnel Work

Training and Supervision of Counselors

Option V. Foundations of Human Movement

Factors Influencing the Learning of Motor Skills

Philosophical and Sociological Foundations of Sport 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.

Bureau of Educational Research and Service

Counseling Theory, Research, and Practice

activities such as in-service educational content and instrumental methodology.

Physiological Factors Related to Fitness and Performance

Student Personnel Work

Training and Supervision of Counselors
educational psychology with 3 hours credit.
5. Electives (with approval of advisor):
   a. Music Education: 12 credit hours from courses numbered 3000, 4000, or 5000 levels. No courses required in the undergraduate curricula may be included.
   b. Music: 3 credit hours from courses at the 3000, 4000, or 5000 levels.
5220 The Administration and Supervision of experimental studies. Prereq: Consent of instructor. Su
5210 Psychological Foundations of Music (3) Techniques and processes through music experiences; development of students at all levels. Standard educational psychology, educational psychology, and elementary statistics. Su
5250 The Role of Music in Education (3) For school personnel, other than music teachers, on the role of music in public education. No previous experience in music required. Su
5280 Music for Early Childhood (3) Prereq: 3120 or 3130 or consent of instructor. Su
5270 Studies of Music for Children in the Primary Grades (3) Children's growth processes in music for Grades 1-3, and musical experiences. For major in music education and/or elementary education. Prereq: 3120 and 3130 or consent of instructor.
5320 Advanced Choral Literature and Conducting (3) Reading, conducting, and interpreting vocal scores suitable for school, college, church, and community bands; emphasis on contemporary and standard major choral works. Prereq: Undergraduate degree with a major in music or music education; 4450, 4510 or equivalent.
5350-60-70 Special Problems in Music Education (3, 3, 3) Current problems in music education at all levels of instruction and in various specialized areas of music curriculum. Prereq: 5710 or equivalent and consent of instructor. E
5410 Advanced Band Literature and Conducting (3) Reading, conducting, and interpreting band scores suitable for school, college, and community bands; emphasis on contemporary and standard band literature. Prereq: Undergraduate degree with a major in music or music education; 4430 or equivalent.
5510-20-30 The Talent Education Program of Shinichi Suzuki (2, 2, 2) Study of the psychology, procedures and literature utilized by Shinichi Suzuki in Talent Education program in Japan. Prereq: Consent of instructor. F, W, Sp
5710 Research in Music Education (3) Prereq: Consent of instructor. Su
5810 Seminar (3) Music teaching in primary and intermediate grades. Survey of research, professional literature and development of bibliography. Laboratory activities. Projects. Prereq: Admission to M.S. program.
5820 Seminar (3) Music teaching in vocal and general music areas of junior high school curriculum. Survey of research, professional literature and development of bibliography. Laboratory activities. Projects. Prereq: Admission to M.S. program.
5830 Seminar (3) Music teaching in instrumental areas of the elementary, junior high, and senior high curricula. Survey of research, professional literature and development of bibliography. Laboratory activities. Projects. Prereq: Admission to M.S. program.
5840 Seminar (3) Music teaching in vocal, theoretic-al, historical, and appreciation area of the secondary school curricula. Survey of research, professional literature and development of bibliography. Laboratory activities. Projects. Prereq: Admission to M.S. program.
Continuing and Higher Education
MAJOR
DEGREE
Adult Education
College Student Personnel
M.S.
M.S.
Professors:
Associate Professor:
K. O. McCullough, Ph.D. Florida State.
Assistant Professor:
The Master of Science degree in Adult Education is offered for teachers, administrators, counselors, and community specialists. The degree program has two options: a thesis option requiring a minimum of 45 hours, and a non-thesis option requiring a minimum of 51 hours. Both 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.
4554-55-56 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. Prereq: Consent of instructor. S/NC only.
5000 Thesis (1-15) E
5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any semester in which 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 Seminar in College Teaching (3) Effective teaching in the college classroom. Membership in college personnel administration in colleges and universities; in community or junior colleges. Prereq: Consent of instructor. W
5360-70-80 Problems in Continuing and Higher Education (1-3, 1-3, 1-3) Independent study of problems and special institutes. S/NC only. E
5410 College and University Law—The Legal Environment (3) Legal precedent affecting optimization, administration, and financing of public higher education. Academic freedom, faculty termination, taxation, private support, religion, tort liability, administrative 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 safeguarding of personal services in public higher education. Student discipline, housing, dress, organizations, activities, fees, tuition, and related federal regulations. W
5430 College and University Law—Tort Liability and Risk Management (3) Legal precedent concerning liability exposure of public institutions of higher education. Personal and institutional liability. Basic principles of risk management and liability insurance. Prereq: 5410 and 5420, or consent of instructor. E
5440 American Higher Education (3) Purposes, functions, organization, and development of higher education. F
5450 Instruction in Higher Education (3) Problems, procedures, and techniques. W
5460 Adult Development (3) Changes in characteristics of the adult over the life span and implications for adult education. F
5470 The Curriculum of Undergraduate Higher Education (3) Background, content, and organization of instructional programs, trends and evaluation procedures, including accreditation activities. F
5510 Governance of Colleges and Universities (3) Development, change, trends, process, and structure of collegiate governance. F
### Major Departments

- **Education**
- **Science Education**
- **Mathematics Education**
- **Instructional Media and Technology**
- **English Education**
- **Elementary Education**
- **Curriculum**

### College of Education

#### Majors

<table>
<thead>
<tr>
<th>Degree</th>
<th>Curriculum and Instruction</th>
<th>Educational Administration and Supervision</th>
<th>Educational and Counseling Psychology</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.S.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ed.S.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M.S.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Graduate Programs

- **Doctoral Program**
- **Master's Program**

### Educational and Counseling Psychology

- **Graduate Programs**
  - **5600 Program Planning in Continuing and Higher Education**
  - **5770 Case Studies in College Student Personnel**
  - **5990 Practicum in College Student Personnel**
  - **5960-70-80 Seminar in Continuing and Higher Education**
  - **5550 Fiscal Problems in Higher Education**
  - **5710 Human Resources Management**
  - **5770 Case Studies in College Student Personnel**

### Administrative Information

- **Professors:**
  - J. J. Bellon (Head), Ed.D. California (Berkley)
  - B. L. Broman, Ed.D. Tennessee; P. B. Burns, Ph.D. Iowa; W. L. C., Ph.D. Ohio State; D. J. Tech
  - M. A. Christiansen, Ph.D. Kansas
  - E. S. Christenbury (Emeritus), Ph.D. Georgia
  - A. R. Davis, Ph.D. Ohio State; D. J. Dessart, Ph.D. Maryland
  - E. D. Doak, Ed.D. Colorado
  - H. F. Franklin, Ph.D. Illinois; R. L. French, Ph.D. Ohio State
  - L. O. Haas, Ed.D. Columbia; R. Howard, Ph.D. Ohio State; A. M. Johnston, Ph.D. Chicago
  - K. J. Joets, Ed.D. Oklahoma; L. N. Knight, Ph.D. Texas
  - A. Malik, Ed.D. Columbia; N. Mas, Ph.D. Southern Illinois; W. C. Murphy, Ph.D. Alabama

- **Associate Professors:**
  - L. C. Cagle, Ed.D. Georgia; C. A. Chance, Ph.D.
  - Ohio State; C. L. Faires, Ph.D. Kent State
  - A. D. Grant, Ph.D. Wisconsin; R. L. Hodge, Ph.D. Texas
  - R. E. Haefner, Ed.D. Ohio State; B. M. Kolker, Ed.D. Indiana; M. E. Myer, Ph.D. Florida

- **Assistant Professors:**
  - Tennessee; A. A. Van Fleet, Ph.D. Florida; C. A. Washburn, Ph.D. Maryland; P. D. Wiley, Ed.D. Houston
  - S. J. Wynt, M.S. Tennessee

Graduate programs are designed to improve scholarship and educational competence in a number of areas leading to the Master of Science degree, the Specialist in Education degree, the Doctor of Education degree, and the Doctor of Philosophy in Education degree.

**THE MASTER'S PROGRAM**

- For the Master of Science degree, thesis and non-thesis options are available in the following majors: Curriculum, Educational Science, Foreign Language Education, Instructional Media and Technology, Mathematics Education, Reading Education, Science Education, or 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 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 fields: curriculum, social 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 49.

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

### Additional Information

- **5000 Thesis**
- **5090 Special Topics**
- **5091 Independent Study**
- **5092 Supervised Readings**

### Administrative Contacts

- **Director:**
  - T. N. Turner, Ed.D. Ohio State

### Contact Information

- **Office:**
  - 111 Education Building

### cucumber and instruction

**MAJORS**

<table>
<thead>
<tr>
<th>Degree</th>
<th>Curriculum and Instruction</th>
<th>Educational Administration and Supervision</th>
<th>Educational and Counseling Psychology</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.S.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ed.S.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M.S.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5142 The Existential Student (3) Literature of existentialism as a source for harmonizing student's educational goals and curriculum.

5150-60-70 Seminar (1-3, 1-3, 1-3) Curriculum, elementary education, secondary education, or social foundations as they relate to goals of student programs. Maximum 9 hrs. S/NC only

5160-90-200 Seminar Educational Specialist Research and Thesis (3, 3, 3)

5210 Seminar in International Education: Asia and Africa (3) Historical, philosophical, and sociological foundations of special reference to Japan, China, India, and Nigeria.

5211 Instructional Strategies in Elementary School Social Studies (3) Specific teaching methods and instructional procedures for organizing social studies learnings. Prereq: Undergraduate social studies course or equivalent.

5212 Programs and Materials in Teaching Elementary 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 Practicum in Diagnosticians in Elementary Mathematics Difficulties (3) Assessment and practicum experience with students having corrective and remedial arithmetic needs. Prereq: 5210, Su.

5240 Creative Thinking and Expression in the Elementary School (3) Gives students opportunity to examine development of creative potential across academic curricular areas of elementary school. Prereq: Consent of instructor. Sp, Su

5250 Secondary School Instruction (3) Persistent instructional problems in secondary schools. Su

5260 Philosophy of Education (3) Truth, knowledge, and valuation in relation to work of schools. Prereq: 3260, Educational Psychology 2430 or 3610, 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 approaches.

5280 Teaching Language Arts in the Elementary School (3) Recent trends in methods, materials, and content. Not available for credit to persons completing 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 innovative science program materials; methods of diversifying teaching, using materials, and analyses of program structure. Prereq: 3270 or equivalent, or consent of instructor.

5284 Seminar in Teaching Elementary Science (3) Analysis of current curricular issues. Prereq: 5282 or 5283, or one year teaching experience, or consent of instructor.

5290 Teaching of Mathematics in the Elementary School (3) Trends in methods, materials, and content. Not available for credit to persons completing recent elementary mathematics course. Prereq: Consent of instructor. F, Su

5291 Programs and Materials in Elementary School Language Arts (3) Programs and special instructional aids associated with language arts. Prereq: 3360 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 development of instructional programs. 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 for development of higher level comprehension skills, concepts, and attitudes for creative (or productive) and critical (or evaluative) reading. 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. Prereq: 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: Consent of instructor.

5304 Programs and Materials for Reading Instruction (3) Examination, selection, and use of materials in teaching reading, 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 needs 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 Correction of Classroom Language Arts Difficulties (3) Classroom approaches to assessing and correcting language arts (other than reading) difficulties. Prereq: One graduate level course in elementary school language arts or consent of instructor.

5309 Curriculum Development and Evaluation (3) Examination of alternative approaches to improving current practice. Prereq: 5580 or consent of instructor.

5310 Curriculum Development at the Local Level (3) 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.

5355 Mathematics Laboratories in Elementary School (K-9) (3) For elementary school teachers dealing with activity-oriented mathematics laboratory materials and pedagogical strategies. Theoretical considerations and development of curricula and materials for laboratory. Prereq: Consent of instructor.

5379 Diagnosis and Correction of Classroom Reading Problems (3) Procedures, methodologies and materials for diagnosis and teaching children having reading problems or consent of instructor.

5380 Practicum in Diagnosis of Reading Problems (3) Theoretical and practical application of specific reading diagnostic instruments; testing of elementary and/or secondary school students, preparing case study reports, and conducting parent conferences. Prereq: Course in diagnosis and correction of reading problems or consent of instructor. May be repeated. Maximum 9 hrs. S/NC only.

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) Diagnostic and corrective reading needs. Prereq: Course in diagnosis and correction of reading problems or consent of instructor. May be repeated. Maximum 6 hrs.

5390 Problems in Improvement of Instruction (1-3) Workshops, conferences, and inservice 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) Contribution of anthropological concepts (primarily concepts of culture) to understanding of education processes, problems, and thoughts in our society and others. (Same as Anthropology 5511.)

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.

5590 Curriculum Planning and Development (3) Introduction to current theory and basic principles. Prereq: 5410 or 5270 or consent of instructor; E

5591 Educational Statistics (3)

5592 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.

5593 Individualization of Instruction (3) Practical experience in designing individualized activities and materials. Prereq: 5590 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) 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) Prereq.

5680 Teacher-Parent-Community Relations (3) Development of techniques for effective relations between parents and teachers. Roles and expectations of parents and teachers, parent involvement, and influence of community on educational process.

5690 Design of Instructional Media (3) Design and application of instructional development model to arrive at solutions to instructional problems and 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) Designing, developing and producing audiovisuals, including pre-sensing, synthesizing, photocopying, non-photographic slides and video tape for producing classroom and instructional aids. Prereq: 5270 or consent of instructor, Library and Information Science 4750 or equivalent. (Same as Library and Information Science 5691.) Prereq: Consent of instructor.

5692 Evaluation of Instructional Media (3) Evaluating and recycling multimedia technology to meet needs and objectives of learners. Prereq: 5691 or consent of instructor.

5693 Administering Instructional Media Programs (3) Duties, functions, and responsibilities of media professionals developing and administering
media program in various organizational and learning settings. Prereq: 5691, 5692, or consent of instructor.

5694 Utilization of Educational Television and Radio (3) Use of noncommercial educational TV and radio in schools and colleges. Prereq: Consent of instructor.

5695 Research in Instructional Media (3) Media research and its application toward improvement of instruction and learning. Prereq: Consent of instructor.

5696 Practicum Experience in Instructional Media (3) Practicum experience in professional media role as identified by student in various organizational and learning settings. Prereq: Consent of instructor.

5697 Application of Instructional Media (3) Media theory and research, newer media and technology, application of media in instructional settings. Prereq: Consent of instructor.

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, examination of existing observation systems.

5790 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.

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 machines and machines.

5820 Seminar in the Teaching of Mathematics (3) Current methods and materials for grades 7-12 for experienced teachers. Prereq: 1 year teaching experience (mathematics grades 7-12) or consent of instructor.

5825 Teaching Mathematics in the Middle and Junior High School (3) Problems related to teaching mathematics in middle and junior high schools. Understanding structure of mathematical concepts, strategies, methods, and materials for teaching mathematics for individualized instruction, mathematical laboratories, and independent study. Opportunities for individual projects. Prereq: Consent of instructor.

5830 Seminar in Mathematics Education (3) Current curricular issues. Emphasis on individual student projects and investigations.

5835 Teaching Mathematics in the Senior High School and Community-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.

5841 Trends and Issues in Early Childhood Education (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 strategies, materials and evaluation methods. Prereq: Course in child development or child psychology at senior or graduate level.

5843 Seminar in Early Childhood Education (3) Analysis of research in early childhood education (K-3) relating to application to programs and methods of instruction. Prereq: 4450 or equivalent, or consent of instructor. May be repeated. Maximum 6 hrs.

5844 Mathematics in Early Childhood Education (K-3) (3) Behavioral characteristics of children in regard to mathematics, content materials and function-al instructional settings, and teaching strategies for development of mathematical ideas. Prereq: 3550 or equivalent. Su.

5845 Social Studies and Science in Early Childhood Education (K-3) (3) Integrative approaches to and substantive classification systems of content areas of social studies in the K-3 level. Emphasis on selection of appropriate social studies and science content and approaches for the young child. Prereq: 3270 and 3720 or equivalent. F, Su.

5846 Language Arts in Early Childhood Educa-
tion (K-3) (3) Language development of young learner with emphasis on teaching methods, procedures, program and materials in early childhood language arts program. Prereq: 3260 or equivalent or consent of instructor.

5899 Field Experience (1-8) Application of curricu-lar and instructional principles, methods, and mate-rials in schools. Program. Prerequisites must be met, and consent of instructor required. Required may be repeated. Maximum 12 hrs. S/NC only.


5901 Linguistics and the Teacher of English (3) Analysis and application of linguistics in the classroom.

5902 Teaching Composition in the High School (3) Techniques for teaching metoric. W.

5903 Teaching Fiction in the Secondary School (3) Reading, study, and analysis of literary selections.

5904 Teaching the Mass Media in the English Classroom (3) Nature of mass media and importance to American education and life.

5905 Teaching English in the Community-Junior College (3) Emphasis on thorough understanding of communication needs of community/junior college students and objectives, strategies, and materials for meeting these needs.

5906 Teaching Poetry in Grades 7-12 (3) Materials and strategies for teaching poetry.

5907 Teaching Drama in Grades 7-12 (3) Strategies and materials for teaching drama.

5908 Developing Speaking and Listening Skills in Grades 7-12 (3) Strategies and materials for teaching speaking and listening.

5909 Instructional Theory and Design (3) Instruc-tional process and relationship to curriculum and learning. Prereq: Consent of instructor.

5910-20-30 Problems in Lieu of Thesis (3, 3, 3) Direction of the Forensic Program (4) (Same as Speech 5911.)

5912 Play Production in Secondary Schools (4) Same as Theatre 5912.

5950 The Function of the Thinking Process in Education (3) Analysis of thinking process for purpose of tracing its implications for education theory and practice.

5960 The Teaching of Natural Science (3) Strategies, laboratory techniques, teaching and evaluation, professional guidelines for middle, junior and senior high schools, community colleges. Prereq: Consent of instructor.

5961 Seminar in Science and Environmental Education (3) Recent developments in science education. Interrelationships of major environmental factors on science education for middle, junior and senior high schools, community colleges. Prereq: Consent of instructor.

5962 Studies in Energy Education (3) Major and alternative energy sources with applications for development of energy educational programs and materials; special emphasis on science taught in schools including community colleges. Prereq: 5961 or consent of instructor.

5970 The Teaching of the Social Studies (3) Su.

5980 Projects, Programs, and Materials in Social Studies (3) Projects and aids associated with each social science discipline.

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

6010 Studies in English Education (3) Reading and study in various areas of teaching of English composition, language, and literature.

6020 Seminar in Teaching the Social Studies (3) Problems associated with classroom instruction in junior and senior high schools.

6030 Research and Theory in Teaching Reading (3) Research and theory in application to teaching of reading; research design as it applies to reading investigations. Prereq: Two 5000-level courses in reading.

6031 Seminar in Reading and Language Arts (3) Topics new to reading and language arts chosen by need and instructor(s). Prereq: 5000-level course in reading education and in language arts or consent of instructor.

6032 Organization and Administration of Reading Programs (3) Synthesizing instructional and learning components of reading into classroom, school, and system programs. Prereq: 3 5000-level courses (preferably 5579 and 5304) in reading education or consent of instructor.

6040 Seminar in Curriculum and Instruction (1) Required three quarters. S/NC only.

6060 Advanced Studies in Elementary Education (3) Critical analysis of research as it applies to classroom practice. Prereq: 5710 or 5800; 12 hrs at graduate level; or consent of instructor.

6080 Advanced Seminar in Philosophy of Education (3) Some selected philosophical issues in education. W.

6081 Phenomenology and Education (3) Theory and applications to selective educational issues. Prereq: 2 courses in history or philosophy of education.

6082 Philosophical Analysis and Education (3) Philosophical analysis of language and concepts in educational research and writing. Prereq: At least 2 courses in history or philosophy of education.

6090 Special Topics (1-6) Topics to be assigned. May be repeated. May be offered for letter grade or S/NC.

6091 Independent Study (1-6) Topics to be assigned. May be repeated. May be offered for letter grade or S/NC.

6092 Supervised Readings (1-6) Topics to be assigned. May be repeated. May be offered for letter grade or S/NC.

6150 Education as Social Policy (3) Education as instrument of national policy; topical problems faced by society in shaping educational programs. Prereq: Consent of instructor.

6210 Seminar in Elementary School Social Stu-
dies Research (3) Research in elementary social studies, status of research in field, needed research-related research from other fields. Prereq: Undergraduate course and one graduate course in social studies, or equivalent.

6230 Programs for Curriculum Improvement (3) W.

6240 Interpretation of Research in Curriculum and Instruction (3) Research studies and relation of findings to professional assignments. Prereq: 5800 or 5710 or equivalent.

6250 Seminar in History of Education (3) May be repeated with consent of instructor.

6282 Advanced Studies in Elementary School Science (3) Critical analysis of current research in elementary school science. Prereq: Undergraduate course and one graduate course in science, or equivalent.
6350 The Professional Education of Teachers (3) Principles and practices of preservice preparation of teachers for American elementary and secondary school curricula and historical trends and issues; innovations and directions for future.
6400 The Dynamics of Educational Change (3) Interdisciplinary approach to change process in education. Prereq: Consent of instructor.
6500 Advanced Studies in Early Childhood Education (3) Prereq: 2 graduate level courses in early childhood education and consent of instructor. May be repeated. Maximum 6 hrs. S/NC only.
6510 Advanced Studies in Elementary School Language Arts (3) Critical research analysis of selected issues in elementary school language arts. Prereq: 2 graduate level courses in elementary school language arts or consent of instructor. Sp.
6511 Advanced Studies in Educational Anthropology (3) Ethnographic methods applied to formal and nonformal educational settings. Prereq: 2 courses in cultural anthropology, educational anthropology, or consent of instructor.
6610-20-30 Seminar in Dissertation Proposal Writing (2, 2, 2) Preparation and evaluation of dissertation proposals. Prereq: Completion of at least one research competency or consent of instructor. S/NC only.
6710 Advanced Educational Statistics (3)
6720 Interpretation of Data (3) Types of data in published materials in education; principles of sound interpretation.
6731 Advanced Studies in Curriculum (3) Analysis of influential curriculum theories and approaches, structure and design of educational programs. Prereq: 5580 and 5550, or equivalent.
6830 Studies in Mathematics Education (3) Reading and study related to historical trends and issues in mathematics education in United States providing broad perspective on current curriculum problems and future trends. Prereq: 5830 or consent of instructor.
6850 Principles of Educational Leadership (3) Conflicting concepts, with application to major problems in instruction, supervision, and administration.
6899 Internship (1-6) Advanced level experiences in application of principles and practices of curriculum development and instructional improvement. Program prerequisites must be met and consent of instructor required. May be repeated. Maximum 12 hrs. S/NC only.
6960 Advanced Studies in Secondary Science and Environmental Education (3) Programs, materials, and recent research for middle, junior and senior high schools, community colleges. Prereq: 5960 or equivalent, consent of instructor.

*May not be used toward meeting 6000 requirements.

Educational Administration and Supervision

MAJOR

DEGREES

Educational Administration and Supervision

MAJOR

DEGREES

5310 School Administration and Civil Rights Issues (3) To help school administrators meet responsibilities and resolve problems stemming from civil rights legislation pertaining to race, sex, and the handicapped.
5420 District Level Administration (3) Role of central administrative team, and relationships, behaviors, and competencies to develop an effective school organization.
5430 Building Level Administration (3) For beginning school principals and administrators, and for those operating in rural elementary, secondary, or consolidated schools.
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.
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.
5460 Personnel Administration: Local School (3) Planning personnel needs: job analysis; recruitment; selection; placement; orientation of new staff; employment and dismissal, and contract administration for both professional and supporting staff.
5470 Introduction to School Facility Planning (3) For school administrators; facility planning; skills in building planning; feasibility and evaluation.
5480 Fundamental Supervision—Local School (3) Developing a concept of supervision; instructional help, support, and service for teachers; supervision of curriculum; staff development; and staff evaluation.
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.
5560 Research for Educational Administrators (3) Descriptive, experimental, and quasiexperimental designs to help student without quantitative background to read and understand technical literature. Primarily for nonthesis option students. Should be taken early in M.S. or Ed.S. program.
5580 Seminar in Communication Skills for Educational Administrators (3) Identification, development and use of interpersonal and group related communication skills.
5711 Problems in Educational Administration and Supervision: School Operation (3) May be repeated.
5712 Problems in Educational Administration and Supervision: Higher Education (3) May be repeated.
5713 Problems in Educational Administration and Supervision: State School Administration (3) May be repeated.
5714 Problems in Educational Administration and Supervision: Community Education (3) Independent study of administrative problems. May be repeated.
5751 Problems in Educational Administration and Supervision: Family Planning (3) May be repeated.
5752 Problems in Educational Administration and Supervision: Finance (3) May be repeated.
5753 Problems in Educational Administration and Supervision: Transportation (3) May be repeated.
6220 Programs for the Professional Preparation of Education Administrators and Supervisors (3) A

6340 Current Trends in School Law (3) Logical arrangement of case and statutory material for public school administration; examination of problems concerning the law and public education. W, Su

6380 Instructional Supervision—School District (3) Definition and analysis of instructional supervision at the school district level: Supervisory operations including level development; instructional support, help, and service for teachers and administrators; personnel development; program evaluation. W, Su

6420 School Board-Superintendency Relationships (3) The local unit of school administration, school district and its governing body, board of education or school board. Sp

6440 School Business Management (3) Emphasizes superintendency team concept; planning, procurement and utilization of fiscal resources. F, Su

6450 Grant and Contract Proposal Preparation (3) Grants and contracts processes in education. Basic concepts applicable to other special agencies. Sp

6460 School Personnel Administration (3) Personnel administration functions for professional and supporting staff in educational organizations. Recruitment, selection, personnel policies, employee wage and salary administration, fringe benefits, collective negotiations, human relations, staff development, and staff evaluation. F, W, Su

6480 Special Topics in School Personnel Administration (3) Human problems in school personnel administration; staff planning, record systems, personnel policies, collective bargaining in education; and staff evaluation. May be repeated. Maximum 12 hrs. F, W, Sp

6530 Futuristic Educational Planning Methods (3) Methods for describing alternative futures. W

6540 Contemporary Economics and Educational Finance (3) Contemporary educational finance policies and their influence on educational service and program, national economy, welfare of individuals, and welfare of the nation. F, Su

6550 State-Federal Relations in Education (3) Purposes and functions of federal/regional/state/local educational agencies, organizational control and political variables. Major education laws, rule and regulation-making process, grants and contracts as inter-level policy instruments. F, Su

6560 Legal Foundations of Public Education (3) Legal framework and theoretical concepts that impinge on operation of schools; basic present legal structure of the United States. Sp

6580 Seminar in Managing Conflict (3) Learning about and experiencing various forms of conflict. W, Su

6750-60-70 Independent Study in Educational Administration and Supervision (3, 3, 3) Prereq: Consent of instructor. A

6800 Administration of Complex Educational Organizations (3) Concepts and theoretical formulations to understand, analyze, evaluate, and change complex educational organizations. W, Sp

6870 Advanced Study in School Facility Planning (3) In-depth experiences in development of educational specifications and techniques of leadership in creation of quality educational facilities. W

6900 Special Topics (3) May be repeated. E

6981 Specialized Seminar: School Operation (3) E

6982 Specialized Seminar: Higher Education (3) Current policy development; organizational relationships, and administrative issues in higher education. W, Su

6983 Specialized Seminar: State School Administration (3) E

6985 Specialized Seminar: Personnel (3) E

6995 Specialized Seminar: School Finance (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 knowledge to known school facility settings. Prereq: Consent of instructor. A

6997 Specialized Seminar in Organization and Management (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. Prereq: Consent of instructor. A

6998 Specialized Seminar: School Law (3) E

6999 Specialized Seminar: Supervision (3) Sp

DEGREES

MAJORS

DEGREES

B.S. M.S. Ph.D.

Educational Psychology Educational Psychology and Guidance

M.A.

Education

M.A.

Psychology

MAJORS

Education

M.A.

Guidance

DEGREES

B.S. M.S. Ph.D.

Education

M.A.

Guidance

ASSOCIATE PROFESSORS:


ASSOCIATE PROFESSORS:

S. W. Huck, Ph.D. Arizona State; S. C. Dietz, Ph.D. Ohio State; C. L. Thompson, Ph.D. Ohio State; R. L. Williams, Ph.D. George Peabody College.

ASSOCIATE PROFESSORS:


ASSOCIATE PROFESSORS:

S. W. Huck, Ph.D. Arizona State; S. C. Dietz, Ph.D. Ohio State; C. L. Thompson, Ph.D. Ohio State; R. L. Williams, Ph.D. George Peabody College.

ASSOCIATE PROFESSORS:


ASSOCIATE PROFESSORS:

S. W. Huck, Ph.D. Arizona State; S. C. Dietz, Ph.D. Ohio State; C. L. Thompson, Ph.D. Ohio State; R. L. Williams, Ph.D. George Peabody College.
teaching. The Doctor of Philosophy degree with a major in Education includes options and emphases as listed on page 49. Appropriate courses taken in this department and in the Department of Psychology will satisfy requirements for certification as a school psychologist. Write the department for information concerning the program requirements. Application deadlines to Ed.D./Ph.D. are February 1 and May 1; Ed.S. and M.S. deadlines are October 15, February 1, May 1, and July 15.

4110 Psychology of Sex Role Development (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 behaviorial sciences.

4300 Mental Health (3) Studies and exploration of positive mental health. Application of mental health principles to a study of counseling and personality assessment.

4350-60-70 Special Problems and Topics (1-6, 1-6-1, 1-6) May be repeated. S/NC or letter grade.

4440 General Evaluation Procedures for Public Schools (3) Prereq: 2430 or equivalent. E

4640 Standardized Testing (3) Use and interpretation of standardized group instruments in assessment of intelligence, aptitude, achievement, vocational interests, and personality adjustment.

4650 The Construction of Classroom Tests (3) Concerned with the development of classroom tests: instructional objectives, principles of test construction, item analysis, evaluation of a test's reliability and validity, interpretation of test scores, relationship between testing and teaching.

4780 Advanced Child Study (3) Prereq: 2430 or 3810 or consent of instructor. W, Su.

4800 Psychology of the Disadvantaged Child (3) Significant behavioral differences and causes; appropriate intervention approaches.

4810 Psychosocial Aspects of Appalachian People (3) Exploration of psychology of people of Appalachian origin, with emphasis placed on a study of the personality assessment instruments.


4830 Differential Psychology (3) Nature and sources of individual differences in behavioral characteristics, and differences between racial, ethnic socioeconomic, sex, and other groups.

5000 Thesis (1-15) E

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

5040 Guidance and Personnel Servies in Education (3) Same as Vocational-Technical Education 5040. F, Su.

5050 Children and Adolescents (3) Mental, social, physical, and emotional growth, development, and learning of children and adolescents; prevention, identification, and remediation of learning problems. W, Su.

5060 Group Approaches with Students (3) Knowledge and skills appropriate to functioning with groups in counseling; psychological and parent education. F, W, Su.

5070 Seminar in Elementary School Guidance (3) Trends, role, function, and administration of guidance in elementary school.

5099 Field Work (1-6) Practical experience in developmentally 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

5101 Advanced Psychology of Adolescence (3) Theory and research on principles and problems of adolescent development; application to individual adolescents. Prereq: 3610 or equivalent.

5110 Psychology of Women (3) Past and current educational and psychological theory and practice with special attention to assumptions and practice in regard to women; social 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.

5111-12-13 Seminar in Current Issues in School Psychology (1, 1) (Same as Psychology 5111-12-13). 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.)


5180-90-200 Educational Specialist Research and Thesis (3, 3, E) 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 student encounters in classroom. Prereq: Course in general psychology. May be taken for undergraduate credit by undergraduate or graduate students. For use in group and individual counseling.

5319 Field Work in School Psychology: Level I (2)

5320 Advanced Classroom Behavior Modification (3) Current research in psychology and its application to classroom guidance. E

5330 Theory and Research in Human Learning (3) Contemporary learning theory; current research and its influence upon school practice.

5331 Current Developments in Human Learning (3) Sp.

5340 Group Dynamics (3) Principles of group dynamics as they apply to a variety of group settings. Group counseling, 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.

5560 The College Student (3) Nature, characteristics, and needs.

5570 Evaluation in Education (3) Techniques and instruments for identifying and appraising social values, the thinking processes, social adjustment, emotional needs, personal interests, and problems.

5780 Career Development: Theory and Research (3) F, Su.

5785 Career Development: Program Development, Implementation, and Evaluation (3) Career development and prevocational programs and practices, J-kudai with emphasis on development, implementation, and evaluation. Prereq: 5780 or equivalent, or consent of instructor. Sp.

5790 Career Development: Workshop (1-6) Designed for in-service training of school personnel. Prereq: 5780 or equivalent. Maximum 6 hrs. (Same as Curriculum and Instruction 5790 and Special Education 5790.)

5810 Social Appraisal (3) Gathering, interpreting, and using data for development of guidance programs and individual counseling. Prereq: Educational Psychology or Psychology 4640 or equivalent in standardized testing. Prereq: Psychology 5840.

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.

5880 Career Development: Occupational and Educational Resources (3) Gathering, interpreting, and using educational, social, occupational, and community information in the guidance programs; sources, types of materials, and occupational files. Prereq: S/NC only.

5900 Counseling Theories and Techniques (3) Presentation, demonstration, and application. Open to students interested in counseling profession. (Same as Psychology 5890.) F, W, Su.

5987 Practicum (3) Didactic experiences and counseling simulations in learning laboratory. Coreq: 5890.

5910-20-30 Problems in Lieu of Thesis (3, 3, 3) F

5940 Counseling Practicum (3) Supervised practice in counseling in elementary or secondary school guidance and/or student personnel work. Prereq: 4640, 5600 (or 5340), 5880, 5897 or consent of instructor. May be repeated. Maximum 6 hrs. E

5950-60-70 Theory and Practice of Consultation (3, 3, 3) (Same as Psychology 5960-60-70.)

5958-5959 Practicum in Consultation (2, 2) (Same as Psychology 5958-59.) S/NC only.

5980 Organization and Administration of Counseling Programs (3) Procedures, policies, and practices. May be repeated. Maximum 6 hrs. E

6000 Doctoral Research and Dissertation (1-15) E

6040 Seminar (1) Required in fall quarter. Minimum 3 hrs. S/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.

6110 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, Sp.

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.)

6550-60-70 Seminar in College Student Personnel (2, 2, 2) Issues in college student personnel, college counseling, and student personnel. Prereq: 6110 or equivalent. S/NC only.

6690 Field Work in School Psychology: Level II (2) (Same as Psychology 6319.)
6610-20-30 Seminar in Dissertation Proposal Writing (2, 2, 2) Preparation and evaluation of dis-
tertation proposal. 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
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 counsel-
ting theory, topics, issues, Prereq: 5890 or consent of
instructor. May be repeated. M, W, F, W, Sp

6840-50-50 Seminar in Professional Issues (1, 1,
1) Job selection, convention participation, pub-
lishing, 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 will vary
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 practice. Minimum: 90 clock
hours each quarter. Prereq: Admission to counseling
psychology program and consent of instructor.
6940 Group Counseling Practicum (3) Supervised prac-
ticum with children and/or adults. Prereq: 5340,
5890, 5897 and 5940 and consent of instructor. May
be repeated with consent of department. Maximum 6
hrs.

6941-42-43 Practicum in Guidance, Counseling,
and Personnel Services (3, 3, 3) Supervised prac-
ticum for the application of guidance tools and tech-
niques. Minimum: 90 clock hours each quarter. Prereq: 5890
and consent of instructor. E

6944-45-46 Teaching Practicum (3, 3, 3) Prereq:
Acceptance in doctoral program and consent of in-
structor. May be repeated. Maximum 6 hrs for each
course. E

6950 Counseling Supervision (3) May be repeated
with consent of advisor. Prereq: 5890, 5894, 6810,
6941. S/NC only. E

Special Education and Rehabilitation

MAJORS

Special Education

M.S.

Vocational Rehabilitation Counseling

M.S.

DEGREES

Educational Specialist

MAJOR

M.S.

Programs lead to the Master of Science
degree in the Special Education.
Prereq: With an emphasis
in one of the special areas.
Under the sponsorship of Social
and Rehabilitation Services, a specialized institute
for the preparation of professionals to adapt
their skills toward services to hearing impaired
diagnoses and deaf people is provided.
For further information write the department
head.

EDUCATION OF THE
HEARING IMPAIRED

4000 Rehabilitation Practicum (3) Evaluation of
client data and rehabilitation prognosis. Prereq:
4230. F, Sp

4190 Speech Development of Hearing Impaired
(3) Anatomy and physiology of speech system. Rela-
tionship of hearing to speech development. Emphasis on
techniques of speech development and im-
provement; for hearing impaired children. Prereq:
Audiology and Speech Pathology 3030. (Same as
Audiology and Speech Pathology 4450.) F, W, Sp

4200 Practicum in Speech Development of Hear-
ing Impaired (3) Applications of theories and techni-
cues of speech development and improvement with
hearing impaired children. Prereq: 4190 and consent of
instructor. (Same as Audiology and Speech
Pathology 4200.) W, Sp

4210 Language Development of Hearing Impaired
(3) Systems by which formal language is presented.
(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. (Same as Audiology and Speech Pathol-
ogy 4220.) W, Sp

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. (Stu-
dent must acquire a degree of proficiency in use
of manual language.) Prereq: Consent of instructor. E

4231 Communication Processes for Hearing Im-
paired II (3) Intermediate course in manual com-
munications skills and techniques with emphasis
on vocabulary development with receptive and expres-
sive fluency. Prereq: 4230 or consent of instructor. A

4240 Nature of Hearing Impairments (3) Basic
principles of audiology; anatomy and physiology of
hearing; nature and causes of hearing loss; methods
and instrumentation for assessment of hearing level;
interpretation of audiograms; selection and use of
hearing aids; relation of audiologic 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

4280 Curriculum Development in Elementary and
Secondary Schools for Hearing Impaired (3)
Adaptation of curriculum development and methods
in public school education to meet needs of deaf
and hard-of-hearing students in residential and inte-
grated settings. W, Su

4290 The Teaching of Reading to Hearing Impair-
ed Children (3) Readiness activities, develop-
mental approaches, theories, and specialized mate-
rials for curricula in teaching reading. W, Su

4870 Student Teaching with Hearing Impaired
Children (9) Supervised practicum with preschool,
day school, and residential pupils. S/NC only. F, W, Sp

4871 Practicum with Hearing Impaired Children
(6) S/NC only. F, W, Sp

5200 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 develop-
ments 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 materials. Emphasis on
approaches which accommodate and assist integra-
tion of hearing impaired children in regular class-
rooms. W, Su

5280 Seminar on Educational Implications of
Language Deficiency (3) Readings, discussion,
and projects on impact of language deficiency on
educational programming for children with language
deficiency. Sp, Su

5310-20-30 Manual Communication (2, 2, 2) Basic
and advanced skills in fingerspelled and signed
forms of communication. Emphasis on ability to ex-
press and receive the manual forms. Prereq: Con-
sent of instructor. Must be taken in sequence. F, Su;
W, Su; F

5490 Educational and Vocational Guidance of the
Deaf and the Hard of Hearing (3) Evaluation; test
techniques for diagnosis and guidance; social and
personality adjustment; occupational opportunities.
F, Sp

5500 Seminar in Language Pathology (3) (Same as
Audiology and Speech Pathology 5540.)

5820 Curriculum Development Applied to Pro-
grams for the Hearing Impaired (3) Current curric-
ulum trends adapted for hearing impaired indi-
viduals. New curriculum in education of these
children. Current education theories for pro-
grams for hearing-impaired children. Prereq: Curric-
ulum and Instruction 5890 or equivalent and consent
of instructor. 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 mate-
rials in special and regular classes. Prereq or coreq:
4110. E

4440 High School Program for the Mentally Re-
tarded (3) Trends, issues, and research relating to
care and work study programs. E

4810 Student Teacher Mental Retardation (3)
Prereq: Major in education of mental retardation. S/
NC only. F, W, Sp

4811 Student Teaching Mental Retardation (9)
Prereq: Teacher in education of mental retardation. S/
NC only. F, W, Sp

4922 Student Teaching of the Educable Mentally
Retarded (3) Observation and supervised practi-
cum. S/NC only. E

5111 Psychology of Mental Retardation (3) Inte-
lectual functioning, psychological theories and learning interrelations and the theoretical and educational implications emphasized. Prereq: 4110. F, Su

5112 Psychology of the Severely Mentally Retarded (3) Program and curriculum development for teaching children 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 identifying educational, physical, and emotional characteristics; special educational techniques. E

4150 Education of Children with Crippling and Special Health Conditions (3) Medical and educational characteristics; appropriate educational modifications and associated services. Prereq or coreq: 3333 or consent of instructor. A

4840 Educational Problems of the Cerebral Palsied Child at Home and School (3) Physical, social, and educational needs of cerebral palseid; evaluation techniques; related services. A

5114 Nature and Characteristics of Learning and Behavior Disorders (3) Forms of academic, socially disturbing behavior, degrees of severity, possible causes, and relationships to each other. Prerequisites: Emphasis on relationships to personality characteristics and development factors interpreted through behavioral and psychodynamic theory as well as practical situations in which learning and behavior disorders may occur. E

4620 Education of the Emotionally Disturbed Child (3) Managing behaviors, modes for instruction, teaching techniques and materials, and teacher-pupil family interpersonal relationships as basic to academic achievement for the pupil. Prereq: 4610. Su

4530 Practicum in Residential Settings Serving Children with Disturbing Behavior (3) Practice in scientifically identifying, observing, and recording disturbing behaviors. Initiating behavior changes required, and defining and recording behaviors. To perform in a tutorial capacity within a residential classroom; and to take part in discussion and implementation of relevant academic curriculum and reinforcement schedules. Prereq: 4610 and 4620 or consent of instructor. A

4640 Practicum in Public School Systems Serving Children with Learning and Behavior Problems (6) Academic tutoring in a teacher's aide capacity within regular classrooms. Particular emphasis and practice in individualizing instruction for learning 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. A

4924 Student Teaching of the Emotionally Disturbed (3) Active learning, observing verbal and nonverbal behavior, empathetic understanding, and communicating with handicapped individuals. F

5180 Approaches to Rehabilitation Counseling (3) Approaches and techniques in individual and group counseling with high-stressed adults to further develop student's counseling skills. Problem-solving techniques and utilization of alternative modes of counseling procedures in rehabilitation. Prereq: 5170 or consent of instructor. W

DISABILITY EVALUATION EDUCATION

5700 Evaluation and Mobilization of Community Resources (3) Issues, processes, and programs relating to community resources and service integration with emphasis on social and rehabilitation facilities and agencies. Assessment utilization and mobilization of community resources and development of innovative service programs for handicapped. W

5710 Medical Aspects of Disability (3) Etiology, clinical signs, symptoms and diagnostic procedures related to musculoskeletal, neurological, circulatory, and respiratory diseases/disorders. Effect on structure and function of human body. Restorative measures to eliminate or minimize residual problems; skills necessary to communicate effectively with lay persons and medical community on evaluation of impairments and administration of appropriate rehabilitation services. W

5720 Medical Aspects of Disability II (3) Etiology, clinical signs, symptoms and diagnostic procedures related to neoplastic, skin, digestive, genito-urinary,and endocrine, and mental health problems. 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

5730 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 experiences. Prereq: Admission to program in disability evaluation or consent of instructor. Sp

5740 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

5750 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

5760 Seminar: Functional Capacity Assessment (3) Criteria for residual functional capacity assessment; problems in achievement or acquisition of residual functional capacity assessments. Prereq: 5710-20 or consent of instructor. Su

5770-71 Current Problems in Disability Claims Evaluation (1-3, 1-3) Current problems in process, content, or administration of disability claims evaluation; workshops in identification and proposal of alternative solutions. May be repeated with consent of instructor. S/NC only. A

SCHOOL SPEECH AND HEARING THERAPY

4030 The Public School Speech and Hearing Program (3) Organization, administration, and procedures. Sp

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 (3-4) (Same as Audiology and Speech Pathology 4320.)

4330 Clinical Practice in Speech Pathology I (1-4) (Same as Audiology and Speech Pathology 4330.)

4340 Clinical Practice in Speech Pathology II (1-6) (Same as Audiology and Speech Pathology 4340.)

4341 Clinical Practice in Communication Disorders in Schools (3) Prereq: 4030, 4320-30-40 and consent of instructor. F, W, Sp

4342 Seminar in Communication Disorders in Schools (3) Prereq: 4030, 4320-30-40 and consent of instructor, F, W, Sp

4400 Voice Disorders (4) (Same as Audiology and Speech Pathology 4400.)

4720 Audiology II (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 (1-6) (Same as Audiology and Speech Pathology 5040.)

5380 Cerebral Palay (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. A

4850 Eye Problems Encountered by the Teacher (3) Eye anatomy and hygiene; common diseases and their treatment; evaluation and adjustments for specific eye conditions; related service resources. A

4923 Student Teaching of the Partially Seeing (3) Observation and supervised practicum in special and regular classes. S/NC only. A

GENERAL COURSES

3333 Education of the Exceptional Child (3) Principles, characteristics, and special needs; local and state programs for diagnosis and care; educational policies and administrative procedures. A

4350-50-70 Problems in the Education of Exceptional Children (3, 3, 3) Preceptor: Consent of instructor. E

4520 Language-Speech Handicapped Child in the Classroom (3) Recognition, understanding, 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. E

4740 Evaluating Exceptional Students (3) Mandates relative to evaluations; theoretical considerations and methods of evaluating exceptional students; basic statistical concepts relative to norm-referenced-reference tested. Preceptor: 3533 or consent of instructor. E

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15)

5403 Resource Teachers for the Handicapped (3) To help students acquire the skill to maintain mildly handicapped children in regular public education environments; job descriptions and expectations, interpersonal relationships, assessments of abilities, modifications of training, delivery, and maintenance of instructional activities for exceptional child within regular classroom. Learning and academic considerations stressed. Preceptor: 5401 or consent of instructor. A

5403 Resource Teachers for the Handicapped (3) To help students acquire the skill to maintain mildly handicapped children in regular public education environments; job descriptions and expectations, interpersonal relationships, assessments of abilities, modifications of training, delivery, and maintenance of instructional activities for exceptional child within regular classroom. Learning and academic considerations stressed. Preceptor: 5401 or consent of instructor. A

5430 Instructing Mothers in the Handicapped (3) To help students acquire the skill to maintain mildly handicapped children in regular public education environments; job descriptions and expectations, interpersonal relationships, assessments of abilities, modifications of training, delivery, and maintenance of instructional activities for exceptional child within regular classroom. Learning and academic considerations stressed. Preceptor: 5401 or consent of instructor. A

5403 Resource Teachers for the Handicapped (3) To help students acquire the skill to maintain mildly handicapped children in regular public education environments; job descriptions and expectations, interpersonal relationships, assessments of abilities, modifications of training, delivery, and maintenance of instructional activities for exceptional child within regular classroom. Learning and academic considerations stressed. Preceptor: 5401 or consent of instructor. A

5403 Resource Teachers for the Handicapped (3) To help students acquire the skill to maintain mildly handicapped children in regular public education environments; job descriptions and expectations, interpersonal relationships, assessments of abilities, modifications of training, delivery, and maintenance of instructional activities for exceptional child within regular classroom. Learning and academic considerations stressed. Preceptor: 5401 or consent of instructor. A

5403 Resource Teachers for the Handicapped (3) To help students acquire the skill to maintain mildly handicapped children in regular public education environments; job descriptions and expectations, interpersonal relationships, assessments of abilities, modifications of training, delivery, and maintenance of instructional activities for exceptional child within regular classroom. Learning and academic considerations stressed. Preceptor: 5401 or consent of instructor. A

5460-70 Experience in Teaching and Supervision of Exceptional Children (1-6, 1-6, 1-6) E

5510-20-30 Administrative Practice on Problems in Institutional Care of Children (3, 3, 3) Physical and social development; business and personnel management. Preceptor: Training and experience in institutions for children, or consent of instructor. A

5550-50-70 Problems in the Education of Exceptional Children (3, 3, 3) E

5555-65-75 Special Topics (1-3, 1-3, 1-3) S/NC or letter grade.

5620 Counseling Parents of Exceptional Children (3) Interpreting exceptionalities (handicapped and gifted) to parents and helping in understanding and acceptance of the child in school/home. E


5790 Career Development: Workshop (1-6) (Same as Educational Psychology 5790.) A

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 children. Current research concerning education and rehabilitation of exceptional persons. Preceptor: Curriculum and Instruction 5600 or Educational Psychology 5210 and consent of instructor: A

5910-20-30 Problems in Lieu of Thesis (3, 3, 3) E

5970 Juvenile Delinquency and the School (3) Reorganization of school in study of sources of maladjustment; school function in community programs for children's welfare; curricular adjustments; directed study of socially maladjusted children; environment, and programs for meeting needs. A

Vocational-Technical Education

MAJORS

DEGREES

Agricultural Education

M.S.

Business Education

M.S., MACT

Distributive Education

M.S.

Industrial Education

M.S.

Vocational-Technical Education

M.S., Ed. D, Ed. D

Professors:

J. I. Matthews (Head), Ph.D. Arizona State;
W. A. Campe (Emeritus), Ph.D. Ohio State;
R. J. Woodin (Emeritus), Ph.D. Ohio State. Agricultural Education: D. G. Craig, Ed.G. Cornell;
G. W. Wiegens, Jr., Ed. Missouri. Business Education: R. Bagner (Emeritus), M.S.
M. E. Coakley (Coordinator), Ph.D. Wisconsin. Industrial Education: G. D. Cheek, Ph.D. Kansas State; R. W. Hasbrouck, Ph.D. Purdue; L. J. Reed (Coordinator), M.S. Oklahoma State.

Associate Professors:


Assistant Professors:


Instructor:

R. Pierce, M.A. East Tennessee State.

THE MASTER'S PROGRAM

The M.S. degree with a major in Vocational-Technical Education is available with concentrations in agricultural education, business education, distributive education, general vocational-technical education, home economics education, industrial education, and technical education. Requirements are:

Concentration 18 hrs
Research 6 hrs
Electives 12 hrs
Thesis Option 9 hrs
Problems in Lieu of Thesis Option 9 hrs
Course Option 15 hrs

All course work must be approved by the student's committee.

Each vocational service area (agricultural education, business education, distributive education, industrial education and vocational-technical education) offers similar programs leading to the Master's degree. Both thesis and non-thesis options are available. Details regarding the Master's programs of each of the service areas may be obtained from the coordinator. The MACT is also available in the business education area.

THE SPECIALIST PROGRAM

The Ed.D. degree program, which is a thesis or non-thesis program, is a cooperative undertaking involving all vocational service areas. Options are available in agricultural, business, distributive, 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 49.

General

5401 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) 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

Student must meet the service area entrance requirements for the concentration selected. General vocational-technical education requires 6 hrs Vocational-Technical Education 5260 and 5610.

* 9 hrs course work approved by graduate committee in area of emphasis outside of area of concentration.
5005 Problems in Lieu of Thesis (3) May be repeated.

5010 History and Organization of Vocational-Technical Education (3) Vocational and technical education in public schools through analysis of social, historical, political, and organization models.


5020 Placement, Follow-up and Evaluation Procedures in Occupational Education (3) Methods and procedures in establishing placement programs, curriculum revision.

5030 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.

5040 Guidance and Pupil Personnel Services in Education (3) (Same as Educational Psychology 5040.)

5050 Supervision of Vocational-Technical Education (3) Program planning, coordination, instruction, roles and functions of supervisors.

5055 Vocational School Administration and Management (3)

5070 Competency Based Vocational Education (3) Introductory, comparative, and practical approaches.

5080 Continuing Education in Vocational-Technical Education (3) Importance, objectives, historical development, psychological and sociological formulations, methods and techniques, research, evaluation.

5100 Occupational Program Development for Disadvantaged Persons (3) Academic, socioeconomic, cultural and/or other handicaps that prevent individuals from succeeding in regular vocational education programs.

5110 Principles and Objectives of Vocational-Technical Education (3) Fundamental principles and contemporary objectives.

5130-31-32 Problems in Vocational-Technical Education (1-6, 1-6, 1-6) May be repeated. Maximum 9 hrs.

5140 Individual Study in Vocational-Technical Education (1-3) Must be approved by supervisory instructor and service area coordinator or department head. Approval form must be filed in office of department head. May be repeated. Maximum 12 hrs.

5150 Microcomputer Operations and Educational Applications (3) Operating systems and program techniques. Hands-on experience in operating common microcomputers, writing, debugging, and running education programs. Prereq: Teaching, administrative, or related experience in schools or special consent of instructor.

5155 Software Design for Microcomputers in Education (3) Advanced BASIC software design: operating System-CPM, TRSDOS and OSI, sequential and random I/O, analysis and operation of commercial educational programs, and teacher-designed programs. Prereq: 5150.

5180-89 Educational Specialist Research and Thesis (3, 3, 3) Selection, analysis, and completion of problem necessitating original investigation, beneficial to investigator and vocational-technical field.

6000 Doctoral Research and Dissertation (3-15) E

6010 Curriculum Planning in Vocational-Technical Education (3) Prereq: Curriculum and Instruction 5410 or equivalent.

6020 Program Planning and Development in Vocational-Technical Education (3) Planning vocational-technical and work force state, local, and institutional programs; research in planning, advisory committees, planned change, administrative structures, and evaluation procedures.

6030 Evaluation of Vocational-Technical Education Programs (3)

6040 Seminar in Vocational-Technical Education (1, 1, 1) Required 3 consecutive quarters during residency. S/NC only.

6050 Administration of Vocational-Technical Education (3) Administrative principles and relationship to vocational and technical training.

6111-12-13 Internship in Vocational and Technical Education (3, 3, 3) Field experiences in selected areas of vocational and technical education. S/NC only.

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, 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 occupation-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 Agriculture (3) Prereq: 4350.

Business Education

5305 Methods and Materials for VOE Programs (3) Development of instructional aids, recent developments and research, individualized instruction, occupational 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 Education (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 secondary and postsecondary levels.

5350 Improvement of Instruction in Accounting and Data Processing Programs (3)

5360 Improvement of Instruction in Business Communications (3) Processing (3) Basics of and strategies for teaching written communications. Word processing and oral communications.


5390 Problems in Business Education (1-9) Variable topics. May be repeated. Maximum 9 hrs.

6300-10-20 Current Issues in Business Education (3, 3, 3)

6330-40-50 Advanced Studies in Business Education (3, 3, 3)

6360 Higher Education for Business (3)

Distributional Education


4440 Supervised Distributional Experience (2) Minimum 200 hours experience for each credit hour 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 distributional education curriculum in secondary and postsecondary programs.

4460 Organization and Operation of Distributional Education Programs (3) Background and development needs, federal and state legislation; curriculum implications; establishing, evaluating, reporting, and improving programs.

4470 Methods and Materials in Distributional Education (3) Prereq: 4310 or consent of instructor.

4480 Coordination Techniques in Distributional Education (3) Selecting training agencies; job analysis; selecting and briefing training supervisors; advisory committees; adult and other community services. Prereq: 4310, 4320.

5410 Administration and Supervision of Distributional Education (3) Operation of distributional education program and work of city or county supervisor. Understanding and appreciating problems from high school, principal's and supervisor's point of view. Trends in distributional education; community surveys, state plans, teacher-coordinator qualifications, changing curriculum.

5415-26-36 Problems in Distributional Education: Retailing (3, 3, 3)

5420 Organizing and Teaching Adult Distributional Education (3) Planning, organizing, promoting, teaching, and evaluating continuing education programs in distributional education utilizing trade associations, employment agencies, business groups, and advisory committees in implementation.

5430-31-32 Special Problems in Distributional Education (3, 3, 3) Individual research, conferences, and/or workshops in teaching and supervising high school, postsecondary, and adult programs.

Home Economics Education

5510 Organization of the Homemaking Curriculum in Secondary Schools (3) Recent advances in home economics education. Development of teaching material in home economics and total homemaking program in secondary school—day-school, adults, home experience, and Future Homemakers of America.

5515 Evaluation in Home Economics Education (3) Purpose of evaluation in development of home economics education.
4680-91-92 Seminar in Industrial Education (3, 3, 3) Educational innovations, current events, problems, and other topics associated with the field of industrial education.

4690-91-95 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.

5610-11-12 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.


5895 New Developments in Industrial Technical Education (3) Prereq: B.S. in Industrial Education and teaching experience.

4680-91-92 Seminar in Industrial Education (3, 3, 3) Educational innovations, current events, problems, and other topics associated with the field of industrial education.

4690-91-95 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.

5610-11-12 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.


5895 New Developments in Industrial Technical Education (3) Prereq: B.S. in Industrial Education and teaching experience.
The Health and Safety Division offers the following degree programs:

Master of Public Health degree with a major in Public Health Administration or occupational/environmental health and safety are also available.

Master of Science degree with a major in School Health Education or Safety Education and Service (thesis and non-thesis option)

Non-thesis option requires 45 quarter hours of coursework.

Educational Specialist degree in Safety Education and Service.

Doctor of Education degree in Health Education.

Doctor of Philosophy degree in Health Education.

Public Health

3000 Foundations of Health Science (3) In-depth study of content areas relating to personal health and contemporary health problems, i.e., mood modifying products, consumer health, international public health. Option in community health education is accredited by the American Public Health Association. Options with specialization in health planning/administration or occupational/environmental health and safety are also available.

Master of Science degree with a major in Public Health Education and Service. (Thesis and non-thesis options) Non-thesis option requires 45 quarter hours of coursework.

Public Health Education and Service.

Doctor of Education degree in Health Education.

Doctor of Philosophy degree in Health Education.

Safety Education and Service.

Public Health

3000 Foundations of Health Science (3) In-depth study of content areas relating to personal health and contemporary health problems, i.e., mood modifying products, consumer health, international public health. Option in community health education is accredited by the American Public Health Association. Options with specialization in health planning/administration or occupational/environmental health and safety are also available.

Master of Science degree with a major in Public Health Education and Service. (Thesis and non-thesis options) Non-thesis option requires 45 quarter hours of coursework.

Educational Specialist degree in Safety Education and Service.

Doctor of Education degree in Health Education.

Doctor of Philosophy degree in Health Education.

Public Health

3000 Foundations of Health Science (3) In-depth study of content areas relating to personal health and contemporary health problems, i.e., mood modifying products, consumer health, international public health. Option in community health education is accredited by the American Public Health Association. Options with specialization in health planning/administration or occupational/environmental health and safety are also available.

Master of Science degree with a major in Public Health Education and Service. (Thesis and non-thesis options) Non-thesis option requires 45 quarter hours of coursework.

Educational Specialist degree in Safety Education and Service.

Doctor of Education degree in Health Education.

Doctor of Philosophy degree in Health Education.

Public Health

3000 Foundations of Health Science (3) In-depth study of content areas relating to personal health and contemporary health problems, i.e., mood modifying products, consumer health, international public health. Option in community health education is accredited by the American Public Health Association. Options with specialization in health planning/administration or occupational/environmental health and safety are also available.

Master of Science degree with a major in Public Health Education and Service. (Thesis and non-thesis options) Non-thesis option requires 45 quarter hours of coursework.

Educational Specialist degree in Safety Education and Service.

Doctor of Education degree in Health Education.

Doctor of Philosophy degree in Health Education.

Public Health

3000 Foundations of Health Science (3) In-depth study of content areas relating to personal health and contemporary health problems, i.e., mood modifying products, consumer health, international public health. Option in community health education is accredited by the American Public Health Association. Options with specialization in health planning/administration or occupational/environmental health and safety are also available.

Master of Science degree with a major in Public Health Education and Service. (Thesis and non-thesis options) Non-thesis option requires 45 quarter hours of coursework.

Educational Specialist degree in Safety Education and Service.

Doctor of Education degree in Health Education.

Doctor of Philosophy degree in Health Education.

Public Health

3000 Foundations of Health Science (3) In-depth study of content areas relating to personal health and contemporary health problems, i.e., mood modifying products, consumer health, international public health. Option in community health education is accredited by the American Public Health Association. Options with specialization in health planning/administration or occupational/environmental health and safety are also available.

Master of Science degree with a major in Public Health Education and Service. (Thesis and non-thesis options) Non-thesis option requires 45 quarter hours of coursework.

Educational Specialist degree in Safety Education and Service.

Doctor of Education degree in Health Education.

Doctor of Philosophy degree in Health Education.

Public Health

3000 Foundations of Health Science (3) In-depth study of content areas relating to personal health and contemporary health problems, i.e., mood modifying products, consumer health, international public health. Option in community health education is accredited by the American Public Health Association. Options with specialization in health planning/administration or occupational/environmental health and safety are also available.

Master of Science degree with a major in Public Health Education and Service. (Thesis and non-thesis options) Non-thesis option requires 45 quarter hours of coursework.

Educational Specialist degree in Safety Education and Service.

Doctor of Education degree in Health Education.

Doctor of Philosophy degree in Health Education.

Public Health

3000 Foundations of Health Science (3) In-depth study of content areas relating to personal health and contemporary health problems, i.e., mood modifying products, consumer health, international public health. Option in community health education is accredited by the American Public Health Association. Options with specialization in health planning/administration or occupational/environmental health and safety are also available.

Master of Science degree with a major in Public Health Education and Service. (Thesis and non-thesis options) Non-thesis option requires 45 quarter hours of coursework.

Educational Specialist degree in Safety Education and Service.

Doctor of Education degree in Health Education.

Doctor of Philosophy degree in Health Education.
3210 First Aid and Emergency Care (4) (Same as Public Health 3210) E

3410 School Health Instruction (3) Selection of health content in the school curriculum. E

3420 School Health Services (3) Development, maintenance, and protection of health of students including examination, screening, special services, communicable disease control, emergency care, and school health records. F, W, Sp

3519 The School in Community Health (3) Role of teacher in community health; school's responsibility in promoting healthful living and the pluses and liabilities of being a health educator. Not open to health and physical education majors. E

3610 Methods in Elementary Health Instruction (3) Preparation and presentation of health topics. Teaching methods, organization, and student participation stressed. Required for elementary teachers. Prereq: 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. E

3710 Workshop in School Health Education (3-4) For advanced students, teachers, school administrators, nurses and other paramedical school personnel. Emphasis on case demonstrations, films, field trips, and supervised research in special health problems. May be repeated. Su

4810-20-30 Problems in School Health Education (1, 1, 1) Individual identification and study of current problems in school health education. Extensive reading of literature. E

5000 Thesis (1-15) E

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

5320 Behavioral Problems in Safety Education and Accident Prevention (3) Problems of behavior, causes of accidents, and application of principles of psychology of safety to the safety behavior in all segments of our environment. F

5330 Problems and Research in Accident Prevention (3) Analysis of safety problems found in wide variety of accidents that occur in community; findings of current research in behavioral sciences as related to variation incidence of accidents. Sp

5340 Organization, Administration, and Supervision of Safety Programs (3) National, state, and local programs in safety administration including administrative, instructional, and supervisory aspects. Basic emphasis on implementation of relevant programs. W

5350 Civil and Defense Education (3) Civil and defense problems: tornadoes, floods, fires, mass civil disorders, and nuclear and personnel attack by alien countries. Sp

5720-30-40 Graduate Workshop in Safety (3-5, 3-6, 3-6) Deals with specific safety problems. Special safety programs in a concentrated period of time. Su


5870-90-90 Current Issues in Safety Education (1, 1, 1) E

6010-30-30 Internship and Research in Safety (3, 3, 3) Allows the student opportunities for engaging in field experience so that a significant problem in that experience will be identified, researched, and reported on in acceptable form. E

School Health

3211 First Aid and Emergency Care (4) (Same as Public Health 3210) E

3410 School Health Instruction (3) Selection of health content in the school curriculum. E

3420 School Health Services (3) Development, maintenance, and protection of health of students including examination, screening, special services, communicable disease control, emergency care, and school health records. F, W, Sp

3519 The School in Community Health (3) Role of teacher in community health; school's responsibility in promoting healthful living and the pluses and liabilities of being a health educator. Not open to health and physical education majors. E

3610 Methods in Elementary Health Instruction (3) Preparation and presentation of health topics. Teaching methods, organization, and student participation stressed. Required for elementary teachers. Prereq: 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. E

3710 Workshop in School Health Education (3-4) For advanced students, teachers, school administrators, nurses and other paramedical school personnel. Emphasis on case demonstrations, films, field trips, and supervised research in special health problems. May be repeated. Su

4810-20-30 Problems in School Health Education (1, 1, 1) Individual identification and study of current problems in school health education. Extensive reading of literature. E

5000 Thesis (1-15) E

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

5320 Behavioral Problems in Safety Education and Accident Prevention (3) Problems of behavior, causes of accidents, and application of principles of psychology of safety to the safety behavior in all segments of our environment. F

5330 Problems and Research in Accident Prevention (3) Analysis of safety problems found in wide variety of accidents that occur in community; findings of current research in behavioral sciences as related to variation incidence of accidents. Sp

5340 Organization, Administration, and Supervision of Safety Programs (3) National, state, and local programs in safety administration including administrative, instructional, and supervisory aspects. Basic emphasis on implementation of relevant programs. W

5350 Civil and Defense Education (3) Civil and defense problems: tornadoes, floods, fires, mass civil disorders, and nuclear and personnel attack by alien countries. Sp

5720-30-40 Graduate Workshop in Safety (3-5, 3-6, 3-6) Deals with specific safety problems. Special safety programs in a concentrated period of time. Su


5870-90-90 Current Issues in Safety Education (1, 1, 1) E

6010-30-30 Internship and Research in Safety (3, 3, 3) Allows the student opportunities for engaging in field experience so that a significant problem in that experience will be identified, researched, and reported on in acceptable form. E

School Health
orders, mental health, growth, and aging. Applications for maintenance of health. Prereq: Course in physiology of exercise or consent of instructor. 5 lectures per week. Same as Public Health 5590. Su

5000 Applied Physiology (6) Principles of physiology with special emphasis on application of physiological findings to practical problems related to human function. Prereq: 1 yr general chemistry, or consent of instructor.

5100 Advanced Exercise Physiology (4) Principles of energy transfer in humans with special emphasis on integration of organ systems in adapting to requirements of muscular exercise. Prereq: Zoology 4940 or equivalent. Recommended: 1 yr chemistry, physics, and mathematics. 3 hrs and 1 lab. W

5200 Experimental Techniques in Applied Physiology (2) Laboratory course in experimental methodology and instrumentation. Respiratory and blood gas analysis, human calorimetry, blood chemistry, and pulmonary function tests. May be repeated with consent of instructor. S/NC only.

5250 Social-Psychological Dimensions of Physical Activity (3) Examination of social-psychological factors which influence performance in physical activity with emphasis on research. Prereq: Psychology 3120 or equivalent. F

5810-20-30 Seminar in Physical Education (1, 1, 1) Current issues and problems in physical education with an emphasis on outstanding studies and research in field. E

5910-20-30 Problems and Projects in Physical Education (1-3, 3, 3) Critical examination of most comprehensive, systematic, and revealing accounts of metaphysical, epistemological, and axiological status of sport. Prereq: Consent of instructor. W

5130 Methods in Physical Education (3) Characterization 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 areas of sport. Prereq: during academic year, philosophical, epistemological, and axiological status of sport. Prereq: Consent of instructor. W

5150 Systematic Philosophical Analyses of Sport (3) Examination of metaphysical, systematic, and revealing accounts of metaphysical, epistemological, and axiological status of sport. Prereq: Psychology 3120 or equivalent. F

6000 Doctoral Research and Dissertation (3-15) 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 research problem, and in-depth 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. E

6510-20 Issues and Problems in Physical Education (3, 3) Critical examination and evaluation of current issues and problems in physical education. W

6610 Seminar in Applied Physiology (2) Prereq: 5610. May be repeated with consent of instructor. S/NC only. E

6640 Research Participation in Applied Physiology (1-6) Advanced research techniques under supervision of faculty member whose research area coincides with interests of student. Prereq: Consent of instructor. May be repeated with consent of instructor. S/NC only. E

6810-20 Practicum (2, 2) Intern experience in areas of major interest. S/NC only. E

Division of Public Health

Professor: W. B. Hope, Jr. (Chairperson), MPH, Sc.D., Johns Hopkins.

Division of Recreation

MAJOR

Recreation

DEGREE

M.S.

Professor: M. L. Peters (Chairperson), Ph.D. Illinois.

Assistant Professor: K. L. Knick, Re D. Indiana.

The Recreation Division offers the following degree program:

Master of Science degree in Recreation (thesis and non-thesis programs) with concentrations in general recreation, recreation administration, and therapeutic recreation.

4130 Recreation Administration (3) Introduction to recreation administration, including planning, personnel, areas and facilities, program services, finance, and public relations. Prereq: 3140, 3200, 3880, or consent of instructor. F, W

4200 Survey of Recreation for Special Populations (3) Responsibility of recreation profession to minority groups whose leisure opportunities and needs may require special servicing. Prereq: 3140, 3200, 3880, or consent of instructor. F, Sp

4310 Camp Administration (3) Program planning and organization, personnel management, camp site development, camp operation for administrators and supervisors.

4500 Specialized Study in a Selected Area of Recreation (1-9) Comprehensive study in a selected specialized 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) F, Sp

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

5130 Interpretations of Leisure (3) Concepts of leisure including social, psychological, cultural, and philosophical; recreational uses of leisure. Prereq: 3140 or consent of instructor. F

5140 Leisure Service Delivery Systems (3) Variables of leisure delivery systems involved in provision of leisure services for community at large. Prereq: Consent of instructor. F

5150 Current Issues in Recreation (3) Identification and consideration of broad issues-social, environmental, ethical-which currently have greatest impact on use of leisure, and implications for recreation administration. Prereq: Consent of instructor. Sp

5420 Therapeutic Recreation (3) Role of recreation in lives and treatment of persons with disabilities-mental, physical and medical. Possibilities for helping disabled realize their fullest potential. Prereq: 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 community agencies. Prereq: 4200 or consent of instructor. Sp

5260 Leisure and Mental Health (3) Relationship between leisure activity and mental health, with emphasis on its use in therapeutic recreation. Prereq: Psychology 3650 or equivalent, and consent of instructor. W

5300 Seminar in Recreation (1) Presentation and general discussion of students' research studies, projects, and thesis in recreation. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. S/NC only. W, Sp

5340 Administration of Recreation Funds (3) Development and management of budgets for recreation agencies with special emphasis on obtaining federal funds appropriated specifically for recreation. Management of revenue received, and exploration of funding alternatives. Prereq: 4130. Sp

5350 Organizational Policies for Recreation (3) Advanced study in the analysis of organizational policies and functions of management in recreation. Prereq: 4130. W

5360 Management and Operation of Recreation
Facilities (3) Management process as it pertains to operation of recreation facilities. F

5440 Problems and Projects in Recreation (1-9) Individual research on problem of special significance to student. Research projects of limited nature undertaken in lieu of thesis. May be repeated. Maximum 9 hrs. New problem must be undertaken for each repetition. E

5450 Specialized Study in Recreation (1-9) Advanced comprehensive study in selected specialized area within leisure and recreation field. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E
College of Engineering

R. E. C. Weaver, 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 VIDEO TAPE-ELECTROWRITER

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 lectures 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 also 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 work at a Japanese university. The program requires approximately two years, one year being spent in Japan and the remaining period being spent at UTK to fulfill the course requirements and to write the thesis or project report, as appropriate to the particular department. The program is administered in the framework of each department's regular graduate program except that the research is done in Japan.

Although the language of communication in Japan would be English, cultural understanding is one of the important objectives of the program and as such a participant would be asked to begin Japanese language study. At the option of the department, up to 6 hours of graduate credit may be allowed for language study, either at UTK or in Japan.

Financial support for living expenses in Japan and for the roundtrip transportation can usually be arranged through fellowships from the Japanese Ministry of Education.

Engineering Experiment Station

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.

Engineering Administration

MAJOR

DEGREE

Master of Science in Engineering Administration

Committee:

H. L. Lovelace, Chairperson, J. F. Bailey,
F. A. Chamblin, F. W. Davis, Jr.,
E. C. Huebschmann, R. E. Shrieves, W. G. Sullivan

A program of study leading to the degree of Master of Science with a major in Engineering Administration is offered. This program is aimed at providing education for graduate engineers in the organization and direction of work in engineering functions, at a level which requires understanding of such areas as marketing, finance, and industrial relations. It should be emphasized that this is an engineering program, aimed at preparing individuals for line management positions in construction, design, development, and manufacturing where both technical and nontechnical factors exert significant influence on the success of a given activity. The program does not provide the opportunity for in-depth study of any of the traditional areas of business administration. Students with such interests are advised to consider graduate programs available in the College of Business Administration.

To be admitted to The Graduate School as a potential candidate for a Master's degree with a major in Engineering Administration, the applicant must submit reasonable evidence of ability to pursue graduate studies at an acceptable level of performance. In general, the applicant should have graduated from an A.B.E.T. accredited undergraduate institution in engineering with a satisfactory grade point average. In addition, applicants must satisfy one of the following experience requirements:

(1) at least two years of engineering experience after graduation if a full-time student or (2) current employment in engineering work if a part-time student.

THE MASTER'S PROGRAM

Minimum requirements for the Master's

*Program has been dropped effective Fall 1980.
degree are the satisfactory completion of the following courses:

1. An Engineering Core, 27 hours of graduate credit consisting of Engineering Administration 5900, at least three courses chosen from: Industrial Engineering 4110, 5110, 5520, and 5710, and a complement of engineering courses normally selected from the student’s undergraduate major department or from courses of other departments in the university.

2. A Business Administration Core, 15 hours of graduate credit consisting of Accounting 5030, Finance 5010, Marketing 5010, Management 5130, and either Business Law 5010 or Transportation 5210. A student may take both the business law and transportation courses and count one of them as a general elective.

3. General Electives, 9 hours of graduate credit chosen from: computer science, economics, engineering, management science, mathematics, psychology, statistics, and other program-related disciplines.

The program requirement totals 51 hours of graduate course credit. No thesis is required. A final oral and written examination must be passed on the work offered for the degree. Course prerequisites for the program are Accounting 2110-20 or 5010, Computer Science 3150, Economics 2110-20 or 5010, Economics 5200, Industrial Engineering 4520, and Statistics 3450 or their equivalents. None of these prerequisites, except Economics 5020, may be counted as part of the 51 hours of credit offered for the degree. These course prerequisites may be waived by the department offering the course upon presentation of evidence of competency in the course prerequisites. A list of courses may be required, depending upon the student’s background and the electives chosen.

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 requirement. May be repeated. S/NC only. E

5900 Project in Engineering Administration (3)

Study and formal report of engineering administration topic, normally performed during last quarter of degree program. May be repeated. S/NC only. E

9900 Project in Engineering (3-15)

Must meet the above requirements, pass a special written examination as well as a general oral examination as a final examination covering thesis, seminar, and other program-related disciplines. A final examination covering thesis, seminar, and other program-related disciplines. 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. 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, Metallurgical, and Polymer Engineering

MAJORS

Chemical Engineering

Ph.D. and M.S.

Metallurgical Engineering

Ph.D. and M.S.

Polymer Engineering

Ph.D. and M.S.

Professors:

H. F. Johnson (Head), D. E. York, J. J. B. Bougue, Ph.D. Delaware, F. A. D. Williams, Ph.D. Wisconsin, E. J. Clark, Ph.D. California (Berkeley), L. W. Crawford, Ph.D. California (Berkley), L. T. McCallion, Ph.D. California (Berkely), L. T. McCallion, Ph.D. California (Berkely).

*Space Institute, Tullahoma, Tennessee.

†Alumni Distinguished Service Professor.

‡May be submitted for by students with significant experience in polymer research.

§Space Institute, Tullahoma, Tennessee.

Chemical Engineering


3420 Heat Transfer (4) Differential and integral 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 separative processes. 3450 Diffusional Operations (3) Diffusion, simultaneous heat and mass transfer, applications including phase separation, gas absorption, extraction. Prereq: 3430, Chemistry 3040. 3610 Introduction to Process Dynamics and Control (3) Introduction to concepts of process dynamics and control. Steady-state analysis of chemical process control systems. Unsteady-state nature of chemical processes. LaPlace transform techniques, block diagram algebra and transfer functions. Mathematical models for several processes are developed and analyzed in detail. Prereq: Mathematics 2840. 3620 Chemical Process Control (3) Basic control theory applied to chemical processes; feed-back control systems, cascade control, feed-forward control, stability analysis, frequency response. Survey of modern control of typical industrial unit operations. Prereq: 3610. 4110 Chemical Engineering Data Analysis (3) Analytical and experimental identification of system extremes; statistical properties of samples and source systems; empirical modeling of processes; statistical process control. Prereq: 3420 and Mathematics 3150. 4120 Probabilistic Chemical Engineering Systems (3) Experiment designs, simulation of stochastic systems, predictive techniques, and analysis of novel process control systems. Prereq: 4110. 4130 Introduction to Optimization (3) Principles and applications of optimization techniques to chemical process design; unconstrained optimization, equality constrained optimization, inequality constrained optimization, and dynamic programming. Prereq: Mathematics 2840. 4140 Design of Separation Processes (3) Mass transfer theory applied to design of materials separation processes. Prereq: 3420-30. 4420 Process Design and Economic Analysis (3) Development of basic information on a process into an integrated plant design considering mass and energy balances, cost estimation, and capital and operating cost. Prereq: 4110. 4430 Special Problems in Design and Economics (3) Extension of 4420 for student participation in the American Institute of Chemical Engineering annual contest problem; other advanced design projects. Prereq: 4420. 4450 Hydrocarbon Processing (3) Study of separation and purification of petroleum and natural gas; application of physical principles to refining operations, emphasizing analysis of complex feedstocks and the development of separation processes. Prereq: 4110. 4470 Sulfur Removal from Coal and Associated Problems (3) Chemical and physical properties of domestic coals, sulfur distributions; beneficiation, 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 conversion processes and estimation of maximum yields; 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, on exchange crystallization. Prereq: 3410. 4620 Process Modeling, Simulation, and Control of Chemical Processes (3) Development of process models, experimental process identification, process computer simulation, conventional and non-conventional feedback control, advanced control concepts. Prereq: 3420, 3430. 4730 Mass and Energy Flow in Biological Systems (3) Basic physicochemical and organizational principles applicable to biological systems. Derivation of general mass and energy transfer. Thermodynamics of transport and equilibrium in biological systems. Discussion of Volterra's equation 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 theory 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; continuous culture of microorganisms, food processing and pharmaceutical processes. 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 products and analytical systems. Prereq: Consent of instructor. 4781-82-83 Topics in Chemical Bioengineering (3, 3, 3) Problems of interest in chemical bioengineering. Prereq: Consent of instructor. 4810-20-30 Special Problems in Chemical Engineering (3, 3, 3) Chemical engineering problems related to recent developments in industrial practice. Prereq: Consent of instructor. 5000 Thesis (1-15) 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 Metallurgical 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, including linear programming, variational method, maximum principle, dynamic programming, and geometric programming. Prereq: 4130. 5210 Process Dynamics (3) Analysis of recycle operations, steady state simulation and optimization of typical processes. 5250 Chemical Process Industry Economics (3) Analysis of economic components of chemical processes; internal economics of chemical enterprise, decision making for investment in capital facilities. Prereq: 4120-30, 4420. 5310 Thermodynamics of Heterogeneous Equilibrium (3) Phase rule; equilibrium between phases; composition relationship 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 patterns in chemical reaction systems, reactor models 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 multi-component systems. Prereq: 4420, 4450 Mass transfer operations; falling film, packed tower and bubble contacting devices; nonisothermal and multicomponent 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. 6000 Doctoral Research and Dissertation (3-15) 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 companies in modern chemical industry. Use of decision theory and mathematical models to achieve optimum process design and decision in face of external competition. Prereq: 5250. 6310 Thermodynamics of Irreversible Processes (3) Thermodynamic treatment of irreversible chemical processes, transport processes, coupling phenomena, with special emphasis on topics and methods of interest to engineering and bioengineering students. Prereq: 5310. 6320 Statistical Thermodynamics of Nonequilibrium Systems (3) Principles of statistical thermodynamics; introduction to modern kinetic theory, development of theories for thermal conductivity, viscosity, and diffusion coefficients for pure gases and gas mixtures. Prereq: 5320. 6410 Stability Phenomena in Chemical Engineering: Discrete Systems (3) Instabilities in chemical process systems, including reactors and separation equipment. Emphasis on formulation of models, associated conservation equations, and methods of solution. Prereq: 5510. 6420 Stability Phenomena in Chemical Engineering: Continuous Systems (3) Hydrodynamic instabilities and instabilities in fluids based upon interaction of fluid dynamic phenomena with heat transfer, diffusion and chemical reaction. Development of equations for thermal conductivity, viscosity, and diffusion coefficients for pure gases and gas mixtures. Prereq: 5320. 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 Catalytic Reactor Design (3) Principles of kinetics and reactor design and analysis of heterogeneous catalytic reactors. Prereq: 6510. 6710 Process Dynamics (3) Development of dynamic models of process control systems and rate laws, testing of models by frequency, step, and pulse response methods. Prereq: Consent of instructor. 6900 Advanced Topics in Chemical Engineering (3) Heat and mass transfer applied to design of chemical engineers. May be repeated. Maximum 9 hrs. Metallurgical Engineering 6860 Production Metallurgy (3) Thermodynamic and kinetic principles of roasting, smelting, refining.
3060 Metallurgical Kinetics (3) Application of principles of chemical reaction kinetics, fluid flow, and heat and mass transfer, to pyro-, hydro-, and electrochemical equilibrium. Reaction order and basic rate laws; activated complex theory; principles of adsorption and catalysis. Roasting of sulfides; reduction processes; carbon deposition; electronics and leaching. Prereq: 3050; 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 3110 with emphasis on control of mechanical and physical properties of materials by specification of composition, thermal, and mechanical treatment; correlation of resultant properties with service performance. Suggested for mechanical, civil, and industrial engineering students.

3130 Engineering Materials III (3) Extension of 2110 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 3110 or 3110 with emphasis on materials processing. Suggested for mechanical and industrial engineering students.

3150 Engineering Materials V (3) Extension of 3110 with emphasis on the mechanisms and control of reaction, transformation, and interaction of radiation with solid matter. Suggested for mechanical and mechanical engineers.


3220 Diffusion and Annealing (3) Introduction to solid state kinetics: point defects, solid solutions, diffusion equations and mechanisms, annealing of cold worked structures. Prereq: 3210; Mathematics 2840.

3230 Phase Transformations (4) Thermodynamic and kinetic principles for equilibrium and nonequilibrium Ternary systems. Kinetics and morphology of precipitation and phase transformations in simple and complex systems. Prereq: 3220. 3 hrs and 1 lab.

3300 Biomedical Applications of Materials for Life Sciences (3) The selection and use of engineering materials: metals, polymers, and ceramics; methods of fabrication of components; corrosion; applications of photobiological and dental materials. Prereq: Chemistry 1110-20-30 or equivalent.

3520 Materials Behavior and Chemical Process Equipment Design (3) Mechanical, metallurgical and chemical engineering disciplines in design of chemical processing equipment. Prereq: Chemical and Metallurgical Engineering 3020 or equivalent; 3160; and Chemical Engineering 3420. Same as Engineering Science and Mechanics 3520.

3710 Metallurgical Applications in Manufacturing Technology (3) Fabrication methods and principles of metallurgical processes for forgings, wrought and seminished 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: 3230 or consent of instructor.

4250 Design and Analysis (3) Design and laboratory sessions on analysis of materials, requirements, and performance in engineering structures and components. Prereq: Senior standing.

4510-20 X-Ray Diffraction and Crystallography (3, 3) Lecture and laboratory work in crystallography, projections, x-rays, diffraction phenomena and techniques, introduction to structure determinations. The first quarter serves as an introduction to the subject. 2 hrs and 1 lab.

4540 Fracture-Safe Design (3) (Same as Engineering Science and Mechanics 4540.)

4610 Physical Properties of Materials (3) Electron theory of solids, types of bonding in solids; thermal, electrical, and magnetic properties of materials; relation between mechanical structure and properties. 3 hrs or 2 hrs and 1 lab.

4730 Mechanical Metallurgy I (3) Elastic behavior. Description of stress, strain, and elastic constitutive relations. Effects of composition, microstructure, and loading on mechanical behavior. Failure by yielding. Prereq: 2110 or 3110 or Chemical and Metallurgical Engineering 3150 or equivalent. Suggested for mechanical engineering students.

4740 Mechanical Metallurgy II (3) Ductile and brittle fracture, creep and stress rupture, fatigue, and residual stress. Effects of state of stress, loading rate, time, temperature, and metallurgical structure. Prereq: 3120 or 3230, and 4730 or Mechanical Engineering 3560 or consent of instructor. Also suggested for mechanical engineering, engineering mechanics, and engineering science students. 3 hrs or 2 hrs and 1 lab.

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.

4770 Mechanical Metallurgy III (3) Finite plastic strain. Plastic stress-strain relations. Principles of fabrication: forging, swaging, extrusion, rolling, deep drawing. Prereq: 4730 or consent of instructor. Suggested for mechanical engineering, engineering mechanics, and engineering science majors. 3 hrs or 2 hrs and 1 lab.

5000 Thesis (1-15) E

5010 Graduate Seminar (1) Prereq: Admission to graduate program. May be repeated. E

5050 Engineering Analysis (3) (Same as Chemical Engineering 5050.)

5110 Point Defects and Dislocations (3) Theoretical and experimental analysis of point, line, and planar imperfections 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 and Annealing in Solids (3) Analysis of models and experimental observations relating to phenomenological and mechanistic description of diffusion and annealing of point defects and cold work.

5150 Phase Transformations I (3) Analysis of models and experimental observations relating to phase transformations in solids. Phase transformations in solidification, precipitation, spinodal decomposition. Prereq: 5140.


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 developed. Prereq: Physical Metallurgy.

5310 Solidification Theory and Crystal Growth I (3) Solvent redistribution, thermodynamic considerations, kinet- ic convection and fluid flow effects on the solid to liquid transition. Prereq: Mathematics 4550.

5410-20-30 Advanced X-Ray Diffraction (3, 3, 3) Review of mathematical techniques; generalized dif- fraction theory, analysis of scattered intensity in re- ciprocal space; relationship of scattered intensity to thermal motion, order-disorder, particle size and lat- tice faults. Introduction to crystal symmetry, space group theory, and crystal structure problems; some laboratory work. Prereq: Mathematics 4610.


5540-50 Electron Microscopy I and II (3, 3) Kinematic and dynamic aspects of electron microscopy developed and their application to electron diffraction patterns and contrast effect in transmission electron microscopy are discussed. Introduction is given to metallurgical applications such as plastic de- formation, fracture, precipitation, and phase trans- formations.

5560-70 Radiation Effects on Materials (3, 3) Interaction of radiation with solid matter, radiation-induced changes in physical and mechanical prop- erties, theory and experiment on deformation on solid state reactions. Phenomena associated with use of engineering materials in radiation environ- ments. Prereq: Mathematics 4540, Physics 3730 or consent of instructor.

5750 Corrosion (3) Analysis of corrosion processes in terms of polarization measurements and the Pour- bax diagram. Influence of stress, temperature, and localized conditions contributing to pitting, crevice, and stress corrosion.

5810-20 Special Topics in Metallurgy (3, 3, 3) Lectures and recitation on more recent advances in metallurgy and related fields.

5840-50 Metallurgy of Deformation and Fracture (3, 3) Theoretical and engineering analysis of effect of stress state, strain rate, environment, tempera- ture, and metallurgical structure on mechanical behavior in service, testing, and design.

5910-20 Metallurgical Thermodynamics (3, 3) Application of thermodynamic and physicochemical methods to metals and metallurgical reactions. Rela- tion of theory and experiment to structure of liquid and solid solutions, and to alloy systems.

6000 Doctoral Research and Dissertation (3-15) E

6110-20 Theoretical Metallurgy (3, 3, 3) Phases of solid state physics applicable to metallurgy; elasticity, introductory quantum theory, specific heats, electron theory, electrical and thermal conductivity, magnetic properties, theory of alloy formation. Prereq: 4610 or Physics 3720; Mathematics 4650 and consent of instructor.

6210-20 Rate Process in Metallurgy (3, 3, 3) Theoretical and practical considerations of rate pro- cess in solids such as diffusion, recrystallization and grain growth, and phase transformations.

6320-30 Solidification and Crystal Growth II and III (3, 3) Fluid flow, magnetohydrodynamic effects in incompressible liquid conductors, morphology, sta- bility of steady state coupled heat and mass transfer processes in liquid systems; solidification, composites, nonsteady state dendritic phenomena, some nucleation phenomena. Prereq: 5310.

6410-20 Thermodynamics of Solids (3, 3) Classical and statistical thermodynamic analysis of stabili-
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, rheo-optical analysis and scale-up, flow through dies and pipelines, screw extrusion, spinning of fibers, injection molding. Not for credit for Polymer Engineering majors.

4930 Principles of Fiber and Textile Engineering (3) Chemical, physical, and mechanical structure of important fibers; melt, wet and dry spinning of manmade fibers; drawing and texturizing; 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 operation 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) E

5010 Graduate Seminar (1) Prereq: Admission to graduate program. May be repeated. E

5050 Engineering Analysis (3) Same as Chemical Engineering 5090.

5110 Structural Characterization of Polymers with Electromagnetic Radiation (3) Theory of scattering and diffraction of electromagnetic waves by matter, special application to experimental techniques and polymer structures. Wide angle x-ray scattering (WAXS), small angle x-ray scattering (SAXS), small angle light scattering (SALS). Interpretation in terms of polymer chain conformation, crystal structure, morphology and superstructure.

5120 Characterization of Orientation in Polymer Systems (3) Representation of orientation in matter, characterization using electromagnetic radiation orientation factors. Experimental methods and measurement including birefringence, wide angle x-ray diffraction, and dichroism. Prereq: 5110 or consent of instructor.


5310 Polymer Solution Properties and Characterization (3) Molecular weight determination, chromatographic solution thermodynamics, phase separation; application to synthetic and naturally occurring macromolecules. Prereq: Undergraduate physical chemistry.

5410 Rheology and Polymer Processing (3) Methods for determining the rheological properties of polymer melts, solutions and suspensions; linear viscoelasticity, simple nonlinear constitutive relations, viscous heat generation; application to processing particularly extrusion, injection molding, film production.

5450 Principles of Injection and Blow Molding Operations (3) Technology; theoretical analysis of injection mold filling, structure of molded parts; principles of structural foam and sandwich molding; principles of injection decomposition, application to crystallization from the melt, precipitation from solution.

5510 Laboratory Methods in Polymer Engineering I (1) Basic experimental procedures for polymer characterization and processing, some phase block polymeric and melts as related to glassy and crystalline transitions, phase incompatibility, thermal-mechanical and optical properties. Coreq: 5110 or consent of instructor. 2 labs.

5512 Laboratory Methods in Polymer Engineering II (1) Basic experimental procedures for polymer characterization and processing, orientation, melt flow, processing. Coreq: 5120 or consent of instructor. 2 labs.

5513 Laboratory Methods in Polymer Engineering III (1) Basic experimental procedures for polymer characterization, polymer melt processing, mechanical behavior of polymers. Prereq: 5410 or consent of instructor. 2 labs.

5610 Textile Processing (3) Same as Textiles and Clothing 5610.

5620 Textile Engineering Mechanics (3) Same as Textiles and Clothing 5620.

5710 Phase Transformations in Polymer Systems (3) Analysis of nucleation and growth of phases in polymer systems, spinodal decomposition, application to crystallization from the melt, precipitation from solution.

5810 Physical Properties of Polymer Structures (3) Molecular weight and composition distributions in copolymers, structure of phase block polymers and polymer mixtures as related to glassy and crystalline transitions, phase incompatibility, thermal-mechanical and optical properties.

5910-20-30 Selected Topics in Polymer Science (3, 3, 3) Advanced problems in modern polymer research of current interest to engineers. Prereq: 4910, 4920 or equivalent.

6000 Doctoral Research and Dissertation (3-15) E

Emeritus Professor:
G. R. Walker, S. M. Massachusetts Institute of Technology, P. E.

Professors:

Associate Professors:

Assistant Professors:

Lecturers:

The Department of Civil Engineering offers degrees leading to the Master of Science, Master of Engineering, and Doctor of Philosophy with a major in Civil Engineering, concentrating in environmental engineering.
structural engineering, soils engineering and materials, and transportation engineering; and to the Master of Science and Master of Engineering in Environmental Engineering with concentrations in water quality, water resources, and air quality.

MASTER OF SCIENCE PROGRAM
The Master of Science programs in Civil Engineering and in Environmental Engineering are offered to graduates of recognized undergraduate curricula. Departmental requirements provide that for a major in Civil Engineering, the Bachelor's degree must be in civil engineering, or certain undergraduate prerequisite courses must be taken before admission to candidacy for the Master of Science in Civil Engineering.

CIVIL ENGINEERING
The Department of Civil Engineering offers two options for the Master of Science degree in Civil Engineering.

Option I: A minimum of 45 quarter hours, including at least 9 hours of thesis, is required.

Option II: A minimum of 48 quarter hours, including a 3-quarter-hour special problems is required. The special problem will culminate in a written report which must be approved by the student's major professor.

ENVIRONMENTAL ENGINEERING
For a major in Environmental Engineering the Bachelor's degree may be in fields other than civil engineering. In some cases prerequisite undergraduate courses may be indicated, and in general these must be completed before courses for graduate credit can be taken.

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

Option I: The student must present a minimum of 45 quarter hours of approved graduate courses. The major shall include a minimum of 9 quarter hours of thesis and 18 quarter hours credit of approved environmental engineering course work. A minor may be selected but is not necessarily required.

Option II: The student must present a minimum of 48 quarter hours of approved graduate courses. The major shall include a minimum of 27 quarter hours of approved environmental engineering course work. A minor may be selected but is not necessarily required.

Option I or II must be approved by the department. Normally, the graduate program of study will be adjusted by the head of the department and the student's committee to suit the individual academic requirements.

MASTER OF ENGINEERING PROGRAM
Graduate programs in Civil Engineering and in Environmental Engineering leading to the degree of Master of Engineering are available to qualified graduates of A.B.E.T. accredited undergraduate curricula in civil engineering or environmental engineering. At least one-third of the program of study must be classified as engineering design. The student's advisor will assist in planning the program of study to ensure that it includes the necessary design content. The thesis and non-thesis options noted under the Master of Science programs are available under these programs.

THE DOCTORAL PROGRAM
A graduate program leading to the degree of Doctor of Philosophy is offered in Civil Engineering.

Specific departmental requirements for the Ph.D. degree include the following:
1. A minimum of 108 quarter hours credit beyond the Bachelor’s degree, exclusive of credit for the M.S. thesis. Of this number, a minimum of 36 quarter hours credit in Doctoral Research and Dissertation will be required.
2. A minimum of 36 quarter hours of graduate courses in the Civil Engineering Department, exclusive of thesis or dissertation credit, at least 9 hours of which must be 6000-level courses.
3. Supporting courses in related scientific and engineering fields, amounting to approximately 36 quarter hours, subject to approval by the student's faculty committee. These related fields will normally include such disciplines as mechanics, chemistry, mathematics, microbiology, physics, and other engineering fields. A minimum of 12 quarter hours of mathematics will be required beyond the civil engineering undergraduate requirements.
4. One foreign language if the student's faculty committee feels that a reading knowledge of a foreign language is crucial to the student's research efforts.
5. Upon completion of at least one-half of all course work, each student must pass a comprehensive examination.
6. After completion of the dissertation, prior to graduation, each student must pass a final examination administered by a faculty committee.

Civil Engineering
4120 Concrete Design (3) Reinforced concrete continuous beams and floor slabs; footings, and retaining walls. Prereq: 4110 and 4410. Sp
4220 Foundations and Substructures (3) Foundations explorations; principles of design of dry and subaqueous foundations. Prereq: 3316. Su
4240 Structural Design (3) Plate girders, composite steel and concrete beams, connections and details, and design of members for buildings. Prereq: 3230 and 4410. 2-3 hr periods. W
4250 Photogrammetry (3) Methods of plotting maps from aerial photographs; stereoscopic plotting instruments; applications. Prereq: 2360 or Forestry Summer Camp for forestry majors. 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: 4410. W
4430 Construction Methods and Equipment (3) Fundamental operations in construction and selection of equipment; production rates, balancing of equipment, and cost estimates. Prereq: 3710. F, W
4510-20 Advanced Structural Design (3, 3) Plastic design in steel; design of typical short span steel highway bridges in 4520. Prereq: 3230 for 4510; 3230 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: 4430.
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
4550 Engineering Behavior of Soils (3) Plastic and elastic behavior of soils, determination and use of engineering properties of in-situ soils. Prereq: 4220 or consent of instructor. 2 hrs and 1 lab. F
4560 Stabilization of Soils (3) Mechanical stabilization of soils by compaction, drainage, 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, geometrics and lighting; on the land side are included terminal layout and design and ground access systems and parking. Prereq: 3600 and 3610. Sp
4640 Traffic Engineering (3) Characteristics of drivers, roadway and their internrelationships; 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 airport facility through a comprehensive team project, includes environmental evaluation of design. Prereq: 4620. 1 hr and 2 tabs. Su
4710 Portland Cement Concrete Mix Design (3) Properties and tests of portland cement concrete, methods of concrete proportioning, 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 bituminous concrete. 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. Sp, Su
4850 Elementary Structural Matrix Methods (4) (Same as Engineering Science and Mechanics 4850 and Architecture 4850.) Su
4860 Structural Wood Design (3) Application of structural design principles to various combinations of wood products. Beams, columns, and diaphragm construction with plywood. Various types of fastenings and connections. Prereq: 3230. F
5000 Thesis (1-15) E
5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. 5/NC only. E
5110-20 Statically Indeterminate Structures (3, 3) Deflection 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 matrix algebra, vectors, stability considerations; stiffness and flexibility analysis of plates and trusses, general members and structures composed of general members. Prereq: 4540 or consent of instructor. Sp
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


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: 5110. Engineering Science and Mechanics 5860. (Same as Engineering Science and Mechanics 5180.) Sp, A

5220 Pavement Design (3) Pavement loads; pavement design; construction practices; and maintenance. Prereq: 3310. Sp.

5240 Advanced Properties of Materials: Cement and Concrete (3) Permeability and durability; volume changes and creep; elastic and thermal properties of concrete, special types of concrete; causes of failure. Prereq: 4710. W.


5270 Planning and Transportation (3) Preparation of transportation and elements of comprehensive development plans. Analysis of relationships between various transportation systems and between transportation and other community features. (Same as Planning 5270.) W

5310 Engineering Practice (3) Valuation and feasibility studies; depreciation and useful life; engineering economics. F.

5320-30 Engineering Practice Applied to Administration of Engineering Projects (3) Engineering administration; planning of governmental and industrial projects; cost estimates and methods of financing. W, Sp.

5410 Construction Contract Law and Administration (3) General principles applicable 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.

5420 Structural Model Analysis (3) Experimental methods of shear, moment, and stress analysis.


5460-70 Construction Estimating I, II, III (3, 3, 3) Project costs, estimating techniques; market cost conditions and how they apply as it comes to costs. Prereq: 4430 or consent of instructor. W, Sp.

5550 Soil Mechanics—Plastic Equilibrium (3) Failure theories; earth pressure analysis, bearing capacity analysis, and slope stability analysis. Prereq: 3310 or consent of instructor. F.

5560 Soil Mechanics—Elastic Behavior (3) Stress-deformation characteristics, consolidation, settlement analysis. Prereq: 3310 or consent of instructor. F.

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 prestressed concrete; design of precast elements; design and construction of reinforced concrete structures. Prereq: 3310.

5740 Behavior of Reinforced Concrete Members (3) Ultimate strength and behavior of reinforced concrete members; relationship between research results and current specifications for design. Prereq: 4120. W

5800 Urban Systems: Engineering and Management I (3) Management of various urban systems usually under city manager and/or city engineer, organization, finance, personnel administration, purchasing and equipment management and dealing with engineering consultants as each deals with urban problems. Prereq: 5120 and 5740. Civil or Environmental Engineering or consent of instructor. W, A

5805 Urban Systems: Engineering and Management 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 regulation. Prereq: 5800. Sp, A.

5810 Traffic Engineering—Characteristics (3) Driver-vehicle-roadway system; level-of-service concept of capacity. Coreq: Statistics 3450. 2 hrs and 1-2 hr lab. W

5820 Traffic Engineering—Operations (3) Fixed-time and volume-density controllers; progressive systems; one-way operations; reversible flows; system operation; controller design; 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: 4620 or consent of instructor. F.

5850 Functional Design of City Streets and Urban Freeways (3) Effect of street systems upon urban growth and development; classification and function of streets; design features, including cross section, intersections, utility considerations, parking, effect of mass transportation; channelization; marketing; lighting; drainage, frontage road, surface street system. Prereq: Consent of instructor. Su.

5860 Urban Transportation Planning (3) Prediction of traffic demands and vehicular flows; land use planning; parking needs. Prereq: 5810. F.

5870 Public Transit Planning (3) Person movement by bus, rapid rail and taxicab transit. Nature of public transit; its various roles and how they fit community's need; user preferences; modal split models; total social, political, economic and technical impacts of public transit. Prereq: 4600 or graduate standing. W, A

5890 Traffic Accident Reconstruction (3) Proper traffic accident data collection and analysis as basis for designing adequate police or control programs. Many contributing factors to an accident; proximate and secondary accident causes as they relate to roadway improvements. Prereq: 4640 or 5810 or consent of instructor. Sp, A.

5900 Special Problems in Civil Engineering (1-9) To fulfill the special problem requirement in the non-thesis program. Enrollment limited to civil engineer- ing students in non-thesis program. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/NC only. E

5910-20-30 Special Topics (1-6, 1-6, 1-6) Topics related to current developments in civil engineering not included in other courses. May be repeated.

6000 Doctoral Research and Dissertation (3, 3, 3) Selected advanced problems of current interest. Prereq: Consent of instructor. E

Environmental Engineering

3000 Introduction to Environmental Engineering (3) Introduction to human interaction with the air, water, and land environment in which one lives; role of engineering in environmental management; legal aspects of environmental control. F

4030 Environmental Engineering Chemistry (3) Fundamentals of chemistry which relate to generation, formation, analysis, and removal of environmental contaminants. Prereq: Chemistry 1130 and senior standing.

4150 Urban Water Management (3) Introduction to urban water modeling; evaluation of optimum urban water policies; formulation of system constraints and analysis of decision-making process; management of storm water for beneficial use. Prereq: 3330. Sp.

4210 Water Resources Engineering Design (3) Elements of water resource structures and systems, including reservoirs, dams, control works, and open channel design. Dam safety control, environmental impact of reservoir projects. Prereq: 3330 or consent of instructor. F.

4220 Water Resources Engineering Development (3) Multiojective evaluation procedures for comparing and selecting among water resources development alternatives; using project optimization single- and multi-objective projects; special topics in new developments in water resources engineering. Prereq: 3330 or consent of instructor. W.

4330 Hydrologic Design (3) Application of frequency and regression analysis to hydrologic design of water resources systems; unsteady surface runoff and streamflow modeling; urban peak runoff design using kinematic wave and other methods; effects of land use changes on streamflow quantity and quality. Prereq: 3330. W
4510 Elements of Water and Wastewater Transportation Systems (3) Introduction to theory and design of water transportation and distribution systems and wastewater collection systems. Prereq: 4520 and 3330. F, W

4520 Elements of Water and Wastewater Treatment Systems Designs (3) Introduction to unit operations and processes employed in physical, chemical, and biological treatment of water and wastewater. Application of unit operations and processes in design of water and wastewater treatment plants. Prereq: 5262, Sp, S.

4525 Water and Wastewater Treatment Plant Design (3) Detailed process design of water and/or municipal industrial wastewater treatment plants; sludge handling systems, ultimate disposal of residuals. Prereq: 4520 or equivalent.

4530 Environmental Engineering Laboratory (3) Standard analytical techniques for evaluation of specific air, water and solid waste pollutants. Prereq: 4520, 2 hrs and 1 lab. W

4600 Solid and Hazardous Waste Management (3) Magnitude and characteristics of solid and hazardous waste problems; collection systems; disposal alternatives; case studies upon fixation, resource recovery, and proposed new technologies; current and future regulations. Prereq: 4530, Engineering Science 3100. F, Sp.

4700 Air Pollution—Air Resources Management (3) Introductory course on concepts of air pollution; analysis of relationship among emission sources, meteorology, and atmospheric pollution; effects on receptors; engineering approaches for air pollution control. F, Sp.

4820 Environmental Engineering Law (3) Legal aspects of air and water pollution, drainage, land use controls and environmental impact statements with emphasis upon federal-state relations, recent legislation, and court decisions, and enforcement. Prereq: Senior standing. F.

5003 Thesis (1-15) E

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

5150 Water and Urban Welfare (3) Social, environmental, and economic impact on planning and management of water resources systems; on demands upon conflict and choice, reconciliation between environmental and development values, measurement of social and environmental impacts; impact parameters. Analyzing multiobjective policy alternatives with selected case studies. Prereq: Consent of instructor.

5160 Planning and Utilities (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. Not for civil engineering majors. (Same as Planning 5160.) W

5230 Surface Water Transport Processes (3) Dynamics of flow in catchments, streams, lakes and estuaries; Hydrodynamic dispersion, diffusion, boundary layer effects, unsteadiness, kinematic wave approximation. Geometric and hydraulic nonuniformities. Prereq: Engineering Science and Mechanics 3110 or consent of instructor. F.

5232 Sediment Transportation (3) Sediment properties and deposits; bed load and suspended load movement; erosion, scour, transportation and deposition of sediments by flowing water; silting of reservoirs and related topics. Prereq: 5230. W

5234 Flood Damage Reduction (3) National, regional, local flood problems; hydrologic design criteria; traditional flood control measures; land use controls; evaluation and analysis of flood insurance, and other flood damage reduction elements; interdisciplinary approach in floodplain management; case studies. Prereq: Consent of instructor. Sp.

5261 Basic Principles of Remote Sensing (3) Applications of remote sensing in agriculture, engineering, forestry, meteorology, land use planning, and resource management; basics of electromagnetic radiation including wave theory, physical and geometric optics, and the interaction of EM radiation and matter and advanced data handling technology. Prereq: Consent of instructor.

5262 Remote Sensing Data Acquisition (3) Active and passive sensors, their areas of special application and limitation, description of remote sensing platforms, introduction to Remote Sensing and Communication Systems; mission planning. Prereq: 5261 or consent of instructor.


5301 Stormwater Modeling I (3) Interpretation of hydrologic data using methods of systems analysis. Models of air and water quality, water resources systems including rainfall-runoff relationships. Prereq: Consent of instructor. W.

5302 Stormwater Modeling II (3) Continuous streamflow records interpreted using methods of stochastic processes, including flow frequency and time series analysis. Hydrologic design of water resources systems using streamflow simulation techniques including physical and stochastic analog models and flood frequency technique. Prereq: Consent of instructor. Sp.


5330 Descriptive Hydrology (3) Occurrence and description of elements of hydrologic cycle, effects on earth and relation to humans. Not for civil engineering majors.

4400 Introduction to Environmental Systems (3) Models of air and water quality, water resources and solid waste disposal, and location of central facilities; exposure to current literature on environmental management. Prereq: Consent of instructor. F, Sp.

5501 Water and Wastewater Treatment Theory I (3) Theory of unit operations employed in sanitary engineering. Prereq: Consent of instructor. Sp.

5502 Water and Wastewater Treatment Theory II (3) Theory of physical, chemical, and biological processes employed in sanitary engineering. Prereq: 4520. W


5530 Environmental Engineering and Natural Systems Behavior (3) Seminar in selected issues of environmental engineering science research relating to natural and engineered systems; optimization of these systems. Prereq: Graduate standing, Civil Engineering 4800, or consent of instructor. Sp.

5551 Water Quality Management (3) Water quality control objectives and factors, and advanced water quality criteria; effect of various uses on water quality; receiving water characteristics and waste assimilation capacities; optimization of these systems under various conditions. Prereq: 4520. W

5582 Microbiology for Sanitary Engineers (3) Microorganisms and microbiological processes significant in sanitary engineering, including basic microbiology, detection and identification, enzyme-bacterial reactions, energy transfer, synthesis and growth; aerobic and anaerobic biological treatment processes. Prereq: Graduate standing. Sp.

5593 Advanced Environmental Engineering Laboratory (3) Application of modern and typical research methods principally instrumental, to analysis of environmental pollutants. Prereq: 4520. 2 hrs and 1 lab. W


5630 Design of Solid and Hazardous Waste Disposal Systems (3) Unit operations and processes for solid and hazardous waste disposal; soil attenuation, incineration and heat recovery, biological processes, fixation and encapsulation, and resource recovery. Prereq: 4500, 5593, 5503, 1 lab.

5700 Planning and Air Pollution Control (3) Relationship between air pollution, area development, and urban growth. Social, economic, and political processes involved in air pollution control.

5710 Air Pollution Control Engineering (3) Emission control systems for industrial and power generating processes, stack sampling methods, air monitoring, dispersion of pollutants. Prereq: Graduate standing. F, Sp.

5715 Ambient Air Monitoring (3) Physical and chemical techniques for ambient air monitoring. Survey network design. Quality control of air monitoring data. Measurement of air pollution levels and impact assessment and environmental management programs. Prereq: Consent of instructor.


5725 Air Quality Modeling and Impact Assessment (3) Techniques to assess the air quality impact of new or proposed industrial and projects and existing emission sources. Application of atmospheric dispersion models and evaluation of meteorological and air quality data. Prereq: Graduate standing, Computer Science 3150. Sp.

5730 Air Pollution Control Device Design (3) Design and evaluation of systems used to control gaseous and particle air pollutants. Comprehensive design of specific devices and systems. Prereq: 5720. Sp.

5735 Industrial Source Sampling (3) Sampling methods for gaseous and particulate air pollutant emissions. Analysis of data from industrial sources. Prereq: Graduate standing. 2 hrs and 1 lab. Su.

5745 Ambient Air Chemistry (3) Reaction mechanisms for production of secondary air pollutants from atmospheric processes and natural and man-made sources. Prereq: Consent of instructor. F, Sp.

5760 Diffusion in the Atmosphere (3) Movement and dilution of natural or man-made material released into the atmosphere. Basic theory. Rise of buoyant plumes, relation between Eulerian and Lagrangian spectras, differences between instantaneous and continuous sources, diffusion in a zone of wind shear and diffusion from urban area sources. Prereq: 5725.

5900 Special Problems in Environmental Engineering (1-9) To fulfill the special problem requirement in non-thesis programs limited to environmental engineering students in the non-thesis program. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/NC only. E

5910-20 Special Topics (1-6, 1-6, 1-6) Problems and topics of current interest and development in field of environmental engineering not included in other courses. May be repeated. E.

5990 Environmental Engineering Seminar (1) All paper open to 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 UNNC only. F, W, Sp.

6110-20 Advanced Topics in Fluid Mechanics and Convective Transport (3) (Same as Engineering Science and Mechanics 6110-20.)


510 Industrial Waste Unit Operations and Processes (2) (3) Batch and pilot plant development of physical, chemical and biological variables for treatment of industrial wastes and residuals, utilization of variables in design. Prereq: 5501, 5502, 5503, 5593. 1 hr and 4 labs.

520 Industrial Waste Management (3) Sources and characteristics of industrial wastes; recycling, waste destruction, energy recovery, resource recovery, and treatment options, ultimate disposal of residuals including thermal processes, land application, recovery, and encapsulation; design oriented. Field trips. Prereq: 5501, 5502, 5503.

6280 Advanced Theory and Applications in Water Resources Energy Systems (1) (3) Advanced theory on convective and conductive heat transfer, turbulent flow, hydrodynamics, and fluid transport mechanisms in open channels, applications in evaporation, thermal plant discharge heat dispersion, and stratified flow, and wave mechanics. Prereq: 5110 or equivalent.

6910-20-30 Special Topics in Environmental Engineering (3, 3) Selected advanced problems of current interest in environmental engineering. Prereq: Consent of instructor. E

NOTE: Prerequisite to all graduate courses: Consent of instructor.

Electrical Engineering

MAJOR

DEGREES

Electrical Engineering

M.S., M.E., Ph.D.

Professors:

Assistant Professors:

Assistant Professors:
J. D. Birdwell, Ph.D. Massachusetts Institute of Technology; J. S. Lawler, Ph.D. Michigan State.

MASTER OF SCIENCE PROGRAM

Graduate work leading to the Master of Science in Electrical Engineering may be completed during one academic year of full-time study, or the degree may be obtained in two or three years of study in the evening. Graduate assistantships are available for outstanding students, who may obtain the Master's degree in one calendar year.

Specific departmental requirements include:

1. Electrical Engineering 5070-80 and 5710. Electrical Engineering 5710 is normally available in both fall and spring quarters. Students electing courses such as 5560-50, 5720-30, or 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, 4550, and 4250, or 4510-20-30. Other 4000-5000 level mathematics courses approved by the student's Master's committee must be substituted for any of the above course material covered in undergraduate 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.

4. The 18 quarter hours of 5000-level work in Electrical Engineering must be divided equally between two different electrical engineering areas.

5. Master's thesis, totaling 9 quarter hours or more.

6. A final oral examination covering the thesis and related course work.

Masters of ENGINEERING PROGRAM

A graduate program leading to the Master of Engineering degree is available to qualified graduates of A.B.E.T.-accredited undergraduate curricula in electrical engineering or its equivalent. Specific degree requirements which must be met include:

1. Electrical Engineering 5070-80 and 5710.

2. Nine quarter hours of graduate credit in mathematics consisting of Mathematics 4710, 4550, and 4250, or 4510-20-30. Other approved 4000-5000 level mathematics courses must be submitted for any of the above course material covered in undergraduate work.

3. An additional 18 quarter hours of 5000-level work in electrical engineering or 9 quarter hours of 5000-level work in one area of electrical engineering and 9 quarter hours of 5000-level work in another area approved by the student's Master's committee.

4. The 18 quarter hours of 5000-level work in electrical engineering must be divided equally between two different electrical engineering areas.

5. Master's thesis, totaling 9 quarter hours or more.

6. A final oral examination covering the thesis and related course work.

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 science, basic sciences, or engineering sciences.

DOCTORAL PROGRAM

The Ph.D. degree with a major in Electrical Engineering may be pursued in the areas of circuit theory, computers, electro-optics, 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 course work beyond the B.S. degree excluding thesis research, and dissertation credit.

3. A minimum of 36 quarter hours credit in doctoral dissertation.

4. One foreign language if the student's faculty committee feels that a reading knowledge of a foreign language is crucial to the student's research efforts.

5. Satisfactory performance on both a basic and an advanced comprehensive examination. The basic examination consists of a 3-hour written examination in each of the following five areas: (1) networks, (2) electronics, (3) electro-magnetics, (4) power, (5) systems and computers. The advanced examination is in the student's major area and is prepared by the student's doctoral committee. The advanced examination must be passed and a formal dissertation proposal accepted by the student's doctoral committee before the student is promoted to candidacy for the Ph.D. degree.

The basic examination is normally taken after the completion of 36 hours of graduate course work. A minimum of 27 hours of graduate work must be completed before the student has taken the basic part of the comprehensive examination the first time.

6. Participation in departmental seminars.

The 72 quarter hours of course work must satisfy the following:

a. A minimum of 38 quarter hours of work in electrical engineering at the 5000 and 6000 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.

Many of the electrical engineering courses are offered in the evening. Engineers working in industry are encouraged to participate in the department's graduate program.

Departmental graduate programs providing special opportunities for academic and research work in areas pertinent to atmospheric and space flight are also available at the Space Institute, Tullahoma.

3010 Transient Analysis (3) Analysis of transient response of systems and systems. Laplace transform method and classical differential equation methods for system analysis; complex frequency concept and pole-zero concepts. applications to engineering problems. Prereq: 2030.


3060 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, dynamics of a rigid body, Mathematics 2860.
3060 Propagation I (3) Propagation of waves in transmission lines and in other guiding systems. Impedance and reflections, transmission line filters, waveguide, microwave, fiber optics, and computer aided design methods. Prereq: 3030. 3 hrs including biweekly lab.

3080 Energy Conversion (3) Magnetic circuits, transformer theory and operation, principles of electromechanical energy conversion with emphasis on input-output characteristics; steady-state analysis of induction motors and d.c. machinery. Prereq: 3040. Includes biweekly lab.

3090 Energy System Operation (3) Synchronous machines, transmission-lines, and transformers as power system elements; power system representations, per unit calculation, and symmetrical components, and fault studies. Prereq: 3060. Includes biweekly lab.


3110 Basic Electrical Engineering—Circuits and Fields (3) For non-electrical engineering majors. Prereq: Mathematics 2850, Physics 2310-30. 3 hrs including biweekly lab.

3120 Basic Electrical Engineering—Electronics (3) For non-electrical engineering majors. Prereq: 3110. 3 hrs including biweekly lab.

3130 Basic Electrical Engineering—Machine (3) For non-electrical engineering majors. Prereq: 3110. 3 hrs including biweekly lab.

3180 Logic Design of Digital Systems (3) Introduction to boolean algebra and design of combinational circuits. Presents gate and flipflop characteristics. Design of clocked sequential circuits and other systems containing memory. Introduction to minicomputer architecture and system components to include busses, memory, I/O, and CPU. Prereq: Mathematics 2850 or Physics 2310-30. 3 hrs including biweekly lab.

3190 Plasma I (3) Engineering applications of physical electronics, plasma effects and devices. Topics include electrostatic precipitators, plasma light tubes, plasma switches and applications (electro-optics), and MHD, controlled thermonuclear and other magnetic confinement devices. Waveguide resonators and other loading components. Design of structures utilized for microwave power transmission and for microwave integrated circuits. Prereq: 3060. 4 labs.

4060 Microwave Circuits and Electronics (3) Characteristic devices include isolators, circulators, and amplifiers, couplers and power dividers, circulators, phase shifters, loading and interconnection of systems. Also includes hybrid vacuum devices and by solid state (bulk and junction) devices. Microwave switching, filtering and multiplexing. Prereq: 3060. 3 hrs including biweekly lab.

4090 Propagation II (3) Metal tube, dielectric rod, and straight waveguides. Waveguide resonators and other loading components. Design of structures utilized for microwave power transmission and for microwave integrated circuits. Prereq: 3060. 4 labs.


4370 Introduction to Feedback System Design (3) Mathematical techniques for analysis and design of steady state error and error constants; root-locus method; optimum gain adjustments; compensation networks; introduction to compensation. Prereq: 3720. Lab optional.

4410 Power System Components and Control (3) Analysis of power system components and their interconnection. Studies in control of power and frequency as well as voltage and reactive power. Prereq: 3090.

4420 Power Systems Analysis (3) System studies including load flow, faults, and stability. Prereq: 3090.

4430 Transmission, Distribution, and Protection (3) Studies in underground and d.c. transmission; consideration of voltages and insulation requirements; system protection against faults. Prereq: 3090.

4460 Lasers and Masers (3) Introduction of principles of laser and maser operation based on classical concepts and electrical engineering analogies. 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.


5000 Electro-optics Detection and Instrumentation (3) Sensitivity, resolution (frequency response) and noise concepts of and practical engineering data for both spatial recording media (e.g. photographic emulsions) and temporal detectors (e.g. photo-diodes) will be given. The last third of the course will be devoted to selected electro-optic instrumentation systems (e.g. laser light scattering, optical data processing, holographic interferometry).


5470 Electro-Acoustics (3) Wave equation for sound, radiation from pistons, Impedance of a piston, loudspeakers, horns, speaker systems, phonograph recording, tape recording and reproduction, noise reducing systems. Prereq: Senior standing.

4550 Analog Signal Processing Circuits for Electrical Engineering and Instrumentation, including amplifiers, instrumentation amplifiers and other integrated circuits in signal processing. Active filters, amplifiers, analog multiplexers, analog-to-digital converters and synchronous demodulators. Analysis of interfacing problems between transducers and signal processors. Prereq: 3830. 3 hrs including project laboratory.

4560 Analog-Digital Systems (3) Principles of analog computing systems. Applied to analog computing to include problem set-up and scaling. Characteristics of analog computer systems are developed. Projects comparing digital to analog conversion, and analog to digital conversion techniques. Prereq: 3180 and 3830. 3 hrs including biweekly lab.

4620 Sequential Machine and Digital System Theory (3) Considers design aspects of pulse-mode, clock-mode, and level-mode sequential circuits. Theory and characteristics of one- and two-dimensional iterative networks. Design of large scale 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) Consideration of design problems for combinational and sequential digital systems, including minicomputer and microprocessor architectures and comparisons. Characteristics of ALU and CPU structure, addressing, memory (RAM, ROM, and PROM building blocks), and input-output systems are developed. Control unit organization to include serial-parallel modes of operation, synchronous asynchronous time sequencing and microprogramming of control functions. Prereq: 3180. 3 hrs including biweekly lab.

4560 Bioelectric Instrumentation (3) Nature and origin of bioelectric potentials, transducers, amplifier requirements, recording systems and noise problems.

4580 Electronic Amplifiers (3) Feedback amplifier principles. Wideband linear amplifiers. Audio and radio-frequency power amplifiers. Prereq: 3830, 3720. 3 hrs including project laboratory.

4690 Communications Electronics (3) Receiver and transmitter circuits for communications. Prereq: 3040, 3830. 3 hrs including project laboratory.

4700 Digital Integrated Electronics (3) Comparators, logic gates, flip-flops, registers, counters, memories, analog switches, A/D and D/A converters, clipping, clamping and sweep circuits. Prereq: 3830, 3180. 3 hrs including project laboratory.

4740 Integrated Circuits (3) Processing and fabrication of active and passive components for monolithic hybrid circuits, and digital design techniques for linear and digital circuits. Prereq: 3830. 3 hrs including project laboratory.


4800 Hardware-Software Interface in Minicomputer and Microprocessor System Design (3) Introduction to programming of the computer, the microprocessor, instruction set architecture, hardware-software interaction and trade-offs. Priority interrupt structures are discussed and utilized. Telecommunications are developed. Project oriented, contract course. Completion of two projects, one utilizing a minicomputer and the other a microprocessor, with minimal course requirements. Prereq: 3080. 3 hrs including biweekly lab.

4810 Discrete-Data Systems (3) Introduction to analysis and design of discrete data control systems using computer simulation. Real-time digital filtering techniques; applications of digital computers in closed-loop feedback systems.
5230 Advanced Electrical Machinery Applications (3) Linear motors; pole amplitude modulation and other speed control techniques; variable frequency direct current drives; field orientation and vector control systems. Coreq: 4620 or Mechanical Engineering 4150 or equivalent.

5380 Advanced Direct Electrical Energy Conversion II (3) Theory, latest devices, and engineering applications for production of electrical energy by photovoltaic, plasma, metal vapor, nuclear, and electrodynamic effects. Prereq: 4620 or Mechanical Engineering 4150 or equivalent, or consent of instructor.

5390 Advanced Direct Electrical Energy Conversion III (3) New advanced devices, photovoltaics, power electronics, etc. Prereq: 4620 or Mechanical Engineering 4150 or consent of instructor.

5410 Power System Networks (3) Sequence impedances for transmission lines, machines, and transformers. Formulation of system network characteristics such as Zbus, Ybus, and others. Computer methods. Prereq: Graduate standing or consent of instructor.

5420 Fault and Load Flow Studies (3) Analysis of power system under short and series fault conditions. Computer methods for fault studies. Load flow problem is formulated with computer methods, emphasized. Prereq: 5410 or consent of instructor.


5440 Distribution System (3) Electric power distribution with emphasis on particular reference to utilities. Power distribution 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 subsynchronous resonance. Consent of instructor. May be repeated with consent of department.

5510-20-30 Advanced Analog Electronics (3, 3, 3) Physical operation of modern electronic devices with emphasis on semiconductor devices such as diodes, bipolar transistors, J-FETS, and MOSFETs. Small-signal equivalent circuits and noise models of active devices. Design and analysis of linear wide-band low-noise feedback amplifiers and radio-frequency amplifiers using discrete, monolithic and hybrid devices; voltage and current regulators, including switching regulators. Use of specialized electronic systems in analog signal processors. Advanced topics in the analog design of power systems for steady state and transient stability. Prereq: 4370, 4620, 4680, 4740 or consent of instructor. Coreqs: Math 4510 or 4710. Project laboratory included.

5540 Thick-Film Hybrid Microcircuit (3) Process- ing and design basic techniques for prototype production of hybrid-thick-film integrated circuits: optical, structural, and electrical considerations. Computer-aided design and new developments in thin film pastes, cost-effective design techniques. Project oriented, includes bidirectional 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, linear and nonlinear control. Prereq: 4760 or consent of instructor. Project laboratory included.

5610-20 Logic Design and Finite Automata Theory (3, 3) Design considerations for combinational and sequential logic systems. Fault diagnosis of logic circuits. State identification and structure realizations of sequential machines. Prereq: 4620-20 or equivalent. Project laboratory included.

5615-25 Introduction to Switching Theory and Logic Design (3, 3) Boolean algebra and applications. Combinational switching circuits. Sequential switching circuits. Information logic. Computer science majors and those without prior experience in hardware and logic design. Prereq:
Wave propagation in isotropic and anisotropic media, transmitted power, stored energies, propagating and nonpropagating modes, orthogonality properties, boundary and radiation conditions, sources. Prereq: 5820.

5870 Introductory Microwave Networks (3) Circuit equivalents for n-port, junctions, obstacles, loading and fillings. One way and two way devices, directionality, equivalent circuits for microwave components, reflection charts. Prereq: 5810. Coreq: 5830.

5930 Digital Image Processing (3) Theory and techniques. Visual system models, two dimensional sampling and interpolation, image representation and transforms, image enhancement, restoration, reconstruction, image coding techniques, image deconvolution, 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 minicomputer and microprocessor system are studied. Project-oriented supported by hardware and software interface design. Prereq: 4850 or equivalent or consent of instructor. (Same as Computer Science 5940-50.)


6100 Electromagnetic Wave Propagation (3) Dispersion relations, multipath effects, correlation. Fundamentals of propagation in the atmosphere, ground wave and sky wave propagation. Propagation in ionosphere, ground wave and sky wave propagation. Prereq: 4860-50 or equivalent.


6710-30 Network Synthesis (3, 3, 3) Synthesis of one-, two-, and n-port networks for prescribed frequency and time domain conditions. Approximation of prescribed network characteristics by functions known to be suitable for synthesis. Recent contributions to topological synthesis. Prereq: 5110-20-30.


must be included with the departmental application.

The flexibility and interdisciplinary aspect of the program options are intended to be of particular interest to prospective students currently employed in research, development, or design activities and whose interests in continuing education (either full-time or part-time) lie at one of the interfaces between science and engineering, or can best be 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 beyond that required from 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>Course</th>
<th>Hours</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Engineering courses</td>
<td>18</td>
<td>27*</td>
</tr>
<tr>
<td>(Major option; may include</td>
<td></td>
<td></td>
</tr>
<tr>
<td>but is not restricted to</td>
<td></td>
<td></td>
</tr>
<tr>
<td>courses offered by the</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering Science and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanics Department.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Related courses (May</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>include additional courses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>in mathematics, computer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>science, or the physical</td>
<td></td>
<td></td>
</tr>
<tr>
<td>and life sciences as well</td>
<td></td>
<td></td>
</tr>
<tr>
<td>as engineering courses.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Theses</td>
<td>9</td>
<td>9</td>
</tr>
</tbody>
</table>

A final examination is required under both plans, covering graduate course work and the thesis (if any).

**THE DOCTORAL PROGRAM**

General policies and requirements of The Graduate School relating to admission, residence, languages, research, examinations, faculty advisory committee, and admission to candidacy apply to this program.

Specific departmental requirements for the Ph.D. degree include:

1. A minimum of 108 quarter hours credit beyond the Bachelor's degree, exclusive of credit for the Master's thesis. These shall include a minimum of 36 quarter hours credit in Doctoral Research and Dissertation and a minimum of 72 quarter hours credit in other courses.

2. A minimum of 36 quarter hours in engineering graduate courses, exclusive of thesis and dissertation credit. These courses will normally be numbered 5000 and above, with at least 12 quarter hours of 6000-level courses, which constitute one or two areas of concentration selected by the student. The number of courses in this group to be taken will depend on the program selected by the student and the approval of his/her advisory committee.

3. A minimum of 18 quarter hours in mathematics or computer science in courses numbered 4000 and above, exclusive of a first course in ordinary differential equations.

4. A minimum of 9 quarter hours of courses numbered 4000 and above, offered in departments other than mathematics, computer science, and the student's major department and which are not included in the areas of concentration selected by item 2.

5. Active participation in graduate seminars and colloquia.

6. Comprehensive examination consisting of a written qualifying examination and an advanced examination. The qualifying examination covers areas of engineering science and mathematics, for the most part at a level and scope expected of well-qualified recipients of a Bachelor's degree in engineering. The advanced examination requires demonstration of special competence in the areas of concentration selected by each student under item 2.

7. Submission of a written proposal for dissertation research to the student's advisory committee. Oral defense of the proposal is normally required when the student takes the advanced portion of the comprehensive examination.

8. Submission of a dissertation which meets the requirements of The Graduate School, the department, and the student's advisory committee.

3311 Mechanics of Materials (4) Concepts of stress and strain; strain-stress relations and Mohr's circle; static analysis of members; area moment of inertia; stress and displacement analysis of axially-loaded members; torsion; bending. Not for departmental graduate credit. Prereq: Basic Engineering 1310. Coreq: Mathematics 2850.

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, biometry, and biomechanical models of body systems. Coreq: Mathematics 2840 or consent of instructor.

3420 Introduction to Clinical Engineering (3) Application 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.

3520 Materials Behavior and Chemical Process Design (3) (Same as Metallurgical Engineering 3520)

3700 Dynamics (4) Kinematics of rigid bodies; mass moments of inertia; coulomb friction; kinetics of rigid bodies using force, mass, acceleration; work-energy; impulse-momentum. Not for departmental graduate credit. Prereq: 2705 or Basic Engineering 1320. Mathematics 2840.

3710 Intermediate Dynamics (3) Three-dimensional dynamics of particles and rigid bodies; dynamics of bodies with varying mass; central force motion; LaGrange's equations. Prereq: 3700, Mathematics 2840.

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.

**4430 Orthopedic Biomechanics (3)** Introduction to engineering principles and applications in orthopedics and rehabilitation. Statics, Newton's laws of motion, engineering materials, biological materials. Prereq: Consent of instructor. For non-engineering majors.


**4520 Biomedical Fluid Mechanics (3)** Discuss objectives, review foundations and present developments in biomedical and fluid mechanics. Properties of human blood and blood vessels, determinants of cardiac performance, analysis and measurement of flow and pressure in arteries, non-traumatic study of circulatory system, mechanics of microcirculation. Applications to areas of hemolysis, thrombosis, and fluid dynamics of heart assist devices. Prereq: 4500 or a course in fluid mechanics or consent of instructor.

**4530 Biomechanics (3)** Discuss objectives, review foundations and present developments in areas of human mechanics. Concepts, stability, biometrics, biomechanics of injury and prosthesis, human body measuring, prosthetic devices and biomechanical problems related to impact. Prereq: 3311 or 4520.

**4540 Fracture-Safe Design (3)** A critical review of the mechanical properties of materials that are indicative of fracture resistance. Kinematics of fracture, R-curves, stress intensity factors, and J-integrals; the use of these properties in design. Prereq: 3310 and Mechanical Engineering 2110. (Same as Metallurgical Engineering 4540). 3 hrs or 2 hrs and 1 lab.

**4550 Principles of Nondestructive Testing (3)** (Same as Physics 4560)

**4610 Experimental Stress Analysis (3)** Basic concepts; theory, techniques, and instrumentation of resistance strain gage technique. Computerized signal processing. Analysis for stress, strain, and deflection. Prereq: 2250 or 2705.

**4620 Dynamic Data Acquisition (4)** Instrumentation of measuring systems for dynamic events and responses; signal conditioning, oscillographs, and magnetic tape recording; telemetry and data transmission; data processing. Prereq: 2280, Electrical Engineering 3120. 3 hrs and a 3-hr lab.

**4630 Introductory Photomechanics (3)** Introduction to photoelasticity, photoelastic coating method, Moire method, interferometry, and holography. Prereq: 3310, Physics 2320, or consent of instructor.

**4710 Fundamentals of Vibrations (3)** Free and forced vibrations of lumped and undamped lumped parameter systems; energy methods. Prereq: 2270, Mathematics 2840.


**4810 Engineering Analysis (4, 3)** Integration of fundamental physical laws and mathematical methods of analysis in application to realistic engineering problems. Prereq: 3510, 3511, and Mathematics 3150.

**4850 Elementary Structural Matrix Methods** (Same as Civil Engineering 4850 and Architecture 3010)

**4910 Special Engineering Science Topics (3)** Problems related to recent developments and practice. Open to juniors or seniors with consent of instructor. May be repeated. Maximum 6 hrs.

**5000 Thesis (115)**
5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student unilaterally abandons his/her candidacy or for whom no degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

5110-20 Fluid Dynamics (3, 3) Kinematics of fluids, vorticity, rate deformation, plane and axially symmetric stream functions; Navier-Stokes equation, exact solutions, creeping flow and boundary-layer approximations, laminar and turbulent flow, potential theory, complex potentials, conformal mapping. Prereq: 5800.

5130 Introduction to Turbulence (3) Macroscopic effects, analogies, statistical treatment, correlation functions, energy spectra, diffusion; application of turbulent jets and pipe flow. Prereq: 5800.

5140 Finite Element Methods In Fluid Mechanics (3) Computational fluid mechanics using finite element techniques. Basic methodology; initial-value techniques; matrix interaction; accuracy and convergence concepts. Laminar and turbulent boundary layer flow; inviscid and aerodynamic flows; incompressible Navier-Stokes equations. Prereq: 5110 and 5860.

5180 Finite Element Structural Analysis (3) (Same as Civil Engineering 5180.)

5220 Mechanics of Viscous Flow (3) Viscous forces in flow phenomena; application of Navier-Stokes equations; boundary conditions; stress-optic methods of laminar flow analysis. Prereq: Mathematics 4610. (Same as Chemical Engineering 5210.)


5410-20 Theory of Elasticity (3, 3) Stress, strain in three-dimensional bodies; axisymmetric problems; stress concentration; plane stress, plane strain. Prereq: 5800.

5430 Thermal Stresses (3) Heat conduction; thermoelastic equations; thermal stresses in beams, rings, plates, and shells; thermal buckling problems. Prereq: 5410 or 5310-20-30, and Mechanical Engineering 5440.

5440 Theory of Linear Viscoelasticity (3) Linear viscoelasticity of solids; quasistatic problems; vibra-
tions; dynamic problems; stability prob-
lings; foundations of three-dimensional visco-
elasticity. Prereq: 5800.

5550 Fracture Mechanics (3) Equilibrium cracks and unstable crack propagation; numerical methods for deter-
mination of fracture mechanics parameters. Prereq: 5800; Metallurgical Engineering 4730 or Chemical Engineering 4740 or 5540.

5630-40 Photoelasticity (3) Physical optics, wave motion, polarized light, basic principles of photoelasticity, equipment, and techniques; application to two-dimensional analysis of elasticity and stress concentration; numerical methods in photelastic stress analysis, photoelastic coating methods, three-dimensional photoelasticity. Prereq: 3311, Mathematics 4610, and consent of instructor. 5640: 2 hrs and 3 labs.

5710-20 Advanced Dynamics (3, 3) Physical laws relative to translating and rotating reference frames; rigid body dynamics; variational methods; LaGrange's equations; Hamilton's principle. Prereq: 3710 or 4710, Hamilton's principle. Prereq: 5800; Metallurgical Engineering 4730 or Chemical Engineering 4740 or 5540.

5730 Advanced Vibrations (3) Vibration of multi-
degree of freedom lumped parameter systems. Iterative and approximate solutions. Introduction to random vibrations. Prereq: 4710 and 4850.

5780 Vibrations of Continuous Media (3) Equa-
tions of motion for strings, rods, beams, membranes, plates, and shells; natural modes and frequencies; response of damped and undamped components to applied dynamic loads; approximate methods of solution. Prereq: 5410 and Mathematics 4550.

5790 Orbital Mechanics (3) Planetary, satellite, and astronomical orbits and trajectories; orbital perturba-
tions; classical principles of minimization. Prereq: 3710 and 4710.

5800 Introduction to Continuum Mechanics (3) Fundamental of solids and fluids; Cauchy's fundamental equations, and flow in continuous medium; constitutive equations, applications to solids and fluids. Prereq: 3130 and 3311 or equivalents. Mathematics 4610.


5860 Introductory Finite Element Methods (3) General finite element procedure; convergence re-
quirements; programming concepts. Stress analysis, heat transfer, fluid flow, and solution of differential equations. Prereq: 5800 or 5310, or Mechanical Engineering 5540, or consent of instructor.

5910 Special Topics in Engineering Mechanics (3) Mechanics problems related to recent develop-
ments in fluid mechanics and aerelasticity. May be repeated with consent of department.

6000 Doctoral Research and Dissertation (3-15) E

6110-20 Advanced Topics In Fluid Mechanics and Convective Transfer (3, 3) Survey of literature on advanced convective momentum, heat, and mass transfer; boundary layer theory based on the Navier-Stokes equations; boundary layer stability analysis; phenomenological models for turbulence; turbulent boundary layer flow; high speed flow of phenomena in nonreacting and reacting systems. Prereq: 5110-20-30, or equivalent; Mathematics 5300, 5450-50, 5470. (Same as Environmental Engineering 6110-20.)

6140 Advanced Finite Element Methods In Fluid Dynamics (3) Computational fluid dynamics using finite element method. Formulation for two- and threedimensional, multispecies compressible flows, second-order turbulence closure; parallel Navier-Stokes equations, Multidimensional, turbulent, and reacting flows. Prereq: 5130 and 5140.

6230-40-50 Theory of Turbulence (3, 3, 3) Mathematical description of turbulence; isotropic turbu-
elence, energy spectra, Kolmogorov's hypothesis; large and small eddy structure by turbulent flows; turbulent diffusion by continuous movement; ap-

6310 Theory of Plates (3) Classical theory of bend-
ing of plates of various shapes; thick plates; plates of variable thickness and large deflection problems. Prereq: 5310-20-30.

6320 Analysis and Design of Thin Shell Struc-
tures (3) Geometry of surfaces, derivation of thin shell theory, and applications of theory for structural engineer. Prereq: 6310 or Civil Engineering 5160.

6330 Theory of Elastic Stability (3) Theory of elas-

6340 Theory of Plasticity (3) Yield conditions; strain hardening; general constitutive equations; plastic potential; uniqueness theorems; extremum and variational principles; problems in perfectly plastic solids; thin plastic deformations; piezoelectric, linear plasticity. Prereq: 5410 and Mathematics 4550.

6610 Photoelasticity (3) Stress-optic law in three dimensions and index ellipsoid, rotational effects in threedimensional photoelasticity, techniques and applications of threedimensional photoelasticity, scattered light method, dynamic photoelasticity, photothermoelasticity, photoelasticity and photovis-
elasticity, recent developments in photoelasticity. Prereq: 5640, 5420 and consent of instructor. 5640: 2 hrs and 3 labs.

6710 Impact and Stress Waves In Solids (3) Mechanical impact; wave propagation in elastic solids; impact and waves in elastic rods, beams, and plates; contact of elastic bodies; dynamic loading in viscoelastic and plastic materials; dynamic properties and materials. Prereq: 5410. Coreq: Mathematics 5630.

6800 Nonlinear Viscoelasticity (3) (Same as Po-
ymaterial Engineering 6210.)

6810 Energy Methods (3) Virtual work, minimum potential and complementary energy, stress-energy principles of Lagrange and Hamilton's equations of motion; variational methods; examples from the fields of plates, shells, buckling, vibrations, and advanced dynamics. Prereq: 5710-20 and Mathematics 5610-20-30.

6910 Special Topics In Engineering Mechanics (3) Advanced problems of interest in mechanics, worked either as group or individually. Prereq: Con-
sent of instructor. May be repeated with consent of department.

NOTE: Not all of the above courses will be offered in any one year.

Industrial Engineering

MAJOR

DEGREES

Industrial Engineering M.S., M.E.


Assistant Professors: M. K. Goodman, M.S., Tennessee, P.E.; J. C. Hungerford, M.S., Ohio; K. E. Kirby, Ph.D., Tennessee.

THE MASTER'S PROGRAM

A graduate program leading to the degree of Master of Science is open to graduates of recognized undergraduate curricula in industrial engineering or to graduates of other engineering curricula who take up to 15 quarter hours of prerequisite course work. A non-thesis option with 45 hours of course work plus a 3-hour design project is available. Graduates are eligible for professional practice. Admission requirements include those presented above plus the requirement of a Bachelor's degree from an A.B.E.T.-accredited engineering program. This 45-quarter hour program requires 18 hours of course work in an industrial engineering core, 9 hours of technical methods electives, 9 hours of industrial engineering design electives and 9-hour thesis or design project.

Any 4000-level course required in the Bachelor of Science in Industrial Engineering program at The University of Tennessee may be repeated with consent of department.

4060 Production Systems Planning and Control I (3) Theory and applications of forecasting, production planning, inventory analysis, production and control, and systems design and implementation. Design of the material requirements process as an integrated system. Prereq: 3510-20. Not available for graduate credit for industrial engineering students.

4070 Production Systems Planning and Control II (3) Theory and application of master scheduling, materials requirements planning systems, lot sizing and safety stocks, distribution and requirements planning. Prereq: 4060.

4080 Forecasting Methods in Industrial Engineering (3) Application of technological forecasting techniques to industrial engineering problems. Includes moving averages and exponential smoothing, linear and polynomial regression models, autocorrelated time-series analyses, Delphi methods and other selected industrial forecasting methods. Prereq: 4060.

4150 Project Control with CPM and PERT (3) A study of project planning and control based primarily on techniques of CPM and PERT. Prereq: Engineering Science and Mechanics 3310. Not available for graduate credit for industrial engineering students.

4170 Automatic Process Control (3) Characteristics of automatic processes and controllers; elementary open and closed loop analysis, multi-project control, and computer programs. Prereq: 3430.

4230 Scheduling Systems (3) Performance measures for shop and flow shop scheduling, including both static and dynamic conditions, as well as techniques for generating production schedules. Determination of probabilistic dispatching conditions. Prereq: 3520.


4600 Predetermined Time Systems (3) Work design and measurement using predetermined time system; methods time measurement, basic motion time study, work factor. Theory and application. Prereq: 3830.

4910-20-30 Special Industrial Engineering Topics (3, 3, 3) Prereq: Consent of instructor. May be repeated one time only.

4950 Industrial Safety (3) Development of organization and programs for prevention and control of accidents with emphasis on OSHA Rules and Regulations.

5000 Thesis (1-15) E

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

5110 Work Design (3) Advanced methods analysis of work hour design, work organization, human capabilities design and interface analysis; emphasis on operator as system component. Prereq: Motion and time study or work measurement. Prereq: 3430 and Computer Science 3150.


5360 Statistical Methods in Industrial Engineering (3) An introduction to statistical methods and data analysis and interpretation of data collected in application of industrial engineering techniques. Prereq or consent of instructor.


5600 Human Factors Engineering (3) Human characteristics which influence design of tools, equipment, and environments, and products. Modeling of human-machine interactions for system controller. Prereq: Consent of instructor.

5700 Optimization Methods in Industrial Engineering (3) Mathematical programming techniques, applications to production and inventory systems. Prereq: 5700, 5720, and 5730. Classical optimization theory, N-dimensional geometry and calculus of variations, selected areas of operations research.

5701 Operations Research Applications (3) Survey of operations research techniques with emphasis on application to industrial engineering problems. Prereq: Mathematics 2860 (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 application of computer programs to programming problems. Prereq: Computer Science 3150 and matrix algebra.

5720 Queuing Models and Simulation (3) Theory and application of existing queuing models and simulation models employed to evaluate complex queuing systems. Data analysis and hypothesis testing related to pertinent waiting line probability density functions. Prereq: 5700, 5560.

5730 Game Theory and Random Processes (3) Operations research including game theory with applications to decision making in competitive environments, and random processes with applications to queuing, inventory models, and decision making. Prereq: 4830.


5830 Health Systems Engineering II (3) Health systems for analysis, control, and improvement of health care systems and total health care delivery. Prereq: 4830.

5840 Air Traffic Control Systems (3) Current systems of air traffic control. Stochastic systems and air traffic control. Design and use of applicable system


6700 Nonlinear Programming (3) Optimization techniques for static and dynamic nonlinear systems subject to various constraints. Applying optimization theory to solve nonlinear optimization problems. Variable metric methods, search methods, constrained nonlinear programming, and penalty function methods. Pre: 5700.


6810 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. Pre: Graduate standing or consent of instructor. May be repeated with consent of department.

Mechanical and Aerospace Engineering

MAJORS DEGREES
Aerospace Engineering M.E., M.S., Ph.D.
Mechanical Engineering M.E., M.S., Ph.D.


Assistant Professors: R. Armill*, Ph.D., Virginia Polytechnic Institute; P. E. George, Ph.D., Purdue, J. Masier, Ph.D., Tennessee, M. Parang, Ph.D., Oklahoma; R. G. Parsons, Ph.D., North Carolina State.

GRADUATE STUDY PROGRAMS

Graduate programs in Mechanical Engineering or Aerospace Engineering are available which extend the degrees of Master of Engineering, Master of Science, and Doctor of Philosophy with concentrations in solar energy, energy conversion and utilization, power generation, machine design and dynamics, aerodynamics and gasdynamics, aeroacoustics, stress analysis, propulsion, heat transfer and fluid mechanics, and thermodynamics. In addition to the general policies and requirements of The Graduate School, each student must satisfactorily complete a program of study which has been approved by the student's committee. Specific program requirements are given below.

MASTER OF ENGINEERING PROGRAMS

Entrance into the Master of Engineering program is restricted to qualified graduates of A.B.E.T.-accredited undergraduate curricula in mechanical or aerospace engineering. At least one-third of the program of study must be classified as engineering design. The student's advisor will assist in planning the program of study to ensure that it includes the necessary design content. Three program options (thesis, course, and problems) are described below. Note that some students may not be eligible for the course option.

MASTER OF SCIENCE PROGRAMS

Entrance into the Master of Science programs is available to qualified graduates of recognized undergraduate curricula in mechanical or aerospace engineering and to qualified graduates of other curricula who satisfy the necessary prerequisites. Three program options (thesis, course, and problems) are described below. Note that some students may not be eligible for the course option.

MASTER'S PROGRAM OPTIONS

Three program options are available:

A. The Thesis Option. The requirements of this option are that the student must satisfactorily complete a program of study that includes:

1. A minimum of 36 quarter hours of course work which includes at least 18 quarter hours of graduate (5000-level or above) courses in mechanical and/or aerospace engineering and normally 9 quarter hours of course work (4000-level or above) in mathematics.

2. A minimum of 9 quarter hours of credit in thesis.

3. Participation in the departmental seminar programs.

4. Submission and defense of a written thesis which demonstrates the ability to conduct and report on an independent investigation.

5. Passing a final examination on all work submitted for the degree.

6. The Course Option. Normally, this program is restricted to those students who have had significant engineering work experience. The evaluation of the work experience and the final selection of the student's program of study are left to the student's committee. The requirements of this option are that the student satisfactorily complete a program of study that includes:

1. A minimum of 45 quarter hours of course work which includes at least 27 quarter hours of graduate (5000-level or above) courses in mechanical and/or aerospace engineering and normally 9 quarter hours of course work (4000-level or above) in mathematics. No more than 3 quarter hours of engineering course work may be below the 5000 level.

2. Participation in the departmental seminar program.

3. Passing a comprehensive written final examination on all course work submitted for the degree. The student's committee will be of sufficient size to include all the study areas reflected in the course program.

C. The Problems Option. The requirements of this option are that the student must satisfactorily complete a program of study that includes:

1. A minimum of 36 quarter hours of course work which includes at least 18 quarter hours of graduate (5000-level or above) courses in mechanical and/or aerospace engineering and normally 9 quarter hours of course work (4000-level or above) in mathematics.

2. A minimum of 9 quarter hours credit in Selected Engineering Problems (5900). A written report must be presented for each problem investigated.

3. Participation in the departmental seminar program.

4. Passing a comprehensive written final examination of all course work submitted for the degree and an oral examination of all work (including problems) submitted for the degree.

THE DOCTORAL PROGRAM

Admission into the doctoral program will be granted to those applicants who have demonstrated superior achievement in their engineering backgrounds. The student must satisfactorily complete an approved program of study which normally includes:

1. A minimum of 72 quarter hours credit beyond the Bachelor's degree, exclusive of credit for the M.S. thesis or problems.

2. A minimum of 36 quarter hours of credit in doctoral dissertation.

3. A minimum of 18 quarter hours in mathematics in courses numbered 4000 or above.

4. A minimum of 36 quarter hours in mechanical and/or aerospace engineering courses numbered 5000 and above, with at least 12 quarter hours of 6000-level courses. These are exclusive of thesis, problems or dissertation credit.

Participation in the departmental seminar program.

GRADUATE CREDIT FOR UNDERGRADUATE COURSES

Junior (3000-level) and senior (4000-level) mechanical and aerospace engineering
84 College of Engineering

in the static and dynamic analysis and redesign of complex, three-dimensional, statically indeterminate structures. Prereq: 5361 or consent of instructor.

5510-20-30 Experimental Stress Analysis (3, 3, 3)
Theory of elasticity; experimental methods; photoelasticity, strain gauges, lacquer coatings.

5540-50-60 Advanced Machine Design (3, 3, 3)
Design of bearings, gears, shafting; lubrication.

5570-80 Dynamics of Machinery (3, 3) Kinematics and kinetics; fixed, moving, and rotating coordinate systems; momentum; energy methods; variable mass; rigid body dynamics; Lagrangian methods. Prereq: 3560, 3910.

5590 Vibrations of Mechanical Systems (3) Free and forced vibrations of single and multiple degree of freedom systems; linear and nonlinear. Prereq: 3630.

5710 Metal Machining (3) Analytical approach to mechanics of machining. Basic phenomena-plastic flow, fractures, friction and wear. Prereq: 3650, 3440, and Metallurgical Engineering 2110.

5800 Transfer Matrix Methods in Elastomechanics (3) Application of transfer matrix methods to static and dynamic lumped parameter systems. Calculation of forced response, mode shapes, and natural frequencies. Introduction to systems having continuous variables. Prereq: 3601 or consent of instructor.


5880-50-60 Rocket Propulsion System (3, 3, 3) Rocket engines. Chemical, electric, and nuclear propulsion systems.

5990 Special Topics in Mechanical Engineering (3-9) Selected problems in mechanical engineering. Prereq: Consent of advisor. May be repeated. S/NC only.

6000 Doctoral Research and Dissertation (3-15) Enrolment limited to students in Problems Program. Prereq: Consent of advisor. May be repeated. S/NC only.

Aerospace Engineering

3610 Dynamics (3) Newton's Law: work-energy impulse-momentum, Lagrange equations, central force, gyroscopic effects. Applications to aerospace systems.

3620 Mechanical Vibrations (3) Free and forced vibrations of single and multiple degree of freedom systems, balancing of rotating machinery.

3630-40 Structural Analysis of Aerospace Vehicles (3, 3) Fundamentals of structural analysis as applied to configurations of aerospace interest. Introduction to aeroelasticity phenomena. Must be taken in sequence.

4110 Aerodynamic Fundamentals (3) Atmosphere, aerodynamics fundamentals, including perfect gases, fluid flow types, airfoil theory, wing theory, drag. For non-aerospace engineering majors only.

4120 Aircraft Propulsion and Performance (3) Propellers, propulsion systems for aircraft, static performance and static performance problems, maneuvers, control surfaces, stability and control. For non-aerospace engineering majors only.

4210 Compressible Flow (3) One-dimensional inviscid flow, and expansion waves; friction and nonadiabatic flow.

4220 Low Speed Aerodynamics (3) Potential flow theory; kinematics and dynamics of perfect fluids; analysis and design of aerodynamic bodies.

4230 Viscous Flow (3) Boundary layer theory; laminar and turbulence, compressibility effects; numerical solution methods.

4240 Astronautics (3) Propulsion, trajectories, guidance, control, and atmospheric reentry of space vehicle systems.

4250 Propulsion (3) Principles of propulsion devices; turbojet, ram-jet, and rocket engines.

4260 System Design (3) Synthesis and design of complete aerospace systems, including aerodynamic and technical aspects. Participation in team design effort including formal presentations and design report.

4471-91 Experimental Aerospace Engineering (3, 3) Experimental methods and measurements of force, length, temperature, pressure, transport rates and physical properties. Planning, conducting, analyzing, and reporting experimental tests according to test standards and other specifications.

4510 Airplane Performance (3) Introduction to aerofoil and wing characteristics, drag; propellers; static performance and maneuverers; theory and design of control surfaces.

4910 Selected Topics in Aerospace Science (3) Current problems in aerospace science; topics in science and engineering required for an understanding of the several areas of aerospace science.

5000 Thesis (1-15) 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

5110 Fundamentals of Aerodynamics (3) Kinematics and dynamics of perfect fluids; potential flow about a body; conformal mapping; hodographs. Prereq: 4220 or Mechanical Engineering 5310, Mathematics 4250.

5120 Experimental Methods in Fluid Mechanics (3) Experimental techniques with laboratory experiments; hot wire anemometry and turbulence measurements; flow visualization, wind tunnel tests (supersonic and subsonic), water table experiments, supersonic flow measurements, boundary-layer measurements. Prereq: 4210-20-30 or Mechanical Engineering 5310.

5150-70-80 Air Vehicle Aerodynamics and Performances (3, 3, 3) Application of aerodynamics to air vehicles to provide estimates of performance, stability, and control characteristics for subsonic to hypersonic speeds. Reference: Dynamics, drag, lift and altitude. Propulsion systems, vehicle performance characteristics, and trajectory optimization. Prereq: 4220.

5210-20 Aerodynamics of Compressible Fluids (3, 3) Fundamentals of dimension analysis; heat transfer; boundary layer theory; slender body theory; similarity rules; method of characteristics. Prereq: 4210 for 5210, and 4220 for 5220.

5240 Dynamics of Viscous Fluids (3) Equations of incompressible fluid flow; laminar and turbulent flow; transition; separation; boundary layer theories; exact and approximate solutions. Prereq: Mechanical Engineering 5310 or equivalent.

5250 Introduction to Hypersonic Flow (3) Slender body flow, similarity; Newtonian theory; blunt body flow; viscous interactions; free molecule and rarefied gas flows. Prereq: 5240.

5260 Selected Topics in Aerodynamics (3) Transonic, supersonic, and hypersonic flow theories. May be repeated. Maximum 9 hrs.

5270-80-90 Aerospace Ground Test Facilities (3, 3, 3) Atmospheric models and similarity considerations applied to ground test facilities. Analysis, design, and construction of space environment test facilities. Prereq: 5240, Mechanical Engineering 5130 and 5230.

5310 Magnetohydrodynamics (3) Electromagnetic field theory; chemical kinetics, thermodynamic and thermophysical properties of gas plasmas; governng equations and applications. Prereq: 4220 and Mathematics 4710.

5340-50 Atmospheric Entry (3, 3) Motion and heating along ballistic and lifting trajectories; dynamic stability; heat protection systems. Prereq: 5220. Recommended: 5240.

5440-50 Transonic Flow (3, 3) Theoretical and experimental aspects. 5440—Nature of flow at transonic speeds and delineation of specific problems—nonlinear nature of flow; strong viscous interaction, development of small disturbance equations and similarity parameters, shock-wave in transonic flow and assumption of invartional motion, solution techniques. 5450—Shock-wave boundary layer interaction and consequences, design of shock-free flows, wind tunnel testing at transonic speeds, interference problems. Prereq: 5220 or equivalent.

5510-20-30 Aerospace Mechanics (3, 3, 3) Principles of mechanics applicable to aerospace vehicles including equations of motion, multibody problems, and trajectory analysis.


5620 Aeroacoustics I (3) Special topics and recent research results. Theory of sonic boom, aerodynamic noise, jet noise, and general theoretical developments. Consent of instructor. Prereq: 5610.

5810 Aviation Systems: An Overview (3) Aviation systems, present and future, emphasis on systems approach. Socioeconomic basis of aerospace and propulsion technology, meteorology, air traffic control, airport-community interface, and technological trends and developments relevant to present status and future development of air transportation. For non-aerospace and non-mechanical engineering majors only. Prereq: 5810.

5820 Air Vehicles (3) Current capabilities and future requirements for air transport vehicles. Parameters significant for air vehicle type selection. Integration of air vehicle into aviation system. For non-aerospace and non-mechanical engineering majors only. Prereq: 5810.

5900 Seminars (1) All phases of aerospace engineering, including design and development projects. Consent of advisor. May be repeated. S/NC only.

5950 Seminars (1) All aspects of aerospace engineering, including design and development projects. Consent of advisor. May be repeated. S/NC only.

6000 Doctoral Research and Dissertation (3-15) E Credit to be arranged; 3 hrs maximum each quarter.

6910 Advanced Topics In Gasdynamics (3) Selection of topics based on particular interests of student and faculty: nonequilibrium gasdynamics, radiation gasdynamics, nonequilibrium gasdynamic flows, advanced shock and detonation theory, perturbation techniques. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

Nuclear Engineering

MAJOR

DEGREES

M.S., M.E., Ph.D.

Professors:

P. F. Pasqua (Head), Ph.D. Northwestern, P.E.;
H. L. Dodd, Ph.D. Tennessee, P.E.; J. B. Furseill, Ph.D. Georgia Institute of Technology; T. W. Kerlin, Ph.D. Tennessee; J. F. Mott, Ph.D. Minnesota; R. Perez, Ph.D. Madrid (Spain); J. C. Robinson, Ph.D. Tennessee; H. C. Rolland, Ph.D. Tennessee; P. N. Stevens, Ph.D. Northwestern, P.E.

Associate Professor:

L. Miller, Ph.D. Texas A&M, P.E.

Assistant Professors:

E. M. Katz, Ph.D. Tennessee; B. Upadhyaya, Ph.D. University of California.

The Department of Nuclear Engineering offers degrees in the Master of Science, Master of Engineering, and Doctor of Philosophy with concentrations 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.


4. Final examination covering the thesis and graduate coursework.

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 problems 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 coursework and practice school problems.

MASTER 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 course work submitted must be from the 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 practice.

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 in an appropriately recognized university, with a major in engineering or physics, and present at least a B average. All candidates will be required to demonstrate general competence in a comprehensive examination in the core 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).

4. A minimum of one-third of the program 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.

1110-20-30 Introduction to Nuclear Reactor Theory (3, 3, 3) Nuclear structure, radioactivity, nuclear decay, nuclear interaction, fission process, chain-reacting systems; diffusion equation including multiphase diffusion theory, neutron moderation, reactivity coefficients; perturbation theory. Prereq: Physics 3730 or consent of instructor. F, W, Sp

1140 Thermonuclear Systems (3) Fusion reactions; properties of plasmas; plasma containment; plasma diagnostics; techniques of diagnostic devices. Prereq: Physics 3750, 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 composition, diffusion properties of neutrons, criticality, control rod experiments, control rod calibration, statistical weight, shielding, xenon poisoning, prompt critical reactor behavior, fission density and alpha flux. Prereq or coreq: 4110 or equivalent. F, W, Sp


4710 Energy Transport (4) Development of differential and integral energy conservation equations; conduction, convection, and radiation heat transfer; applications to nuclear reactor fuel elements and heat exchangers. Prereq: 3730. F

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. Prereq: Physics 3730, Mathematics 4550. Sp

4820 Reactor Kinetics and Controls (3) Derivation of kinetic equations; basic kinetic parameters; transient response; feedback control and protective systems. Prereq: 4110. W

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

4930 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) E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree requirements. 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, frequency response, stability (linear and non-linear), and sensitivity analysis by state variable methods. Dynamic analysis of distributed systems. Prereq: Consent of instructor. F

5220 Reactor System Dynamics (3) Application of methods of general system dynamics to reactor system analysis, transient response, and non-neutronic processes. Dynamics, stability, and control of zero power reactors and power reactor systems. Prereq: 5210, 4130 or equivalent. W

5230 Experimental Methods in Reactor Dynamics (3) Measuring system dynamic characteristics in time domain and frequency domain. Measurement, analysis, and interpretation of data using random and deterministic system perturbation. Prereq: 5220. Sp

5240 Reactor Instrumentation (3) Instrument components and systems for operation, control, and safety of nuclear reactors; role of instrumentation in public health and safety; engineered safeguards for power plants. Prereq: 4820, or consent of instructor. A

5310-20-30 Nuclear Systems Reliability (3, 3, 3) Systems reliability analysis as applied to nuclear systems. Qualitative and quantitative methods. Coreq: Statistics 3450. F; W, Sp

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.

5510-20-30 Nuclear Systems (3, 3, 3) Various reactor types, flow diagrams, thermal analysis, control methods, component descriptions of power systems using various reactor types and nuclear power economics. Prereq: 4610-20-30 or equivalent or consent of instructor.

5710-20-30 Nuclear Design (3, 3, 3) Analytical techniques for neutron science of nuclear reactor core design. Multigroup discrete ordinate theory, multigroup PN theory, integral transport theory, perturbation theory, and others. Generation of required multigroup constants formulated with available point data and Nordheim treatment in slowing down region and gas kernel in thermal region. Prereq: 4130 or equivalent. F; W, Sp

5740 Reactor Shielding (3) Application of analytic solutions of Boltzman transport equation to shield design problems. Spherical harmonics, moments methods, numerical solutions, adjoint calculations, and invariant imbedding cases studied. Prereq: 4810. F


5840-50 Fast Breeder Reactors (3, 3) Special characteristics of fast breeder reactors; emphasis on LMFBR. Need for breeders; neutron physics and thermal characteristics of reactor core; development status of engineering components; fuel cycle cost analysis; safety; coolants other than sodium; world status of development.

5970 Special Topics in Nuclear Engineering (3) Lectures and recitation on recent advances in nuclear engineering. Prereq: Consent of instructor. May be repeated with consent of department.

5980 Nuclear Engineering Practice (3-12) Experiences in solving and reporting on engineering problems. Prereq: Approval of Nuclear Engineering Department. May be repeated. Only Alternate Plan students may take this course. S/NC only. E

6000 Doctoral Research and Dissertation (3-15) E

6110-20-30 Selected Topics in Reactor Theory (3, 3, 3) Transport theory, control rod theory, and perturbation theory. Selected topics from literature. Prereq: Consent of instructor. F, W, Sp

6140 Radiation Shielding (3) Advanced topics in radiation shielding, Monte Carlo techniques and space radiation problems. Natural space radiators, energy-source radiators, dose conversion, probability. Selected neutron, gamma, and space-radiation shielding problems. Prereq: Consent of instructor. Sp

6150 Reactor Dynamics (3) Special topics in reactor dynamics and control. Prereq: Mathematics 5630. Su

6410 Selected Topics in Nuclear Systems Reliability Engineering (3) Advanced state-of-the-art topics in nuclear systems reliability engineering and risk assessment. Prereq: 5330 or consent of instructor.

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
College of Home Economics

Nancy Belck, Dean
Jay Stauss, Associate Dean, Graduate Studies and Research
Fran Andrews, Assistant Dean, Undergraduate Studies
Helen Grove, Assistant to the Dean

Graduate studies in Home Economics prepares the student for teaching, research and public service in colleges and universities or managerial positions in government and industry.

General requirements for graduate study are prescribed by The Graduate School and the student's department. Each student's application is reviewed by faculty, and students lacking adequate preparation may be required to take additional courses as prerequisites to graduate study.

APPLICATION FOR ADMISSION AND FINANCIAL AID

Requirements for admission to The Graduate School are on page 10 of this catalog. A College of Home Economics application and three Graduate School Rating Forms are required. These may be obtained at the Dean's Office, Jessie Harris Building, or by writing, calling, or visiting the College.

Jay Stauss, Associate Dean
for Graduate Studies and Research
College of Home Economics
The University of Tennessee
Knoxville, Tennessee 37916
Phone: (615) 974-5221

Graduate Record Examination scores for the aptitude test including the quantitative, verbal, and analytical sections are required for the aptitude test. Those who plan to enter a Master's program in Nutrition and are residents of Arkansas, Kentucky, or West Virginia are eligible to enroll on an in-state tuition basis as Common Market students. Those who plan to enter the Master's program in Nutrition and are residents of Alabama are eligible for in-state tuition in the Academic Common Market.

PROGRAMS LEADING TO THE DEGREE OF MASTER OF SCIENCE

Thesis Option:
Child and Family Studies
Consumer Studies and Housing:
Public Policy
Interior Design and Housing
Food Science
Food Systems Administration
Nutrition
Textiles and Clothing

Major:
(9 hours of 5000 courses) 18 hrs
Thesis 9 hrs
Minor area(s) of study:
(minimum of 12 hours of 5000 courses) 18 hrs
Total 45 hrs

A minimum of 30 hours at or above the 5000-level is required.

In some instances, two related minor areas may be selected with 9 hours in each area and a minimum of 3 hours of a 5000 course in each.

Minor area(s) of study are chosen in an area other than in home economics with the approval of the appropriate professors.

An oral examination is required. Nine hours is the maximum credit allowed for special problems work and seminar work in any one area of home economics.

Non-Thesis Option:
The non-thesis option is available for all majors listed under the thesis option and is the only option available for public health nutrition.

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.

CONSUMER STUDIES AND HOUSING:

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 provides 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 96 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 (minimum 36 hours; maximum 48 hours) may be included in the 96 hours presented for the degree.
6. Final examination.

Other Requirements:

Interdisciplinary option: The interdisciplinary option of the Doctor of Philosophy degree in Home Economics provides an opportunity for advanced graduate study with an interdisciplinary approach that focuses on the development, integration and application of knowledge to innovative solutions of the multi-level problems of society. As suggested by the interdisciplinary option, a student in the interdisciplinary doctoral program is in the relatively unique position of having a number of alternatives available—alternatives which are developed as a function of the student's creation within the general framework provided.

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 the development needs of individuals and families.

Phylogenetic Development and Well-being (base department of Nutrition and Food Sciences):
- Physiological response to nutrient intake
- Improvement of nutritional status through informed nutrition options
- Cultural, economic, and technological influences on food selection.

Environmental Factors (base department of Textiles, Merchandising, and Design; or Nutrition and Food Sciences): the relationship between family structure and decision-making processes in the use of human resources
- Cultural, sociological, psychological, and economic factors
- Technological developments
- Aesthetics in improving the quality of the environment.

Consumer's Economic and Social Well-being (base department of Child and Family Studies; Textiles, Merchandising, and Design; or Nutrition and Food Sciences): the relationship between family structure and decision-making processes in the use of human resources
- The effects of social macro- and microeconomics and political development on consumption patterns and other behavior
- Consumer behavior in the socioeconomic needs of consumers.

1. Home Economics 610-20, 6210.
2. Twenty-four to 36 hours from at least two areas in the College of Home Economics.
3. Fifteen to 24 hours in collateral or supporting courses (mainly from departments 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.

Interdisciplinary concentration in food science and concentration in food systems administration:
1. Three hours in research methods from

Food Science 5510 or 5520 or Food Systems Administration 5210, 6 hours from Food Science 5510-20, 30-40, 6110, Food Systems Administration 6110, and Zoology 5350 or equivalent.
2. Twenty-four hours in 5000- and 6000-level courses in food science or in food systems administration.
3. Nine hours in a collateral area. Upon approval of student's faculty committee, 4000, 5000, and 6000 courses in collateral area may be substituted for 5000 and 6000 courses in food science or in food systems administration.
4. Minimum of 4 hours of credit in doctoral seminar.

Nutrition option:
1. Thirty hours of 5000 or 6000 courses in nutrition exclusive of research and Zoology 5350 or equivalent.
2. Nine hours in a collateral area. Upon approval of student's faculty committee, 4000, 5000, and 6000 courses in collateral area beyond the 9 hours may be substituted for 5000 and 6000 courses in nutrition.
3. Minimum of 4 hours of credit in doctoral seminar.

GRADUATE PROGRAMS FOR HOME ECONOMICS EXTENSION
Graduate programs at both the doctoral and Master's levels are available for students interested in home economics extension. At the doctoral degree level, programs of study may be planned in the interdisciplinary or in the food science options. A Master's degree major in Consumer Studies and Housing: Public Policy is particularly suitable for students interested in home economics extension, although Master's programs in individual and family behavior may be planned in any subject matter area of home economics with agricultural extension education as a collateral area. Additionally, four-week courses are offered in February each year for students particularly interested in home economics extension.

Departments of Instruction
Child and Family Studies

MAJORS

DEGREES

Child and Family Studies
M.S. Consumer Studies
M.S.

Food Economics
Ph.D.

Professors:
P. L. Hightower, Ph.D. (Iowa); N. Belick (Dean), Ph.D. (Michigan State)

Associate Professors:
J. L. Cunningham, Ph.D. (Michigan State); D. B. Eastwood, Ph.D. (Utah); V. M. Nordquist, Ph.D. (Tennessee); J. Staus (Associate Dean), Ph.D. (Washington State); R. M. Swagler, Ph.D. (Ohio State); S. Twardosz, Ph.D. (Texas); F. White (Head), Ed.D. (Tennessee)

Assistant Professors:
A. Cox, M.S. (Tennessee); J. Kidwell, Ph.D. (Purdue); C. A. Pentz, Ph.D. (Ky); G. Peterson, Ph.D. (Cal State); B. Brightman, G. Schrann, Ph.D. (Tennessee); J. Southwood, Ed.D. (Tennessee); A. J. Weddle, Ph.D. (Tennessee)

4220 Conserving Time and Energy in the Home
Application of management principles to home-making activities; evaluation of equipment, work centers and work procedures in terms of time and energy demands. Adaptations for the handicapped.

4250 Adult Development and Aging (3) Adult life in our society. Adjustment to internal and environmental changes through middle and aged years. Prereq: 2110 or Home Economics 1510 or equivalent. Ground in adult development or consent of instructor.

4350 Advanced Child Development (3) Survey of selected theories relevant to child development with emphasis on research literature and research methodology. Prereq: 4 hrs. psychology, and 6 hrs child development or equivalent. W

4420 Learning Experiences with Parents (3)
Dynamics of parent-teacher interaction. Emphasis on a variety of techniques for developing communication and working relationships between parents and teachers through experiences in a variety of settings. Prereq: 3210 or Home Economics 1510. W

4430 Family Relationships (3) Interpersonal relationships among family members and societal roles. Prereq: 3510 or 3515. Sp.

4810 Child in the Community (3) Child life in our community agencies; study of community agencies; focus on needs; visits to agencies contributing to the welfare of children. Prereq: 2110 or Home Economics 1510, or equivalent.

4840 Administration of Programs for Young Children (3) Administration of programs for children. Training in preparation, housing, feeding, scheduling, and financial aspects of home, day care facilities, nursery schools, and other programs. Sp.

4850 Child and Family (3) Historical background, contemporary family structure and relationships; emerging needs and programs. Prereq: 4 hrs. in social sciences.

4830 Consumers and the Market (3) Analysis of elements in marketplace which create problems for consumers. Special attention is given to consumer decision making, need for information and constraints and opportunities associated with government protection of consumers. Prereq: Economics 2110. W. Sp.

5000 Thesis (1-15)

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

5060 Practicum (1-12) Field experience in selected agencies and organizations that focus on solutions to problems in consumer studies. Prereq: Consent of instructor. S/NC only. E

5110 Field Work in Family Life (3) School and community education programs concerned with education for family living. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. S/NC only. E

5140 Consumption and Standards of Living (3) Economic and welfare aspects of consumption. Analysis of factors associated with changes in the standard of living. Review of major consumption studies. Prereq: 4850 or 5170 or consent of instructor.

5160 Assessment of Family Behavior (3) Methods of measurement related to study of family. Current methodological issues. Prereq: 5410 or 5530 or consent of instructor.

5160 Management of Time and Energy in the Home (3) Selection and evaluation of methods and devices for able-bodied and handicapped. Survey of literature.

...
Current trends and methods of research. Prereq:
4320 or consent of instructor.

5170 Consumer Economics (3) Consumer func-
tions in economy; structure of consumer markets; government action relating to consumers; factors affecting prices of consumer goods.

5174 Public Consumption (3) Relationships be-
tween consumers and public sector. Market system.

5180 Family Financial Consultation (3) Analysis of family expenditure patterns, common financial difficulties, 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-

5510 Supervision in Preschool Programs (3) Gui-

5640 Teaching Child and Family Studies (5) Semi-

5700 Current Problems and Trends in Child and

5800 Problems in Child, Family and Consumer

6110 Seminar in Child Development, Family Rela-
tionships, 3 hrs sociology. 2 hrs and 1 lab.

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—Phys-

6320 Individual and Family Development: Cogni-

6330 Individual and Family Development: Social-

6410 Theory Construction in Family Studies (3)

6500 Seminar in Human Resource Development

6560 Practicum (1-12) Field experience in selected
groups of teams that focus on interdisciplinary solu-
tions to multilevel problems of society. Prereq: Con-
sent of instructor. May be repeated. Maximum 12 hrs.

6730 Urban Consumers (3) Focus on how consum-
ers function in an urban economy. Urban growth and

Home Economics

MAJOR

DEGREE

Home Economics

Ph.D.

6060 Practicum (1-12) Field experience in selected
groups of teams that focus on interdisciplinary solu-
tions to multilevel problems of society. Prereq: Con-
sent of instructor. May be repeated. Maximum 12 hrs.

610 International Studies (1-18) Student- or staff-
initiated course for study in foreign country of

6210 History and Philosophy of Home Econo-

6220 Development of Community Services Pro-

6230 Evaluation of Community Services Pro-

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—Phys-

6320 Individual and Family Development: Cogni-

6330 Individual and Family Development: Social-

6410 Theory Construction in Family Studies (3)

6500 Seminar in Human Resource Development

6560 Practicum (1-12) Field experience in selected
groups of teams that focus on interdisciplinary solu-
tions to multilevel problems of society. Prereq: Con-
sent of instructor. May be repeated. Maximum 12 hrs.

6730 Urban Consumers (3) Focus on how consum-
ers function in an urban economy. Urban growth and

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
Nutrition and Food Sciences

MAJORS

Food Science
Nutrition
Food Systems Administration

DEGREES

M.S.
M.S.
M.S.

Food Science
Nutrition
Home Economics

Ph.D.

Professors:

B. L. Beach, Ph.D. Wisconsin; R. E. Beauchane
Ph.D. Kansas State; B. R. Carruth (Head), Ph.D.
Missouri; M. J. Hitchcock, Ph.D. Wisconsin;
J. R. Ostatt, Ph.D. Wisconsin; J. R. Savage, Ph.D.
Wisconsin; J. T. Smith, Ph.D. Missouri; A. A. Smith
(Memphis), Ph.D. Tennessee.

Associate Professors:

D. H. Disney, Ph.D. D. H. Tulpe, M. P. Penfield,
Ph.D. Tennessee; D. S. Sachan, Ph.D. Illinois;
M. N. Traylor, M.P.H. California (Berkeley).

Assistant Professors:

F. C. Andrews (Assistant Dean), Ph.D. Ohio State;
J. B. Biltie (Memphis), Ph.D. Tennessee;
M. D. Brooks (Memphis), M.S. Alabama;
G. W. Dainow, Ph.D. Massachusetts; R. Evans, M.A.
Jacksonville; J. D. Skinner, Ph.D. Oregon State.

Food Science

4000 Origin of Food and Foodways (3) Origin and
development of individual and group foodways.
Precept: 8 hrs social science or humanities, F, W

4010 Introductory Experimental Food Science (3)
Physical and sensory evaluation in experimentation with
flour, high protein foods, and batter and dough
systems. Prereq: 3510. 2 hrs and 1 lab. W, Sp

4020 Experimental Food Science (3) Individual
experimentation and its relation to the research litera-
ture. Prereq: 4010, Nutrition 3320 recommended. 1
hr and 1 lab. Su

4040 Food in Contemporary Society (3) Consum-
er's options, responsibility and potential influence
with respect to food supply. F, Su

4100 Food Preservation (3) Application of basic
principles and research in food preservation.
Prereq: 1010, 4 hrs microbiology, and Nutri-
tion 3310 or equivalent. 2 hrs and 1 lab.

5000 Thesis (1-15) E

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

5140 Foods and Nutrition: Physicochemical Prin-
ciples (3) Thermodynamics; physicochemical prop-
erties of proteins, carbohydrates and lipids; chemis-
try of colloid state; chemical kinetics; specialized
kinetics of enzymatic processes. Prereq: Nutrition
3330 and Mathematics 1540 or equivalent. Sp, A

5510 Food Texture (3) Classification of foods
according to textural parameters; instrumentation in
evaluation of textures. Prereq: 4010 or Food Tech-
nology 4920; Plant and Soil Science 3610 or
equivalent; or consent of instructor. F

5550 Food Behavior of the Individual (3)
Behavior of the Individual (3) Development of
and changes in choices of food and food habits.
Prereq: 3000, 3 hrs of nutrition, or consent of instructor. Sp, or Su

5560 Foodways in the United States (3) Current
foodways of selected subcultures in United States
and historical basis for their development. Prereq:
4000, 3 hrs of nutrition, or consent of instructor. W, Sp

5610-20 Advanced Food Science (3, 3)
Biochemical and physiological interactions in food.
Prereq: 4010; Nutrition 3320 or equivalent, or consent of instructor. W; Sp

5630 Carbohydrates and Fats in Relation to Food
Science (3) Physical and chemical characteristics of
sugars, starches, and fats with emphasis on their
behavior in food. Prereq: 4010; Nutrition 3320-30 or
equivalent.

5640 Proteins in Relation to Food Science (3)
Physical and chemical characteristics of the proteins
of milk, eggs, flour, and meats with emphasis on their
behavior in food. Prereq: 4010; Nutrition 3320-30 or
equivalent.

5700 Current Programs and Trends in Food Sci-
ence (1-3) Recent advances in food science, impact
on curriculum, new job opportunities, and implica-
tions for teachers, extension workers, and dietitians.
Prereq: Consent of instructor. May be repeated.

5800 Problems in Food Science (1-3) Advanced
study from the food science viewpoint. Prereq: Consent
department head and professor in charge of investi-
gation. May be repeated.

5850 Field Experience (3-9) Field experience in food-
related industry or agency under supervision of
faculty member. Prereq: Consent of instructor.

5900 Seminar (1-3) Prereq: Consent of instructor.
May be repeated. Maximum 3 hrs. S/N Only.

6000 Doctoral Research and Dissertation (3-15)
May be repeated. S/N Only. E

6110 Advanced Topics in Food Science (3)
Comprehensive individual study and group discussion of
topics related to current problems in food science.
Prereq: Consent of instructor. May be repeated.

6210 Food Dispersion (3) Physical characteristics of
solutions, colloidal dispersions, and suspensions
in relation to treatments applied. Prereq: 5530.

6310-20 Structure of Food Plants and Animal Tis-
sues (3, 3) Histological structure of food plants and
animal tissues related to physical characteristics,
impact, and chemical properties of components.
Prereq: 5630-40.

6510-20 Food and Sociocultural Change (3, 3)
Cultural, dietary, and interpersonal changes affecting
food intake and consumption patterns. Must be taken in sequence. Prereq: 5560 or 5650; or consent of instructor. F, W

6900 Seminar (1-3) May be repeated. S/N Only. E

Nutrition

3310 Organic Chemistry (4) Emphasis on subjects
leading to 3320-30, Textiles and Clothing 4220. Pre-
req: General Chemistry. 3 hrs and 1 lab. Not for graduate credit to departmental majors. F, Sp

3320 Food Analysis (4) Elementary quantitative
analysis; typical food analyses. Prereq: 3310 or
equivalent. 3 hrs and 1 lab. Not for graduate credit
to departmental majors. W, Su

3330 Physiological Chemistry (3) Metabolism of
carbohydrates, lipids, and proteins. Role of vitamins
and minerals in metabolism. Not for graduate credit
to departmental majors. Sp, Su

3390 Physiological Chemistry Laboratory (1) Pre-
req: 3320; Consent: 3330. Not for graduate credit
to departmental majors. Sp, Su

4010 Reproductive and Developmental Nutrition (3)
Nutritive requirements for expectant mothers, in-
fants, and preschool children. Prereq: 3020, 3050, or
3410. 2 hrs and 1 lab. F

4020 Nutrition for Children, Adolescents and
Adults (3) Application of basic principles and re-
search findings to good nutrition for children, adoles-
cents and adults. Prereq: 3020, 3050, or 3410. 2 hrs and
1 lab.

4030 Community Nutrition (3) Nutrition problems
and services in the community; supervised field ex-
periences are integral part of the course. Prereq:
3020, 3050, or 3410. Sp

4110 Introduction to Nutrition Research (3) Dis-
cussion of principles and laboratory experiences.
Prereq: 3410 or equivalent, 2 hrs and 1 lab. Sp

4230 Nutrition in Disease (3) Nutrition problems in
diseases influenced by diet. Prereq: 3410. W, Su

4231 Clinical Experiences In Dietetics (1) Planned
clinical experiences applying principles of nutrition in
disease. Coreq: 4230. Su

4240 Nutrition in Disease II (3) Interdisciplinary lec-
tories of proteins, carbohydrates, and lipids; chemis-
try of normal and diseased organs and/or tissues and
the dietary or behavior modifications required. Prereq:
4230. Designed for senior students in the coordinat-
ed undergraduate program in dietetics. F

4430 Diet and Drug Therapy (3) Effect of drug ther-
apy on absorption and utilization of nutrients, and
effect of diet on absorption, utilization and toxicity of
drugs. Prereq: 3410 or consent of instructor. W

5000 Thesis (1-15) E

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

5110 Advanced Physiological Chemistry (4) Bio-
energetics and related metabolism of nutrients.
Prereq: 3330 and 3390. A

5220 Advanced Physiological Chemistry (3) Nutri-
tional factors in relation to body fluids, gas transport,
and endocrine function. Prereq: 3330. W

5410 Foods and Nutrition: Physicochemical Prin-
ciples (3) Thermodynamics; physicochemical prop-
erties of proteins, carbohydrates and lipids; chemis-
try of colloid state; chemical kinetics; specialized
kinetics of enzymatic processes. Prereq: Nutrition
3330 and Mathematics 1540 or equivalent. Sp, A

5210 Advanced Nutrition (3) Critical review of fund-
damentals. Prereq: 3330, 3410. F

5230 Experimental Methods in Nutrition (3) Use of
small animals in experimental nutrition. Prereq: 3320-30, 3410. 2 hrs and 1 lab F

5240-50 Research Techniques (3, 3) Human meta-
bolic balance experiments. Analytical methods for as-
say of food and biological materials. Prereq: 5330.
3 labs. A

5310 Community Nutrition (3) Nutrition problems
and practices in community; supervised field work.
Prereq: 3410 and consent of instructor. 3 labs. F

5320 Community Nutrition (3) Observations and
participation in nutrition programs of local and state
agencies. Prereq: 5310 and consent of instructor. 3
labs. W

5330 Community Nutrition (3) Nutrition programs
of state and federal agencies; preparation of material
for nutrition education; supervised field work. Prereq:
Consent of instructor. 3 labs. Su

5340 Field Study in Community Nutrition (1-12)
Personal participation in and analysis of state or re-
gional community nutrition programs. Location of in-
depth study to be selected in consultation with in-
tuctor. Prereq: 3320 and consent of instructor. S/
NC Only. Sp

5350 Mental Retardation or Other Developmental
Disorders of Childhood (3) Multidisciplinary core
required of all students attending at Child Develop-
ment Center, UT Center for the Health Sciences, Memphis. Prereq: Consent of department
head. F, W, Sp
Textiles, Merchandising, and Design

MAJORS

Degree Options

Textiles and Clothing M.S.
Interior Design and Housing M.S.
Consumer Studies and Services M.S.
Public Policy M.S.
Home Economics Ph.D.

Professors:
G. R. Bakenkom, Ph.D. Florida State; J. O. Dejonge (Hon.); Ph.D. Loyola; B. C. Gowen, Ph.D. Manchester (England).

Associate Professors:
D. F. Case, Ph.D. Princeton; R. Dillbeck, Ph.D. Missouri; M. F. Drake, Ph.D. Pennsylvania State; L. A. Kocher, Ph.D. California (Davis); G. K. McCurry, M.S. California State.

Interior Design and Housing

A student's course of study may include intensive training in interior design before entering an undergraduate program, behavioral design research, and/or history and preservation of interior architecture. Students interested in Housing may elect an interdisciplinary program in Consumer Studies and Housing Public Policy.

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. Sp

5000 Thesis (1-15) E

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

5900 Field Experience (3-9) Planned administrative and/or public service projects. Prereq: must include slides or original work. May be repeated. Total 9 hrs.

5900 Seminar (1-3) Prereq: Consent of instructor. May be repeated. Maximum 3 hrs. S/NC only.

6000 Doctoral Research and Dissertation (3-15) E

6110 Housing: Public Policy (3) Study of historic design in housing, as reflected in housing regulation and policy.

6150 Design and Layout of Food Service Systems (3) Design of physical facilities and selection and purchasing of equipment for food service systems.

5110-20 Experimental Food Service Delivery Systems (3) Role and responsibilities of administrator in maintaining desired quality and quantitative standards in food service systems. Prereq: 1130 or consent of instructor. W

5120 Administration of Food Service Delivery Systems (3) Analysis and control of food systems income and expenses. Prereq: 1130 or consent of instructor. W, A

5120 Experimental Design of Food Service Facilities (3) Design and layout of food service systems. Prereq: 1130 or consent of instructor. W

5120 Food and Lodging Physical Plant, Planning and Maintenance (4) Feasibility, planning, development, and construction of food and lodging physical plant and maintenance. Prereq: 1102 or consent of instructor. Sp

4270 Tourism, Food and Lodging Information Systems (3) Qualitative and quantitative analysis of information for decision makers in food and lodging operations related to tourism industry. Prereq: 4102, 4250, Computer Science 4101, Sp

5000 Thesis (1-15) E

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

5900 Field Experience (3-9) Planned administrative and/or public service projects. Prereq: must include slides or original work. May be repeated. Total 9 hrs.

5900 Seminar (1-3) Prereq: Consent of instructor. May be repeated. Maximum 3 hrs. S/NC only.

6000 Doctoral Research and Dissertation (3-15) E

6110 Housing: Public Policy (3) Study of historic design in housing, as reflected in housing regulation and policy.

6150 Design and Layout of Food Service Systems (3) Design of physical facilities and selection and purchasing of equipment for food service systems.
planning and design of interior space; applications of research-oriented interior design projects. 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 design of interior architectural environments—derivation of design implications from analysis of sociology, psychology, and related sciences. Prereq: 6 hrs behavioral science, and 6 hrs natural science or consent of instructor.

5520 Environmental Factors in Interior Design (3) Systematic design methodology 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 in product design; selection of materials, task support, and storage furniture pieces and systems; production of construction drawings and scale models. Prereq. Consent of instructor. Sp

5613 Housing Management (3) Role and functions of housing management specialist in problems of private and assisted housing management. Prereq: 4320 or consent of instructor.

5614 Housing Regulations and Controls (3) Functional regulation and other control practices and mechanisms as determinants of nature, availability of housing in local communities by various user groups. Prereq: 4520 or consent of instructor.

5620 Experimental Methods in Household Equipment (3) Research methods and techniques in determination of household equipment. Prereq: 2430 or consent of instructor. 1 hr and 2 labs.

5630 Environmental Requirements for Family Work Centers (3) Trend in planning work center actividades, task support, and recreation-oriented 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.

5640 Environmental Design Research (1-3) Evaluations of research methods and other control practices and mechanisms as determinants of nature, availability of housing in local communities by various user groups. Prereq: 4520 or consent of instructor.

5650 Environmental Research in Physical Environments (1-3) Analysis of private and public 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.

5660 Experimental Methods in Household Equipment (3) Research methods and techniques in determination of household equipment. Prereq: 2430 or consent of instructor. 1 hr and 2 labs.

5670 Environmental Responds in Physical Environments (1-3) Analysis of private and public 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.

5680 Environmental Design Research (1-3) Evaluations of research methods and other control practices and mechanisms as determinants of nature, availability of housing in local communities by various user groups. Prereq: 4520 or consent of instructor. 1 hr and 2 labs.

5690 Environmental Design Research (1-3) Evaluations of research methods and other control practices and mechanisms as determinants of nature, availability of housing in local communities by various user groups. Prereq: 4520 or consent of instructor. 1 hr and 2 labs.

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: 5040. 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 textile 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 intran-resource. Plant tours and case studies on production problems. Field trips required. S

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses all units required and all faculty before the 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. Research methods. 3 labs. Sp

5120 Advanced Problems in Textiles and Clothing (3) Refreshner course; new developments in textiles. Selecting fabrics, agencies aiding consumer, and individual problems in textile field. 2 hrs and 1 lab. F

5130 Advanced Tailoring (3) Comparison of hand tailoring and trade methods used in making suits, coats, or costumes. 3 labs.

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, economic, 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

5210 Evaluation of Instructional Materials in the Field of Textiles and Clothing (3) Evaluating instructional materials in communicating information in various areas of textiles and clothing. 1 hr and 2 labs.

5220 Historic Textiles (3) Development of textile industry in world; fibers used, design, and color. F

5240 Practicum (1-8) 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

5250-60-70 Problems in Textile Chemistry (4, 4, 4) Theoretical and experimental study of chemistry of textile fibers including polymerization, reactions, properties of yéoing 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. Pre-

req: 3420 or equivalent; 1 qr organic chemistry. 2 yrs science.

5310 Fashion Analysis (3) Fashion as social and economic force, evolutionary theories of fashion operation. Prereq: 6 hrs each of sociology and economics.

5320 Problems in Historic Costume (3) Variable flow of styles in relation to cultural determinants. Prereq: 3480 or consent of instructor. May be repeated. Maximum 9 hrs. W

5610 Textile Processing (3) Methods and mechanisms of texturing continuous filament yarns, methods and mechanisms of processing staple yarns, spinning system, composite yarns weaving, knitting, non-woven fabric formation. Prereq: Engineering Science and Mechanics 3311, Mathematics 2840. (Same as Polymer Engineering 5610.)


5700 Current Programs and Trends in Textiles and Clothing (1-3) Pertinent developments and trends in textiles and clothing and implications for new areas of programs, techniques and/or curricula approaches. Content and emphasis vary according to changes in field and needs of groups serviced. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

5800 Problems in Textiles and Clothing (1-3) Advanced study selected from field of textiles and clothing. Prereq: Consent of department head and professor in charge of investigation. May be repeated. Maximum 9 hrs.

5900 Seminar in Textiles and Clothing (1-3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E


5140 Selected Behavioral Theories in Clothing (3) Role of clothing in functioning of people, utilizing behavioral theories. Prereq: 5710, 6 hrs of graduate level sociology or psychology, or consent of instructor.

5180 Social-Psychological Theories of Clothing Consumption (3) Analysis and evaluation of social science theories of consumer behavior in relation to textiles and clothing. Prereq: Consent of instructor. 1 qtr organic chemistry. 2 yrs science.

5900 Seminar in Textiles and Clothing (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

6100 Textile Flammability (3) Factors affecting textile flammability as consumer issue. Standards, regulations, test methods, economic impact. Prereq: 5120, 5180, 5250, or consent of instructor.

6170 Physical Performance Behavior of Textile Structures I (3) Fundamentals of yarn and fabric structures; relationship of structure to physical characteristics of textile materials. Prereq: 5120, or consent of instructor.

6190 Seminar in Textiles and Clothing (1-3) May be repeated. Maximum 6 hrs.

6210 Advanced Topics in Housing Research (3) Various concepts, theories, and methodologies of social sciences in housing research. Prereq: Consent of instructor.
Aviation Systems

MAJOR
Aviation Systems

DEGREE
M.S.

Lead Professor:
M. A. Wright, Ph.D. Wales.

Professors:
W. Frost, Ph.D. Washington; W. F. Jacoba, Ph.D. Gottingen (Germany); A. A. Mason, Ph.D. Tennessee; J. M. Wu, Ph.D. California Institute of Technology; R. L. Young, Ph.D. Northwestern.

Associate Professors:
F. G. Collins, Ph.D. California (Berkeley); R. D. Kimberlin, M.S. Tennessee; J. R. Maus, Ph.D. California Institute of Technology; W. Frost, Ph.D. Washington ; W. F. Jacobs, Ph.D. Gottingen (Germany); A. A. Mason, Ph.D. Tennessee; J. M. Wu, Ph.D. California Institute of Technology; R. L. Young, Ph.D. Northwestern.

Assistant Professors:
W. B. Baker, Jr., Ph.D. Tennessee; V. K. Smith, III, Ph.D. Georgia Institute of Technology.

The University of Tennessee Space Institute offers a program leading to the Master of Science with a major in Aviation Systems. The Aviation Systems program is designed for those who possess a Bachelor's degree in engineering or science and who wish to study under a "systems philosophy" toward careers in research and development or administration in various phases pertinent to aviation. The program features 18 quarter or administration in various phases pertinent to careers in research and development or administration in various phases pertinent to aviation. The program features 18 quarter hours major field credit in various aspects of aviation systems, 6 or more quarter hours credit in each of the areas of research, development and administration, and electives which permit further specialization to either area.

To qualify for admission to this program, the applicant must possess a Bachelor's degree in engineering or science from a recognized institution, show evidence of ability to pursue and benefit from the program, and fulfill The University of Tennessee Graduate School admission procedures and grade point standards. Subject matter prerequisite to the program includes basic knowledge of computer utilization as represented by Computer Science 3150 or equivalent, a background in statistics as represented by Statistics 3450 or equivalent, a basic understanding of aerodynamic fundamentals, aircraft propulsion and performance as represented by Aerospace Engineering 4110 and 4120 or equivalent, a background in accounting as represented by Accounting 5010 or equivalent basic accounting courses, a basic knowledge of economics as represented by introductory economics or equivalent.

Both thesis and non-thesis programs are available. The thesis program involves satisfactory completion of the following minimum requirements:

1. 18 hours in the major field of aviation systems.
2. For the research and development area, 6 quarter hours in Industrial Engineering 5700 and 5710; for the administration area, 6 quarter hours in Economics 5030 and Accounting 5810, for a total of 12 quarter hours.
3. 6 hours of electives selected from the major field, engineering and/or the areas in item 2.
4. 9 hours in Aviation Systems 5000, Thesis, hence demonstrating the ability to conduct and report on an independent investigation.

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

1. 18 hours in the major field of aviation systems.
2. For the research and development area, 9 quarter hours in Industrial Engineering 5700, 5710, and 5720; for the administration area, 9 quarter hours in Economics 5030, Accounting 5810 and Finance 5010-20, for a total of 18 quarter hours.
3. 6 hours of electives in one of the areas in item 2.
4. 6 hours of electives in the major field, engineering and/or the areas of item 2.
5. Satisfactory completion of 3 quarter hours in Aviation Systems 5100, Project in Aviation Systems.
6. Satisfactory completion of a comprehensive final written examination on all course work submitted for the degree and defense of the project course paper.

The thesis program involves 45 quarter-hour credits minimum while the non-thesis program involves 51 quarter-hour credits minimum.

Courses suitable for credit in the major field include:

- Aerospace Engineering 5810 and 5820, Industrial Engineering 5840; Aviation Systems 5070, 5080, 5090, 5210, 5220, and 5870.

Electives typical of those suitable for credit in the area of aviation systems, research and development include:

- Aerospace Engineering 5150-69-70; Computer Science 3510-20, 4550 and 4650; Industrial Engineering 4060, 4150, 4230, 5720, 5730, 6700, 6730; Mathematics 4225-35-45, 4510-20-30; Metallurgical Engineering 5810-20-30; and Statistics 3450.

Electives typical of those suitable for credit in the area of aviation systems, administration include:

- Accounting 5020; Business Law 5010; Economics 5020; Management 5130; Marketing 5010-20; Transportation 5050, 5130, 5210-20, and 5910.

- 5000 Thesis (1-15) E

- 5070 Airports and the Community (3) Structure of airports and their communities: Technology and economics of cargo, baggage, ticket and passenger handling. Airport management, economics and logistics. Interfaces with the community, collection and distribution, demand requirement analyses, types of developments and their projections. 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; requirements analysis, and model analysis of the system. Prereq: Aerospace Engineering 5810.

- 5090 Governmental Policies for Aviation (3) Theoretical and legal basis for economic and governmental regulation of aviation. Historical and legislative development of aviation regulatory agencies, organizational structure and administrative and enforcement procedures. Prereq: Aerospace Engineering 5810.

- 5100 Project in Aviation Systems (3) In-depth study and formal report on aviation systems topic, normally performed during last quarter of work toward degree in non-thesis program. For aviation systems degree candidates only.

- 5210-20 Experimental Flight Mechanics (3, 3) Flight mechanics, experimental techniques. Special equipment used during flight test data. Tests con-
Comparative and Experimental Medicine

MAJOR
Comparative and Experimental Medicine

DEGREES
M.S., Ph.D.

Joint Graduate Coordinating Committee

H. Kitchen (Chairperson); C. C. Congdon; J. E. Fuhr; M. Holland; R. L. Leopold

The Comparative and Experimental Medicine degree program (M.S. and Ph.D.) is a jointly administered graduate program intended to prepare students for teaching and/or research careers in the health sciences. This program emphasizes the comparative approach to the study of pathology, immunopathology, aberrant metabolism, oncology, and genetic disorders. The Ph.D. program is open to approved graduate students seeking training in this area and is especially useful for individuals with professional degrees. For the student with an undergraduate biological science background, the Comparative and Experimental Medicine program provides an unusual opportunity to study disease processes common in humans and animals from a multidisciplinary perspective. The scope of this intercollegiate program, which pools faculty resources from both veterinary and human medicine, is broadened by faculty members representing animal science and numerous areas of the life sciences. The interdisciplinary training environment includes such diverse support as facilities and personnel at the Veterinary Teaching Hospital; the Oak Ridge National Laboratory, Knoxville Zoological Park, 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 143 in this catalog.

ADMISSION REQUIREMENTS

General Requirements
Admission requirements of The Graduate School of The University of Tennessee, Knoxville will apply. In addition, all applicants will be required to submit two official transcripts from all institutions attended and three letters of recommendation from individuals who are familiar with their scholastic or professional backgrounds.

Requirements for Admission to the Master of Science Degree Program
Successful applicants will be scholastically qualified students with a baccalaureate degree in the life sciences and should have completed course work including chemistry through organic, mathematics through calculus, one year of physics, one year of basic biology, plus advanced studies in zoology including courses such as biochemistry, anatomy, histology, cell biology, or others that are appropriate for individuals aspiring to research careers in the biomedical sciences. Students with professional degrees will have most of the above requirements so that entrance to graduate training usually will occur at the doctoral level.

All applicants for M.S. programs, except those with a professional 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 for admission to a doctoral program will 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 with strong backgrounds in the physical and biological sciences who have the baccalaureate degree may be admitted upon presenting evidence of satisfactory performance on the Graduate Record Examination and, in addition, must obtain the approval of the Joint Graduate Coordinating Committee of the Comparative and Experimental Medicine programs.

Exemptions from entrance requirements may be made at the discretion of the Joint Graduate Coordinating 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 as directed by the Joint Graduate Coordinating Committee.

For additional information, see sections in this catalog on College of Veterinary Medicine and College of Medicine—Knoxville Unit, or write to Office of Research and Graduate Programs, P.O. Box 1071, Knoxville, Tennessee 37901.

Ecology

MAJOR
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 research citations and research facilities. The Great Smoky Mountains, Cumberland Plateau, valley and ridge topography, TVA lakes and wild rivers provide locally a spectrum of natural habitats and consequently biological diversity that is truly unique. In addition, faculty research programs provide opportunities for student research elsewhere on this continent and abroad.

ADMISSION REQUIREMENTS

Requirements for admission to this program are:

(1) admission to The Graduate School;
(2) at least 12 quarter hours of college English, 9 quarter hours of college mathematics, and 4 quarter hours of ecology at the upper division level;
(3) departmental application and 3 rating forms;
(4) the Graduate Record Examination.

Applicants for admission to the Master of Science degree should be addressing the Chairperson, Graduate Program in Ecology, University of Tennessee, Knoxville, Tennessee 37916.

ADVISORS

Advisors are selected from ecologists on the shared faculty of the University who have competence in the area in which the student expects to work. Entering students should consult early with the chairperson of the program on the choice of a faculty advisor who will become the chairperson of the student's faculty committee.

THE MASTER'S PROGRAM

The minimum 45 quarter hours of graduate credit shall include 18 hours of ecology courses (exclusive of thesis), of which 6 hours shall be in Ecology 5210-20 and 30 and at least 8 additional hours in ecology courses numbered above 5100; 9 hours of thesis in Ecology 5000, and 16 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 one area of instruction.

The general requirements for this Master's degree are listed on page 18.

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 and a minimum of 9 quarter hours of courses numbered above 6000. A student cannot enroll for dissertation until the research proposal has been discussed and approved by the doctoral committee. A foreign language is required.
Management: They are designed to prepare students for personnel, managerial, and organizational research, for university teaching, and for consulting relationships with industry. Admission to the program is upon the application of 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 departments.

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 Office and the Industrial and Organizational Psychology Program, 413 Stokley Center for Management Studies, Knoxville, Tennessee 37916.

Two separate applications must be completed for 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 of financial aid assistance consideration is required. Ordinary, 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 63rd to 65th percentile on the aptitude tests. (This corresponds to a raw score of approximately 500 on each of the tests.) The GRE Advanced 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 1982 entrants)

A. Management or Psychology 5170, 5180, 5190.
B. Statistics 5050-60-70 and 3 hours of applied psychometrics.
C. Eighteen hours of additional course work to be selected primarily 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 630 or the 85th percentile on the GRE Advanced Test in Psychology.

B. To Ph.D. programs 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 1982 entrants)

A. Minimum course requirements:

1. Management or Psychology 5170, 5180, 5190.

B. Statistics 5050-60-70. Examination by petition.

3. Minimum of three 6000-level seminars to be selected from Psychology or Management 5250, 5260, 5270, and Management or Psychology 6380.

4. 36 hours of Psychology or Management 6000.

B. Recommended electives:

1. For preparation for advanced section

II. GRE: Psychology courses as appropriate.

2. For students who require preparation in psychometrics: Applied psychometrics.

3. For students who wish to pursue special research interests aside from their dissertation: Management 5250, 5260, Management or Psychology 6980.

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, 5180, 5190.

B. Completion of a comprehensive examination in general psychology within no more than two years of entry by attaining a score of 650 on the GRE Advanced Test in Psychology.

C. Completion of a 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).

*May be repeated for additional credit.

** Any student in the doctoral program may be required to prepare a Master’s thesis by the Industrial and Organizational Psychology Committee. This policy will be implemented by the committee at such time as a review of the student’s record suggests that additional data on the qualifications for pursuing a Ph.D. are required.

***See program handbook for definition of a B average.
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. Brattstein; Ethology: G. B. Burghardt; Plant Physiology/Biochemistry: R. W. Holton; 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 study and research in the following concentrations: animal physiology, cellular and molecular biology, environmental toxicology, ethology, plant physiology/biochemistry, and reproductive and developmental biology. Students interested in any of these areas should contact either the chairperson of Life Sciences or the director of the area of interest. Each concentration area is overseen by a committee and may have unique admission and graduation requirements above the minimums for the overall program.

GENERAL ADMISSION REQUIREMENTS
1. A Bachelor's degree with a major in a biological, behavioral or physical science.
2. GRE (aptitude) scores.
3. Three letters of recommendation.
4. Course work including a year of calculus (differential and integral), one year of chemistry, and a year of physics. Specific course deficiencies may be corrected during the first year.

GENERAL PROGRAM REQUIREMENTS
The program requirements are in general the same as those of The Graduate School. The Master’s program requires 45 hours of study approved by the student's committee, a thesis, and a comprehensive oral examination. The minimum requirements for the doctoral program include at least 9 hours above the 6000 level, 36 hours of course credit, a pattern of courses approved by the student's committee, a comprehensive examination, a doctoral dissertation, and a final examination. Individual concentration areas may have additional requirements.

AREAS OF CONCENTRATION

Animal Physiology: The inter-departmental program in physiology includes research in the areas of regulatory, reproductive, cognitive, exercise, cellular, developmental, muscle, or neuro-physiology.

Cellular and Molecular Biology: The inter-departmental program in cellular and molecular biology includes research in structural functional aspects of cells or subcellular components, or the interactions between cells.

Environmental Toxicology: The toxicology program provides intensive training in basic toxicological principles and techniques. Courses and research expose trainees to mechanisms of intended and unintended interactions between living systems and potentially toxic agents from the point of view of biochemistry, physiology, ecology, public health, environmental law and regulation, pest management, pollution control and repair, and testing and residue analysis of toxicants.

Ethology: Ethology is the naturalistic study of normally occurring animal and human behavior. The program provides intensive training in basic ethology with specialized studies available in the development, evolution, and physiology of behavior; human ethology; and behavioral ecology and sociobiology.

Plant Physiology/Biochemistry: This program provides the opportunity for intensive training and research experience in areas transcending the usual boundaries of botany, biochemistry, and agricultural plant sciences. It devotes itself to seeking solutions of problems concerning the interactions of energy and agriculture, primarily at the biochemical and physiological level.

Reproductive and Developmental Biology: The inter-departmental program includes research in animal and plant development, reproductive endocrinology and control of reproductive function, gene regulation and cellular interactions in development.

Management Science

MAJOR DEGREE
Management Science M.S.

Committee:
R. S. Garfinkel (Chairperson), Management Science; R. W. Boling, Management; J. S. Bradley, Mathematics; E. Glustoff, Economics; J. K. Ho, Management Science; W. J. Morse, Accounting; R. E. Rosenthal, Management Science; R. E. Strieves, Finance; C. C. Thigpen, Statistics; M. G. Thomason, Computer Science; C. R. Woolliam, Management.

THE MASTER'S PROGRAM
The M.S. program in Management Science is designed as preparation for a career in the application of quantitative techniques for the solution of management problems in large organizations. The program's flexibility also makes it appropriate as preparation for doctoral study in Management Science. Management Science course work will expose students to both the theoretical development of quantitative techniques and their application to managerial decision making. In addition to the development of sufficient mathematical maturity for creative use of quantitative skills, the program requires concentrated study in a supporting area. Supporting areas are available in other departments of the College of Business Administration (excluding statistics) as well as in computer science, public administration, ecology and other areas, subject to approval by the Management Science Committee. Applications are encouraged from all majors, but mathematics background equivalent to the completion of at least two years of college calculus and proficiency in a computer language (e.g. Computer Science 3150) is required. The program is designed to be completed in one calendar year by full-time students entering in the fall quarter. 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

Quarter Hours
Management Science 5310-20-30-35-40 14
Applied concentration area (approved by advisor) 12
Statistics 5110 3
Statistics elective (5000 level or above) 3
Mathematics (4000 level or above) 6
Electives selected from mathematics, statistics, computer science, and/or management science 6
Electives in any area approved by advisor 6

Total 50

A thesis option is available which substitutes 9 hours of thesis credit for the following 14 hours of course work: Management Science 5335-40, and one 3-hour course in the applied concentration area and 6 hours of electives in any area. The Management Science Committee will work closely with the student in tailoring a program to his/her needs. The committee must approve a tentative overall program during the student's first quarter and must approve all courses on a quarter-by-quarter basis. Recognizing the diverse backgrounds and needs of Management Science M.S. students, the Management Science Committee is prepared to waive some of the above requirements on an individual basis. For example, an undergraduate mathematics major with a strong background may be allowed to take 6 additional hours of electives in place of the mathematics requirements. On the other hand, a student lacking experience in rigorous senior-level mathematics courses will be allowed 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 66 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. 42.
The College of Liberal Arts offers programs leading to eight advanced degrees. See page 9 for degrees and majors.

General Information

FOREIGN STUDY COURSES

Foreign study courses offered in some departments of the College provide an opportunity to undertake independent study outside the United States. Prior to departure the student must have a plan of study approved by the department head and a supervising faculty member of the department concerned. Credit will be given only upon fulfilling all requirements set by the department and may vary from 1-12 hours. The maximum credit which may be applied toward a degree in the College is established in each individual case by the department in which the student is working.

OFF-CAMPUS STUDY

Recognizing that learning is not restricted to formal classroom situations, the College provides for students to earn credit toward graduation for approved off-campus study. Such study may be undertaken only with prior approval of the faculty member and the department concerned. It may include certain kinds of work experiences, community involvement, working in political campaigns, etc. Credit per quarter will vary from 1-12 hours. The maximum credit which may be applied toward a degree in the College is established in each individual case by the department in which the student is working.

INDEPENDENT STUDY

Certain educational goals may best be met through independent study done by an individual under the direction of a faculty member. Students who wish to do such independent work should obtain the approval of the faculty members and the departments concerned prior to embarking upon their study. Credit per quarter will vary from 1-12 hours. The maximum credit which may be applied toward a degree in the College is established in each individual case by the department in which the student is working.

Departments of Instruction

Anthropology

MAJOR

Anthropology

DEGREES

M.A., Ph.D.

Professors:

W. M. Bass (Head), Ph.D. Pennsylvania;
C. H. Faulkner, Ph.D. Indiana; A. K. Guthe, Ph.D.
Michigan; R. L. Jantz, Ph.D. Kansas;
P. W. Parmalee, Ph.D. Texas A. & M.

Associate Professors:

I. E. Harrison, Ph.D. Syracuse; M. H. Logan, Ph.D.

Assistant Professors:

B. J. Howell, Ph.D. Kentucky; W. E. Klippel, Ph.D.
Missouri; G. F. Schroedl, Ph.D. Washington State.

The Department of Anthropology offers the Master of Arts and the Doctor of Philosophy degrees with concentrations in physical anthropology, cultural anthropology, archaeology, zooarchaeology, 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 one-half of the courses must be at the 5000 level).

4. A thesis. In addition to the two (2) copies required by The Graduate School, one bound copy of the thesis is to be presented to the department and 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 of consultation with that committee of a program of study. Determination 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 prerequisite: 2530. F or W.

3440 Religion of Primitive Peoples (3)
Religions of nonliterate peoples. Place of religion in their social and cultural systems. Recommended prerequisite: 2530. (Same as Religious Studies 3440.) F or Sp.

3450 Community Studies in Complex Culture (3)
Review of cross-cultural comparative urban and village communities and methodologies used in community studies. Recommended prerequisite: 2530. A

3510 Peoples and Cultures of Mainland Asia (3)
Ethnographic survey of the indigenous cultures of...
3555 Cherokee Ethnohistory (3) Survey of period. Recommended prereq: 2530. F or Sp

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 precontact period. Recommended prereq: 2530. F or Sp

3555 Cherokee Ethnohistory (3) Survey of sociopolitical aspects of Indian affairs and external relationships from first European contact to present. Emphasis on eighteenth and nineteenth centuries.

3575 Afro-American Anthropology (3) Anthropological perspectives on Blacks in New World; examination of Afro-Americans via anthropological theories and methodology.

3580 Peoples and Cultures of Mesoamerica (3) Ethnographic survey of aboriginal peoples and post-conquest changes in Indian cultures. Emphasis upon analysis of small rural communities using modern village studies as source material. Recommended prereq: 2520. A

3610 Archaeology of United States and Canada (3) Survey of prehistoric peoples north of Mexico from initial occupation to European contact. Recommended prereq: 2530. F

3620 European Prehistory I (3) Cultural development during Paleolithic, Mesolithic, and Neolithic. Recommended prereq: 2520. W, A

3630 European Prehistory II (3) Cultural developments during Metal Ages. From the close of Neolithic through Iron Age. Recommended prereq: 2520. 3620 and 3630 should be taken in sequence. W, A

3640 Ancient Civilization of Mesoamerica (3) Introduction to archaeology of areas of advanced Indian culture in Mexico and Central America beginning with earliest cultures and proceeding to contact with Europeans. Recommended prereq: 2520.

3660 Prehistory of Tennessee (3) History of archaeological research in Tennessee and survey of prehistoric American Indian cultures identified through research.

3670 Principles of Archaeology (3) Research strategies in archaeological excavation, interpretation, and explanation. Prereq: 2520 or consent of instructor.

3700 Forms of Folklore (4) Introduction to the anthropological study of folklore.

3710 Survey of European Folk Cultures (3) Material and other aspects of folk life as expressed in beliefs, art, and folklore, under changing historical and social conditions. Prereq: 2520 or consent of instructor.

3800 Language and Culture (3) Relationship between linguistic categories and patterns of culture. Prereq: 2540 or consent of instructor. Recommended: 2530.

3811 Introduction to Museology (3) (Same as Art 3811.)

3900 Human Osteology (4) Intensive examination of the human skeleton. Prereq: 2510 and consent of instructor. 3 hrs and 1 lab. F

3920 Principles of Physical Anthropology (3) Survey of materials and methods in physical anthropolo-
y: Craniofacial, Recommended: 2510.

3930 The Biology of Races of Man (3) Processes of racial differentiation; criteria of significant differences among existing stocks; influence of biology and culture in race formation; analysis of studies concerning blood groups, race mixture, constitution growth and nutrition. Recommended prereq: 2510. Sp

3950 Human Identification (3) Introduction to techniques in identification of human skeletal material in forensic medicine. Sp; A

4200 Contemporary North American Indian (3) Survey of Indian cultures from initial Euro-American contact to present; emphasis on culture change, U.S. Government Indian policy, reservation life. Prereq: 2530 or consent of instructor. A

4210 Ethnographic Research Techniques (3) Methods of communication, interviewing, and utilizing data. Prereq: Consent of instructor. A

4240 Applied Cultural Anthropology (3) Applications of anthropological theory; methods and findings in programs of community and national development, public health, international aid, and military assistance. Emphasis on the roles of anthropologists, questionnaire construction, and interpretation of data. Prereq: 2520. A

4260 Medical Anthropology: Lecture (3) A survey of medical anthropology. Emphasis on Western and non-Western cultural aspects of health, disease, treatment, death, and related concepts. Focus on analyses and descriptions of anthropological fieldwork. Sp

4295 Medical Anthropology: Laboratory (3) Fieldwork in medical anthropology. Emphasis on cultural aspects of health, disease, death, and industry and society; folk medicine systems which exist with Western, technical medicine. Coreq or prereq: 4260. A

4300 Readings in Anthropology (1-9) Intensive reading, problem oriented. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E

4340 Field Work in Archaeology (3-9) Practicum work surveying, excavating, processing, and analyzing of data; includes reading. Prereq: 2510-20-30 and consent of instructor. May be repeated. Maximum 9 hrs.

4360 Field Work in Physical Anthropology (3-9) Practicum work surveying, excavating, processing, and analyzing of human biological data. May include either skeletal or living populations. Prereq: 2510-20-30 and consent of instructor. May be repeated. Maximum 9 hrs.

4400 Cultural Ecology (3) Survey of concepts and methods in studying dynamic interaction between cultures and their environments. Topics include ecological theory, methods of analysis, and application from selected case studies. Prereq: 2520, 2630, 3410 or consent of instructor. A

4420 Dynamics of Culture (3) Culture change: innovation, diffusion and acculturation; cultural continuity and stability. Prereq: 2530 or consent of instructor. A

4430 Personality and Culture (3) Analysis of relation among individual, society and culture. Application of psychological techniques in cross-cultural studies. Cultural differences and their influence on group behavior. Prereq: 2530 or consent of instructor.

4440 Urban Anthropology (3) Survey of theoretical and methodological issues anthropologists encounter researching cross-cultural urban settlements. Focus on anthropological perspective and urban problems and planning. Prereq: 3460 or consent of instructor. A

4480 Current Trends in Anthropology (3) Analytical critical review in symposium of the current debates, research directions, theories, fieldwork methods, and general assumptions of the four subfields of anthropology: archaeology, physical anthropology, linguistics, and cultural anthropology. Sp

4490 Cross-Cultural Study of Sex Roles and Behavior (3) Examination of sex roles and behavior from cross-cultural and diachronic viewpoints. Draws disparate and scattered studies together and attempts to answer general questions as how sex roles are learned, the parameters of acceptable sexual behavior and degrees of tolerance for sexual deviation in various cultures.

4510 Peoples of China II: Chinese Society After 1839 (3) Anthropological survey of Chinese society and culture in the period of intense Western contact and rejection of the West, and development of modern, communist Chinese society and culture. Prereq: 2530 or consent of instructor. Recommended prereq: East Asian course.

4550 Indians of the Southeastern United States (3) Survey of Southern Indian cultures; emphasis on aboriginal adjustment to environment; analysis of southeastern Amerind groups prior to Euro-American contact. Prereq: 2530, 3540 or consent of instructor.

4560 Cherokee Ethnohistory (3) Intensive survey of ideology and material aspects of Cherokee culture existing at time of first European contact.

4570 Peoples of Southeast Asia (3) Survey of representative ethnic groups and indigenous cultures of mainland and island Southeast Asia. Problems of contemporary culture changes. Prereq: 2530, consent of instructor or an East Asian course.

4580 Asians in the Americas Since 1800: Anthropological Perspectives (3) Character, factors, and motivations in Asian migration to North, Central and South America. Assimilation pattern and enclave communities are major topics. Major focus on United States.

4590 Peoples of Japan (3) Analysis of the culture diversity and unity of peoples of Japan. Prereq: 2530 or consent of instructor. Recommended: 3510 or an East Asian course.

4600 Method and Theory in American Archaeology (3) Historical development of New World archaeology with emphasis on theory and field techniques. Prereq: 2520 or consent of instructor. F

4610 African Prehistory (3) Survey of cultural history in Africa, south of the Sahara, from earliest evidence of human activity to time of European contact. Prereq: 2520 or consent of instructor. A

4640 Zooarchaeology (3) Basic osteological studies of vertebrate classes; emphasis on aboriginal human utilization of native animals in subsistence and culture. Identification, analysis, and interpretation of archaeologically derived molluscan and vertebrate remains. F

4650 Archaeology of Southeastern United States (3) Intensive study of prehistoric American Indian: Special emphasis on Tennessee prehistory. Prereq: 3610 or consent of instructor. W, A


4720 American Folklore (3) Anthropological perspectives of folklore of geographical regions and ethnic groups of the United States. Prereq: 3700 or consent of instructor.

4740 Southern Appalachian Folk Culture (4) Research-oriented course dealing with wide range of traditional culture in Southern Appalachia: settlement patterns, folk housing, economy, clothing, belief, speech, art, song, dance, and oral traditions and customs. Prereq: Consent of instructor. May be repeated.

4750 Mexican Folklore (3) Anthropological perspectives of folklore of Mexico and Spanish-speaking southwestern United States. Prereq: 3700 or consent of instructor and a reading knowledge of Spanish.

4770 Italian Folklore (3) (Same as Romance Languages 4770.)

4780 Cherokee Language (3) Linguistic survey of structure of the Cherokee language.

4830 Physical Growth and Constitution (3) Comparative growth patterns throughout the human life cycle, skeletal and dental maturation, sex differences in growth; human constitutional types. Prereq: 2510 or consent of instructor. A
4940 Biology of Native Americans (3) American Indian cultures and evolution from standpoint of skeletal remains and morphology and genetics of living populations. Emphasis on North American Indians. Prereq: 2510 or consent of instructor. F

4950 Primate Studies (3) Survey of field and laboratory investigations of comparative anatomy and non-human primate behavior. Prereq: 2510 or consent of instructor. F

4960 Primate Paleontology (3) Survey of fossil primate forms: origin and evolution of major primate lineages, emphasizing the earliest Hominid and related forms. Prereq: 2510. Recommended prereq: Zoology 4380. Sp


4975 Human Paleontology Laboratory (1) Detailed examination of casts and other materials pertinent to study of human paleontology. Prereq or coreq: 4970. Sp

5000 Thesis (1-15) E

5010 Graduate Research (1-9) Independent investigation of special problems in anthropology. May be repeated. Maximum 18 hrs. E

5100 Seminar in Cultural Anthropology (3-9)

5101 Foreign Study (1-12) See page 97.

5102 Off-campus Study (1-12) See page 97.

5103 Independent Study (1-12) See page 97.

5140 Seminar in Zooarchaeology (3) Approaches to analysis and interpretation of archaeological faunas. Intensive reading; evaluation and discussion of major faunal studies, guides to identification, methods of presenting faunal data. May be repeated. Maximum 6 hrs. A

5149 Laboratory Studies of theVertebrate Skeleton (4) Examination and comparison of skeletons of major groups of fish, amphibians, reptiles, birds, mammals. Oriented toward identification of archaeologically derived faunas. May be repeated. Maximum 6 hrs. Sp, A

5159 Laboratory Study of the Mollusca (4) Examination and identification of terrestrial and fresh-water mollusks of eastern U.S. Emphasis on living and archaeological-derived pelecypods. Prereq: 4640. 1 hr and 3 labs. Sp, A

5160 Seminar in Archaeology (3-9) Theoretical and practical issues central to contemporary archaeology. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. A

5200 Special Topics in Anthropology (3) Lecture and/or seminar course for advanced students on selected topics of current interest to field of anthropology as a whole. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

5210 Community Anthropology: The Local Community (3) Ethical issues, researcher models and policies; project design, administration, and salvage/research archaeology. Legislation; contracts, responsibilities, and certification; agencies and policies; project design, administration, and standards; field work, analysis and publication; archaeology and public; conservation archaeology as career. May be repeated. Maximum 6 hrs. W

5340 Fieldwork in Archaeology (3-9) Practicum work surveying, excavating, processing, and analyzing of data; intensive reading. Prereq: 9 hours of introductory anthropology or consent of instructor. May be repeated. Maximum 9 hrs.

5400 History of Anthropological Theory (3) Historical contributions of more influential anthropologists. Prereq: Consent of instructor. A

5440 Peasant Societies (3) Critical analysis of theories and theories regarding rural human societies. Kinship, age, sex, locality, and other factors in determining relations between individuals and groups. Prereq: At least one area course. A

5460 Quantitative Methods in Anthropology (3) Application of quantitative techniques of anthropological data. Correlation and derivative procedures, distance analysis, discriminant analysis, and implementation of computer routines. Prereq: Statistics 2100 or equivalent. F

5470 The Healer in Cross-cultural Perspective (3) Graduate seminar dealing with socialization, methods of healing, and therapeutic modes of healers in predominantly non-European cultures. Prereq: 4250. W

5510 Education in Cultural Perspective (3) (Same as Curriculum and Instruction 5511). F

5511 Non-Western Education: Anthropological Approaches (3) Analysis of traditional educational practices among non-Western peoples. May be repeated. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. A

5520 Problems in Old World Archaeology (3) Selected topics and research problems in European and African prehistory or prehistory investigated in depth. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. F

5530 The Maya (3) Intensive survey of Mayan culture of Yucatan and Guatemala from pre-Columbian times to present. Prereq: 3580. A

5540 Archaeological Resource Management (3) Theory and practice—public, conservation, contract, and salvage/research archaeology. Legislation; contracts, responsibilities, and certification; agencies and policies; project design, administration, and standards; field work, analysis and publication; archaeology and public; conservation archaeology as career. May be repeated. Maximum 6 hrs. W

5560 Seminar in Prehistoric Lithic Technology (3) Analysis of techniques employed in production of prehistoric stone industries; raw materials employed; resultant implements, morphology and function; and typological and contextual aspects utilized in archaeological analysis. Prereq: Consent of instructor.

5570 Seminar on Aboriginal Lithic Resources (3) Training in research in stone materials utilized by prehistoric peoples—properties, natural occurrence and geological context, relative abundance and quality extraction and distribution, processing and ultimate forms and functions. Theory and implementation of regional resource surveys, discrete regions in terms of lithology and cultural homogeneity, particularly East and Middle Tennessee. Input from professional geologists, and field research. Recommended prereq: 5660.

5700 Theory in Folk Culture Studies (3) Seminar analyzing major theoretical viewpoints of European and American folklore and folklore study trends from inception to present.

5710 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 environmental influences, controlling various primate and comparative primate dental morphology, dental trait analyses, use of dentition for skeletal aging, and dental casting. Prereq: 5210. A

5910 Measurement of Man (3) Techniques of measuring and describing skeletal material and human subject with emphasis upon practical applications to growth, nutrition and human engineering. Prereq: Consent of instructor. A

5920 Advanced Physical Anthropology (3) Intensive investigation of theory and problems in physical anthropology.

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 (3) Practical and theoretical approaches to analysis of prehistoric human skeletal populations. Demography, vital statistics, pathology, nutrition, and measures of biological relationships as they relate to population as adaptive unit. Prereq: 3900. F

5945 Comparative Primate Anatomy (4) Laboratory-oriented course dealing with functional anatomy of primates. Musculoskeletal system and evolution of various primate adaptive patterns. Prereq: Osteology and one dissection course in zoology.

5950 Paleopathology (4) Identification and descriptive analysis of pathological conditions affecting human 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 dermatoglyphic analysis; genetics and population variation of various dermatoglyphic elements; forensic applications; relationships to various genetic and chromosomal abnormalities. Prereq: Consent of instructor.

5970 Emergence and Early Evolution of Man (3) Ancestry and evolutionary significance of Australopithecines. Prereq: 4970 or consent of instructor. W, A

5980 Neanderthal Man and Human Evolution (3) Morphology, distribution, and evolutionary relationships of Neanderthals. Prereq: 4970 or consent of instructor. W, A

5990 Human Variation (3) Nature of human biological variation with emphasis on microevolutionary processes responsible for establishing and maintaining variation and relationship of variation to population structure. Prereq: 3900 or consent of instructor. A

6000 Doctoral Research and Dissertation (3-15) E

6410-20-30 Seminar in Cultural Anthropology (3, 3) Seminar is offered each quarter primarily for doctoral candidates. May be repeated. Maximum 9 hrs.

6610 Selected Topics in Archaeology (3) May be repeated. Maximum 9 hrs.

6910 Selected Topics in Physical Anthropology (3) May be repeated. Maximum 9 hrs.

6970 Seminar in Human Paleontology (3) Prereq: 4970 or consent of instructor.

Archaeology-Greek and Roman

See Classics

Art

MAJOR

DEGREES

Art

M.A., M.F.A.

Professors:


Associate Professors:

S. J. Blain, M.F.A. Wisconsin; R. D. Dahmert, M.F.A. Wisconsin; J. F. Darrow, Ed.D. Illinois State; W. C. Kenedy, M.F.A. Wisconsin; L. LeFeuvre,
DEGREE REQUIREMENTS FOR M.F.A.

1. Successful completion of 30 hours of studio work in concentration area. Inter-area studies must normally be approved by the faculty no later than the third quarter in residence. Fifteen hours of the major must be in second year courses.

2. Twelve hours of art history for graduate credit.

3. Seminar in Art History (4 hours) and Seminar in Art Criticism (4 hours)

4. Ten hours of electives which may consist of any committee-approved combination of graduate credit courses outside the student's departmental concentration.

5. First year evaluation: At the end of the 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 5999 Projects in Lieu of Thesis (30 hours) is a third year of semi-independent study.

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

GRADUATE MINOR IN THE HISTORY OF ART

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

3516 Typography (4) Theories and techniques of typesetting and printing as fine art medium. Creative may be repeated. Maximum 12 hrs.

3517 Airbrush (4) Technique of airbrush. Emphasis on skill and creative applications. For art majors only. F, Sp

3704 Medieval Art (4) Byzantine and western art of Middle Ages; illumination, mosaics, Romanesque pilgrimage church, Gothic cathedral. F

3705 Northern European Painting: 1350-1600 (4) From courtly art of late Middle Ages to Northern Renaissance. Jan van Eyck, Roger van der Weyden, Bosch, and 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. Ducelo, Giotto, Masaccio, Donatello, Botticelli, A


3725 Art of Southern Europe and New World, 1500-1830 (4) Concentration in Bruegel, Rubens, Rembrandt, Georges de La Tour, Vermeer, Poussin and Hals. W

3726 The Art of Northern Europe 1550-1675 (4) Concentration in Rembrandt, Rubens, Van Dyck, Vermeer, Tintoretto, El Greco, Caravaggio, Zurbaran, Velazquez, Bernini and Goya. Artistic relations between Iberia and Latin America. Sp


3746 History of Modern Sculpture in Europe and America (4) From 1800 to 1900. Neoclassicism to Rodin. From 1900 to present: emphasis on Cubism, Constructivism, Expressionism. Assemblage, Pop, Primary Forms, Environments, and Earthworks. Sp

3753 Crafts in America (4) Craft movement; growth and development. Educational, social, economic, and aesthetic values. Role of designer in society as producer and teacher.

3765 History of North American Art (4) Survey of landmarks in painting, architecture, sculpture, and design from prehistory to 1900. F

3766 History of Twentieth-century American Art (4) Analysis of developments in architecture, painting, sculpture, and design from 1900. W

3775 Art of Indian Asia (4) History of Indian art with consideration of art of Central Asia and Southeast Asia. Sp

3776 Chinese Art (4) F

3777 Japanese Art (4) F

3811 Introduction to Museology (3) Concepts, practices and historical development of museums of art, archaeology, anthropology and science. (Same as Anthropology 3811)


4006 Special Topics (2-4) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 16 hrs.

4015 Individual Problems (4) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

4106 Special Topics in Drawing (4) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 16 hrs.

4115 Drawing IV (4) Individualized pursuit of personal drawing techniques and concepts; individual and group critiques; weekly life drawing sessions. Prereq: 12 hrs 3115. May be repeated. Maximum 12 hrs. E

4119 Advanced Design Studio (4) To explore strengths, structural viability and form potentials of design materials, aesthetic potential. Prereq: Senior or graduate standing or consent of instructor.

4206 Special Topics in Painting (4) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 16 hrs.

4215 Painting IV (4) Individual concepts of personal expression with varied media on canvas. Prereq: 12 hrs 3215 for art majors; consent of instructor for non-majors. May be repeated. Maximum 12 hrs. E

4256 Special Topics in Fiber and Fabrics (4) Student- or instructor-initiated courses to be offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 16 hrs.


Instructors: F. Bahou, M.F.A. California (Los Angeles); L. Kicklowski, M.F.A. California (Davis); T. Sauge, M.F.A. Wisconsin.

The Art Department offers two graduate degrees: Master of Arts and Master of Fine Arts. In order to become a candidate, the applicant must be admitted by The Graduate School and approved by the Department of Art. In addition to the admission requirements of The Graduate School, the Department of Art specifically requires the following:

1. A detailed letter of intent.

2. Three letters of recommendation from former professors or professionals in the field.

3. An undergraduate major in art or evidence of equivalent proficiency.

4. A portfolio to be evaluated by the faculty. Application forms and further information are available by writing to the Department of Art.

MAJOR OF ARTS

Areas of concentration consist of ceramics, communication design, drawing, fiber-fabrics, painting, printmaking, sculpture, and watercolor. One year of residence is required.

Quarter

Curriculum

hours

Thesis

9

Area of concentration

12

Drawing and composition

3

Art history

9

Electives

12

Total

45

The thesis is a critical essay relevant to the area of concentration. The M.A. thesis may not be used to fulfill the project in lieu of thesis requirements for the M.F.A. A graduate exhibition is required. Final examination is oral.

MASTERS OF FINE ARTS

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

Six quarters beyond the baccalaureate degree are required in residence. Residence is defined by the Department of Art as (1) a minimum enrollment of 6 hours per quarter, and (2) use of Department of Art facilities so that students are available for discussion and criticism. Final examinations are oral, concurrent with project exhibition.

Quarter

Curriculum

hours

Project in Lieu of Thesis

30

Major Thesis

30

Art history

12

Electives

10

Seminar in Art Criticism

4

Seminar in Art History

4

Total

90

River Group, pre-Raphaelite Brotherhood, Manet, Courbet, Impressionism, Exakta, Homer, Seurat, through Cezanne W
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>5000</td>
<td>Thesis (1-15)</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>5002</td>
<td>Non-Thesis Graduation Completion (3-15)</td>
<td>Pre-req: 3275. May be repeated. Maximum 12 hrs.</td>
<td>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.</td>
</tr>
<tr>
<td>5011-21</td>
<td>31st Exhibition in Lieu of Thesis (3, 3, 3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5101</td>
<td>Foreign Study (1-12)</td>
<td>See page 97.</td>
<td></td>
</tr>
<tr>
<td>5102</td>
<td>Off-campus Study (1-12)</td>
<td>See page 97.</td>
<td></td>
</tr>
<tr>
<td>5103</td>
<td>Independent Study (1-12)</td>
<td>See page 97.</td>
<td></td>
</tr>
<tr>
<td>5115</td>
<td>Graduate Drawing I (2-6)</td>
<td>May be repeated. Maximum 18 hrs. F, W, Sp</td>
<td></td>
</tr>
<tr>
<td>5125</td>
<td>Graduate Drawing II (2-6)</td>
<td>May be repeated. Maximum 18 hrs. F, W, Sp</td>
<td></td>
</tr>
<tr>
<td>5125</td>
<td>Graduate Painting I (2-6)</td>
<td>May be repeated. Maximum 18 hrs. F, W, Sp</td>
<td></td>
</tr>
<tr>
<td>5225</td>
<td>Graduate Painting II (2-6)</td>
<td>May be repeated. Maximum 18 hrs. F, W, Sp</td>
<td></td>
</tr>
<tr>
<td>5255</td>
<td>Graduate Fiber and Fabrics I (2-6)</td>
<td>May be repeated. Maximum 18 hrs. F, W, Sp</td>
<td></td>
</tr>
<tr>
<td>5275</td>
<td>Graduate Fiber and Fabrics II (2-6)</td>
<td>May be repeated. Maximum 18 hrs. F, W, Sp</td>
<td></td>
</tr>
<tr>
<td>5315</td>
<td>Graduate Watercolor I (2-6)</td>
<td>May be repeated. Maximum 18 hrs. F, W, Sp</td>
<td></td>
</tr>
<tr>
<td>5325</td>
<td>Graduate Watercolor II (2-6)</td>
<td>May be repeated. Maximum 18 hrs. F, W, Sp</td>
<td></td>
</tr>
<tr>
<td>5415</td>
<td>Graduate Sculpture I (2-6)</td>
<td>May be repeated. Maximum 18 hrs. F, W, Sp</td>
<td></td>
</tr>
<tr>
<td>5452</td>
<td>Graduate Sculpture II (2-6)</td>
<td>May be repeated. Maximum 18 hrs. F, W, Sp</td>
<td></td>
</tr>
<tr>
<td>5515</td>
<td>Graduate Communication Design I (2-6)</td>
<td>May be repeated. Maximum 18 hrs. F, W, Sp</td>
<td></td>
</tr>
<tr>
<td>5525</td>
<td>Graduate Communication Design II (2-6)</td>
<td>May be repeated. Maximum 18 hrs. F, W, Sp</td>
<td></td>
</tr>
<tr>
<td>5615</td>
<td>Graduate Printmaking-Lithography I (2-6)</td>
<td>May be repeated. Maximum 18 hrs. F, W, Sp</td>
<td></td>
</tr>
<tr>
<td>5616</td>
<td>Graduate Printmaking-Intaglio I (2-6)</td>
<td>May be repeated. Maximum 18 hrs. F, W, Sp</td>
<td></td>
</tr>
<tr>
<td>5617</td>
<td>Graduate Printmaking-Screen Printing I (2-6)</td>
<td>May be repeated. Maximum 18 hrs. F, W, Sp</td>
<td></td>
</tr>
<tr>
<td>5625</td>
<td>Graduate Printmaking-Lithography II (2-6)</td>
<td>May be repeated. Maximum 18 hrs. F, W, Sp</td>
<td></td>
</tr>
<tr>
<td>5626</td>
<td>Graduate Printmaking-Intaglio II (2-6)</td>
<td>Individual problems with etching and engraving. May be repeated. Maximum 18 hrs. F, W, Sp</td>
<td></td>
</tr>
<tr>
<td>5627</td>
<td>Graduate Printmaking-Screen Printing II (2-6)</td>
<td>May be repeated. Maximum 18 hrs. F, W, Sp</td>
<td></td>
</tr>
<tr>
<td>5795</td>
<td>Reading and Research in Art History (2)</td>
<td>Pre-req: Consent of instructor. May be repeated. Maximum 6 hrs.</td>
<td></td>
</tr>
<tr>
<td>5770</td>
<td>Seminar in Art History (4)</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>5900</td>
<td>Seminar in Art Criticism (4)</td>
<td>Theory and practice. Intended for majors in studio art. A</td>
<td></td>
</tr>
<tr>
<td>5956</td>
<td>Graduate Ceramics I (2-6)</td>
<td>May be repeated. Maximum 18 hrs. F, W, Sp</td>
<td></td>
</tr>
<tr>
<td>5975</td>
<td>Graduate Ceramics II (2-6)</td>
<td>May be repeated. Maximum 18 hrs. F, W, Sp</td>
<td></td>
</tr>
<tr>
<td>5999</td>
<td>Projects in Lieu of Thesis (10)</td>
<td>Pre-req: All graduate course work and successful second year evaluation by the graduate faculty. May be repeated. Maximum 30 hrs.</td>
<td></td>
</tr>
</tbody>
</table>

"Graduate II courses must be preceded by successful first year evaluation by the faculty. Courses offered periodically only at the Pi Beta Phi Arrowmont School of Crafts, Gatlinburg, Tennessee. Courses may be repeated."

4040 Special Topics (1-4) Student- or instructor-initiated course offered at convenience of department. May be repeated.

4041 Drawing (1-4) Intermediate to advanced.

4204 Painting (1-4) Intermediate to advanced.

4254 Fiber Processes (1-4) Intermediate to advanced.

4264 Fiber Construction (1-4) Intermediate to advanced.

4274 Fabric Surface Design (1-4) Intermediate to advanced.

4284 Fabric Constructions (1-4) Intermediate to advanced.

4304 Watercolor (1-4) Intermediate to advanced.

4404 Sculpture (1-4) Intermediate to advanced.

4504 Communication Design (1-4) Intermediate to advanced.

4504 Printmaking (1-4) Intermediate to advanced.

4654 Metal Design (1-4) Intermediate to advanced.

4664 Enameling (1-4) Intermediate to advanced.

4904 Photography (1-4) Intermediate to advanced.

4954 Ceramics (1-4) Intermediate to advanced.

### Audiology and Speech Pathology

#### MAJORS

- **Audiology**
- **Speech and Hearing Science**
- **Speech Pathology**

#### DEGREES

<table>
<thead>
<tr>
<th>M.A.</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>
</tr>
</tbody>
</table>

#### Professors:

- H. L. Luper (Head), Ph.D. Ohio State; S. Adler, Ph.D. Ohio State; C. J. Ferrell, Ph.D. Iowa; D. M. Lipscomb, Ph.D. Washington; I. Nabieks, Sc.D. Prague; H. A. Peterson, Ph.D. Illinois; B. Silverstein, Ph.D. Florida.

#### Associate Professors:

- S. B. Bursfield, Ph.D. Michigan State; C. G. Malsel, M.Ed. Texas.

#### Assistant Professors:

- A. G. Dieterl, Ph.D. Washington; E. Hamby, Ph.D. Iowa; C. J. Ferrell, M.A. 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 a 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 audiology. Within the M.A. in the Speech Pathology program, a student may emphasize language disorders, cultural language differences, or speech disorders such as aphasia or stuttering. Students interested in specializing beyond the typical broad M.A. program should consult the department office or their advisor for lists 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
practicum 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 may elect either the thesis program or the non-thesis option. Students in both programs are required to take 5110 and 5111. The Master's program in audiology and speech science will include a minimum of 45 quarter hours of approved graduate credit, including 9 quarter hours of 5000 credit in the preparation of an acceptable thesis representing original independent work, and a final oral examination. At least one-half of these total courses must be at the 5000 or 6000 level, no more than 9 hours of which may be thesis courses. Students in the non-thesis option program must present a total of 48 quarter hours of approved graduate credit and pass a final written examination. A minimum of 24 quarter hours must be at the 5000 or 6000 level. The decision as to choice of the thesis or non-thesis option 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 faculty committee. In addition to the general Graduate School requirements, specific requirements for the degree of Doctor of Philosophy in Speech and Hearing Science will include:

1. Successful completion of course work in the study of one or more research tools, or other specific scientific 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 hearing science; 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. Prereq: 3040, 3050, or consent of instructor. (Same as Special Education 4040) F, Sp

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) F

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)

310 Stuttering (3) Nature and treatment. Review and integration of various theories. Prereq: 3040 or consent of instructor. (Same as Special Education 4310) F, Su

320 Introduction to Clinical Practice in Speech Pathology (3) Prereq: 3040, 3050, 3310, 4040, and consent of instructor. (Same as Special Education 4320) S/NC only. E

3300 Clinical Practice in Speech Pathology I (1-6) Prereq: 4320 and consent of instructor. (Same as Special Education 4330) S/NC only. F, W, Su

3430 Clinical Practice in Speech Pathology I (1-6) Prereq: 4320 and consent of instructor. (Same as Special Education 4330) S/NC only. E

3430 Clinical Practice in Speech Pathology I (1-6) Prereq: 4340 and consent of instructor. (Same as Special Education 4340) May be repeated. S/NC only. E

400 Voice Disorders (4) Etiology, diagnosis, and treatment of organic and functional voice disorders. Prereq: 10, 3060, or consent of instructor. (Same as Special Education 4400)

4450 Clinical Practice in Audiology I (1-6) Prereq: 4720 and 4930. E

4600 Clinical Practice in Audiology I (1-6) Prereq: 4450, 4720 and 4930. E

4700 Clinical Practice in Audiology I (1-6) Prereq: 4460, 4720, 4930. May be repeated. Maximum 9 hrs. E

550 Thesis (1-15) E

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

5040 Advanced Clinical Practice in Audiology Study and Practice (1-6) Prereq: 4720 and 4930. May be repeated. Maximum 12 hrs. (Same as Special Education 5040) E

5045 Practicum in Hearing Aid Orientation and Communication Counseling (1-6) Practical exposure to counseling 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 I (1-6) Prereq: 4940, 5950, or consent of instructor. May be repeated. Maximum 9 hrs. E

5051 Practicum in Aural Rehabilitation I (1-6) Prereq: 4720 and 4930. May be repeated. Maximum 9 hrs. E

5060 Anatomy and Physiology of Speech (3) Structure and function of neuromuscular system involving the cranial nerves, association and articulation. 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

4630 Practical Applications of Language Habilitation Techniques I (1-6) Prereq: 4720 and determination of various methods and procedures used in treating language retarded children. Prereq: 4610 or consent of instructor. Sp

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 of children of various minority groups, of different ethnic and class membership and from different geographic regions; their causes, and their effects upon educational programs. F, W, Su

4680 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; hearing screening and administration of special auditory tests. Prereq: 3710, (Same as Special Education 4720) W, Su


4930 Aural Rehabilitation: Speechreading and Auditory Training (2) 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: 3710 or 4720. Recommended prerequisites: 4930 and 3050. (Same as Special Education 4940) F, W, Su

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E
5071 Physiological Acoustics and Auditory Physiology (3) Techniques for electrophysiological measurement of auditory sensitivity, sound transmission by ear, distortion in ear, and ear as analytic mechanism. Prereq: 4720, 5070 or consent of instructor. Sp, Su

5100 Comparative Anatomy of the Peripheral Auditory Structures (3) 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. Analysis of research techniques, interpretation of statistical data, 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 assignments designed to familiarize student with instruments for measuring speech and hearing processes. Prereq: 5117. E

5200 Seminar on Stuttering (3) Current research and problem 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. W, Sp

5230 Seminar: Voice Disorders (3) Current significant research in theory and management of voice disorders. Prereq: 4400 or consent of instructor. W, Sp

5250-60 Advanced Clinical Practice in Speech and Language Disorders (1-6) Prereq: 4340 or equivalent and consent of instructor. 5340 may be repeated. Maximum 9 hrs. S/NC only. E

5350-60-70 Advanced Clinical Practice in Speech Diagnosis (1-6, 1-6, 1-6) Prereq: 4340, 4340 or equivalent and consent of instructor. 5340 may be repeated. Maximum 9 hrs. S/NC only. E

5380 Cerebral Palsy (3) Neurological foundations and speech and language training. Prereq: 5060. (Same as Special Education 5380.) F

5381 Adult Dysarthria (3) Neuroromotor organization for speech production; types of adult dysarthria and associated neuromuscular symptomatology; diagnosis and management of adult dysarthric speakers. Prereq: 5069. 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 (3) Noise measuring systems and techniques; factors in military and industrial audiology, role of 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: 5460 or consent of instructor. W

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 the concept of 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 work in hearing conservation programs at industrial settings. Prereq: 5040. May be repeated. Maximum 6 hrs. E

5500 Seminar in Audiology (3) 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: 5500. W, Sp

5505 Special Problems in Audiology (1-6) Prereq: 4720 or equivalent and consent of instructor. May be repeated. Maximum 6 hrs. E

5520 Seminar in Speech Pathology (3) Current significant research in speech pathology. Topics vary from quarter to quarter. Prereq: 12 hrs. in speech pathology. May be repeated with consent of department. Maximum 12 hrs. E

5540 Seminar in Language Pathology (3) Nature, etiology, and treatment of delayed language development in children. Prereq: 4610 (Same as Special Education 5540.) W

5550 Special Problems in Speech Pathology (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

5560 Independent Study 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, personnel management, clinical supervision. For audiologists and speech language pathologists interested in private practice, supervisory or administrative positions. Prereq: 5540. S

5580 Independent Study in Audiology (1-6) Special reading, consultation, and research activities in field of audiology. May be repeated. Maximum 6 hrs. E

5610 Practicum: Language Pathology in Children (3) Seminar and practical experience in the management of children with language disorders commonly encountered in medical environment. Etiology, pathology and evaluation procedures to differential diagnoses of auditory and speech disorders. Field trips may be required. Prereq: 4650. Su

5730 Hearing Disorders (3) Advanced study of auditory disorders commonly encountered in medical environment. Etiology, pathology and evaluative procedures to differential diagnoses of auditory and speech disorders. Field trips may be required. Prereq: 4720 or equivalent and 5700. Su

5740 Pediatric Audiology (3) Advanced study of the theoretical and practical considerations of procedures to evaluate hearing of infants and small children. Prereq: 4720 or equivalent. Sp

5750 Educational Audiology (3) Advanced case management of hearing impaired child: auditory follow-up; educational alternatives, teacher and parent counseling, social adjustment, classroom acoustic and state and federal guidelines. Prereq: 5040 and 5440.

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

5930 Advanced Aural Rehabilitation (3) Procedures and program, assessment of communicative functions and counseling strategies for hearing-impaired. Prereq: 4930. Sp

5950 The Verbo-Tonal System (3) Theory, procedures, and instrumentation of Verbo-Tonal System in rehabilitation, diagnosis, speech therapy, and foreign languages. Prereq: 5710. Recommended prereq: 3050, 4720, and 4930. F, W, Su

6000 Doctoral Research and Dissertation (3-15) E

6010 Experimental Phonetics (3) Acoustical and physiological study 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 sensation and perception of non-speech stimuli. Prereq: 6010. W

6029 Psychoacoustics Laboratory (2) Must be taken concurrently with 6020. W

6060 Applied Anatomy and Physiology of Speech Mechanism (3) Dissection and related readings. Prereq: 5060 or equivalent. Sp

6069 Laboratory in Applied Anatomy & Physiology of Speech Mechanism (2) Must be taken concurrently with 6060. Sp

6270 Experimental Techniques in Cochlear Physiology and Neurophysiology (3) Prereq: 5070 or equivalent. W, A

6280 Seminar in Speech Science (3) Advanced study of experimental areas such as speech physiology, acoustic analysis, recognition, perception and intelligibility of speech, communication theory, and psycholinguistic measurement of speech and language. Topics vary from quarter to quarter. Prereq: 6010 or consent of instructor. May be repeated. Maximum 9 hrs. Sp, W, A

6110 Experimental Design in Speech and Hearing (3) Analysis of experimental design in theses and related journals. Psychophysical methods for data acquisition. Generation of experimental designs based on parametric and nonparametric statistics. Prereq: 5110 or equivalent and consent of instructor. S

6117 Theories of Hearing (3) Physiological process basic to classical theories of hearing related to sensitive loudness: pitch, loudness, differential threshold, adaptation, and fatigue. Prereq: 6280 or consent of instructor. May be repeated. Maximum 9 hrs. W, A

6119 Advanced Instrumentation in Speech and Hearing Science (3) Selection, use and calibration of instrumentation used in speech and hearing research. Prereq: 5117, 5119 or equivalent. Sp

6500 Advanced Seminar in Audiology (3) Prereq: Consent of instructor. May be repeated. Sp

6520 Advanced Seminar in Speech and Language (3) Topics vary from quarter to quarter but include advanced study of aberrations of voice, articulation, speaking rate and rhythm, language development or use, and language symbolization. Prereq: Consent of instructor. May be repeated. E

6560 Directed Research (1-6) Participation in ongoing or non-dissertational research. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. E

6570 Directed Study in Speech Pathology (1-3) May be repeated. Maximum 9 hrs. E

6580 Directed Study in Audiology (1-3) May be repeated. Maximum 9 hrs. E

6590 Directed Study in Speech Science (1-3) May be repeated. Maximum 12 hrs. E

6590 Directed Study in Speech Science (1-3) May be repeated. Maximum 12 hrs. E

6590 Directed Study in Speech Science (1-3) May be repeated. Maximum 12 hrs. E

6590 Directed Study in Speech Science (1-3) May be repeated. Maximum 12 hrs. E

6590 Directed Study in Speech Science (1-3) May be repeated. Maximum 12 hrs. E
Biochemistry

MAJOR: Biochemistry

DEGREES
M.S., Ph.D.

Professors:
W. D. Wicks (Head), Ph.D. Harvard; J. E. Churchich, Ph.D. Sheffield (England); J. G. Joshi, Ph.D. Poona (India); K. J. Koontz, Ph.D. Rochester

Associate Professor:
L. Huang, Ph.D. Michigan State.

Assistant Professors:
L. B. Brattsten, Ph.D. Illinois; R. Bryant, Ph.D. Illinois; R. H. Faethberg, Ph.D. California (Berkeley); J. W. Koontz, Ph.D. Kentucky.

The graduate program involves successful completion of a series of graduate courses and seminars and a qualifying examination at the end of the first year. In addition, the M.S. degree requires research leading to the writing and oral defense of a thesis, while the Ph.D. degree requires successful completion of a comprehensive examination and extensive research leading to the Ph.D. dissertation and its oral defense.

The qualifying examination: At the conclusion of the first year's work in 5510-20-30, 5310-20-30 and 4230, a comprehensive qualifying examination covering all of the material will be taken by all first year graduate students, without exception. In the first week of the summer quarter. On the basis of results of the examination, the student will be counseled concerning his/her future in the biochemistry program.

THE MASTER'S PROGRAM

This program requires about two years of full-time study and provides both breadth and depth of training by mixing classroom instruction with research laboratory experience. Students completing this program will have a sound foundation in modern biology and chemistry and will be equipped to follow and absorb future advances in these fields. Recent graduates of this program are now involved in such occupations as industrial pharmaceutical research, junior college and high school teaching, hospital laboratory work, cancer research, scientific journalism, and pursuit of Ph.D. degrees. Candidates usually should offer course work covered by an undergraduate major in either biology or chemistry. Departmental requirements consist of the satisfactory completion of 45 credit hours of graduate work and the mastery of the subject matter of the following courses:

1. Introductory Organic Chemistry with laboratory (at least one year)*, at least one quarter of analytical chemistry, Chemistry 4510*, Introductory Physics*, Differential and Integral Calculus*, at least three quarters of approved advanced courses in chemistry or physics, for example, Chemistry 5110-20-30-35, Chemistry 5340, Physics 5210-20-30, Physics 5440, Physics 5510-20-30; plus minimum of three quarters of approved physical chemistry (Biochemistry 4210-20-30, or Chemistry 4910-20 and Biochemistry 4230, or Chemistry 3410-20-30) and at least 18 hours of biology beyond the introductory level including at least 3 hours of genetics and 3 hours of physiology. At least 3 hours must be graduate credit in an approved area of specialization which should be identified early so that necessary prerequisites can be taken.


3. In addition to the courses listed in item 3 above, four courses selected from those numbered 5110 or higher, excluding 5300 or 5640.

4. Qualifying examination.

5. Participation in Biochemistry 6410 and in the advanced biochemistry seminars 6010 during the entire period of residence.

6. Comprehensive examination: Students who pass the comprehensive qualifying examination and successfully high marks and those who complete a mandatory M.S. degree (required prior to the comprehensive examination) will take the examination, which is held at the end of the second year of study and a format compatible with Graduate School requirements as determined by the student's committee.

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

8. A final examination which will be conducted primarily with the student's dissertation.

Petitioning for Master's degree: Students who have passed the preliminary examination in the Ph.D. program may petition the department for award of a Master's degree. The additional requirements for such a degree shall be:

- The completion of at least 45 hours of approved course work for graduate credit, at least half of which must be at or above the 5000 level.

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

b. The preparation of a research manuscript suitable for submission for publication in a major scientific journal;

c. The 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.

4110-20 Cellular and Comparative Biochemistry

(4, 4) Electrolyte behavior; chemistry and structure of proteins, enzymes, and nucleic acids; protein function: catalysis 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, Sp, W, Sp

4119 Cellular and Comparative Biochemistry Laboratory (2) Basic biochemical procedures of general application in biochemistry and molecular biology. Prereq or coreq: 4110. F, W, Sp

4210-20 Introduction to Physical Biochemistry

(3, 3) 4210—Introduction to thermodynamics; phase stability and phase change; chemical potential; solvation, pressure, and activity of the Debye-Huckel model; electrochemistry; membrane permeability; 4220—Elements of statistical mechanics, diffusion, collision theory, chemical kinetic theory, 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 biology. 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 structural x-ray crystallography of proteins and nucleic acids. Prereq: 4220 or Chemistry 3430, or equivalent.

5000 Thesis (1-15) E

5010 Biochemical Techniques (2) Theory and laboratory practice in chromatographic and electrophoretic techniques in isolation and characterization of macromolecules of importance in biochemistry and molecular biology. Prereq: 4110 or equivalent. Open to undergraduates with consent of department.


5210 Biochemistry of Mitochondria and Selected Organisms (3) Organization and metabolic systems in mitochondria and other cell organelles. Supramolecular organization, biochemical organization, transport systems, drug metabolism, oxygen toxicity and defense mechanisms, nitrogen fixation and photosynthesis. Emphasis on experimental approaches. Prereq: 4120 or 5510 or equivalent.

5130 Protein Structure and Enzyme Function (3) Physicochemical properties of proteins; primary, secondary, tertiary and quaternary structure; denaturation, renaturation and other conformational change; structure-function correlations; coenzyme-specific models of catalysis; inhibition; relaxation, and allosteric kinetics of catalysis. Prereq: 4110 and either 4420 or Chemistry 3430.

5210 Structure and Function of Biological Membranes (1) Structural organization of biological membrane components. Dynamic; properties as studied biochemically and biophysically. Selective topics of membrane functions related to structural organization.

5220 Structures and Functions of the Nucleic Acids (3) Chemistry of nucleic acids; hydrogen bonding and double-stranded structures; coiling, supercoiling, and other structural considerations; biosynthesis of DNAs and RNAs; repair
mechanisms; degrading mechanisms; mechanisms of genetic information storage and retrieval. Prereq: 4110-20 or equivalent.

5230 Protein Synthesis and Its Role in Metabolic Regulation (3) Mechanism of assembly of peptide chains; ribosomes, structure and function; deciphering and genetic code; regulation of transcriptional and translational events (induction, repression, etc.). Prereq: 4110-20.

5300 Graduate Research Participation (3-5) May be repeated. Maximum 12 hrs.

5310-20-30 Experimental Techniques (2, 2, 3) Tutorial laboratory course in modern experimental methodology and instrumentation. Intended primarily for departmental majors. F, W, Sp

5450 Special Topics (1-3) Registration only by prior arrangement with department. May be repeated.

5510 Properties of Biomolecules Related to Function (3) Structures, chemical and physical properties of biomolecules developed from theoretical and experimental points of view to explain actions and interactions. Prereq: Chemistry 3211-21-31; Chemistry 2140 recommended.

5520 Molecular Basis of Metabolism and Its Regulation (3) Regulation of metabolic pathways dependent on energy demands of organism and on synthesis of macromolecule precursors. Prereq: 5510 or consent of department. W

5530 Biosynthesis and Regulatory Functions of Intercellular Molecules (3) DNA, RNA, and Proteins; Roles in replication, transcription, translation and metabolic regulation. Prereq: 5520. S

5560 Environmental Toxicology (3) Basic concepts in toxicity, interactions at subcellular, cellular, organ, organismal, population, and environmental levels, legal aspects. Major emphasis on biochemistry of toxicity. Prereq: 4110-20. Chemistry 3211-21-31, Chemistry 4910-20-30, or consent of instructor. (Same as Ecology 5610.) W

5840 Techniques in Environmental Toxicology (2) 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 2140-2149 and 3211-21-31, 3219-29-39. (Same as Ecology 5640.) Sp

6000 Doctoral Research and Dissertation (3-15) E

6010 Advanced Biochemistry Seminar (1) Topics to be covered posted in spring quarter for following year. Open to graduate students who have passed Ph.D. preliminary examinations. May be repeated. Maximum 9 hrs. S/NC only. F, W, Sp

6410 Current Topics in Biochemistry (1) Seminars and lectures dealing with current advances in field of chemical biology. May be repeated with consent of department. S/NC only. F, W, Sp

6420 Current Topics in Biological Membrane Research (1) Current literature on biological membrane research. Prereq: 4110-20 or equivalent. May be repeated. Maximum 9 hrs. S/NC only. (Same as Microbiology 6420). F, W, Sp

6431 Current Topics in Environmental Toxicology (1) Critical reviews of research problems and methods in environmental toxicology; behavioral toxicology, biological and ecological effects, bioassay and epidemiology. Presentations by students, faculty and guest lecturers from academia and industry. May be repeated with consent of department. Maximum 6 hrs. (Same as Ecology 6431.) S/NC only. F, W, Sp

6450 Advanced Special Topics (1-3) Registration only by prior arrangement with department. For students who have passed Ph.D. preliminary examination or are in advanced state of graduate study. Topics to be posted in advance. May be repeated. Maximum 9 hrs.

**Botany**

**MAJOR**

**DEGREES**

M.S., Ph.D.

**Professors:**

R. W. Holton (Head), Ph.D. Michigan;
E. C. Opletch, Ph.D. Duke;
H. K. DeSelma, Ph.D. Ohio State;
A. M. Evans, Ph.D. Michigan;
W. R. Hammond, Ph.D. Vanderbilt;
L. W. Jones, Ph.D. Texas;
J. F. E. deKorkom, Ph.D. Emory;
F. H. Norris (Emeritus), Ph.D. Ohio State;
J. S. Olson, Ph.D. Chicago;
R. D. Columbia;
A. J. Sharp (Emeritus), Ph.D. Ohio State;
P. L. Whale, Ph.D. Texas.

**Associate Professors:**

C. C. Amundson, Ph.D. Colorado;
J. D. Caponetti, Ph.D. Harvard;
A. S. Heilman, Ph.D. Ohio State;
R. R. Hankel, Ph.D. Miami (Ohio);
L. G. Hickok, Ph.D. Massachusetts;
K. W. Hughes, Ph.D. Utah;
O. J. Schwartz, Ph.D. North Carolina State;
H. H. Shugar, Ph.D. Georgia.

**Assistant Professors:**

B. Moellin, Ph.D. North Carolina State;
E. E. Schilling, Ph.D. Indiana;
D. K. Smith, Ph.D. Tennessee;
W. O. Smith, Ph.D. Duke.

The Department of Botany offers the Master of Science and Doctor of Philosophy degrees with concentrations in anatomy, bryology, cytology, cyto genetics, ecology, genetics, lichenology, morphology, mycology, phycology, physiology, plant systematics, and taxonomy.

**Requirements for admission:** In addition to the general Graduate School requirements (see page 10) the botany department also strongly recommends submitting aptitude and advanced scores from the Graduate Record Examination, at least three letters of recommendation from academic or professional persons, a short statement describing probable areas of interest in botany, and the following specific courses: (1) general botany or biology, 12 quarter hours; (2) advanced botany or closely 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 18-21. 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 research proposal suitable for a thesis problem. Must be completed before enrollment in Botany 5000. W

2. Satisfactory performance on an examination in one modern foreign language or an A or B in French 3030 or German 3030. F

3. Satisfactory completion of 2 credit hours at the 6000 level. F

4. Preparation of a written thesis and its defense. F

5. Presentation of a thirty-minute departmental seminar. W

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

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

4. Satisfactory performance on a final written examination completed 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 6003 or 6030.

2. Satisfactory performance on a written comprehensive examination.

3. Presentation of one or more cognate areas outside of the department totaling 9 graduate credit hours with at least a B average.

4. Satisfactory performance on an examination in one modern foreign language or an A or B in French 3030 or German 3030. W

5. Satisfactory completion of 9 credit hours at the 6000 level (excluding dissertation). W

6. Preparation of a written dissertation and its oral defense. W

7. Presentation of a one-hour departmental seminar near the end of the doctoral program. W

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

**Note:** Graduate School requirements are denoted by an asterisk. These requirements should be interpreted as minimal requirements and specific stipulations or requirements such as additional foreign languages, additional oral preliminary examinations may be required by the individual student's faculty committee.

**2010-20 Plants in Evolution (4, 4) Monera to angiosperms; emphasis on evolutionary relationships, morphogenesis, and development. Prereq: 8 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. F, W**

**3031-32 Field Botany (4, 4) Emphasis on fall and winter flora respectively. Prereq: 3030. Need not be taken in sequence. W**

**3050 Socioeconomic Impact of Plants (3) Significance of plants in origin and development of human cultures; evolution of cultivated plants, and role of plants in present civilizations. Occasional field trips. Sp, Su**

**3070 Genetics and Society (3) An introduction to genetics, anthropology and evolution with emphasis on their implications for human society. (Same as Anthropology 3070.) W, A**

**3090 Biology and Human Affairs (3) Basic biological principles involved in deterioration and preservation of an environment in which human cultures may survive. F, W, A**

**3210 Introductory Plant Physiology (4) Organismal physiology of plants; water relations, mineral nutrition, morphogenesis, elements of metabolic pro-
cresses, effects of age, light, natural rhythms, evolutionary processes, effects of age, light, natural rhythms, and other aspects of plant speciation. Prereq: 6 hrs botany. Recommended prerequisite: Botany 3010-20 or equivalent. Su, A

4017 Field Mycology (3) Field experience on identification of mosses and lichens. Frequent field trips, field recognition of species and habitats. Laboratory sessions. Prereq: 6 hrs botany. Recommended prerequisite: Botany 3010-20 or equivalent. Su, A

4021 Field Bryology (3) Field experience on identification of bryophytes with emphasis on field studies and current research. Field identification of species and habitats. Prereq: 6 hrs botany. Recommended prerequisite: Botany 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: Botany 3010-20 or equivalent. Su, A

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: Botany 3010-20 or equivalent. Su, A

4030 Mechanisms of Plant Speciation (3) Processes of plant speciation emphasizing population genetics, isolation, competition, effects of age, light, natural rhythms, and other aspects of plant speciation. Prereq: 3010-20 and Biology 3110. F, A

4045 Aquatic Vascular Plants (3) Field experience on identification of aquatic vascular plants. Frequent field trips, field recognition of species and habitats. Prereq: 6 hrs botany. Recommended prerequisite: Botany 3010-20 or equivalent. Su, A

4050 Synanthrology (3) Field experience on identification of composite. Frequent field trips, field recognition of species and habitats; laboratory sessions. Prereq: 6 hrs botany. Recommended prerequisite: Botany 3010-20 or equivalent. Su, A


4061 Field Physology (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: Botany 3010-20 or equivalent. Su, A

4075 Botanical Photography (3) Photography of natural history subjects and achievement in the art of photography, recognition of key characteristics, significant aspects of natural history of local species. Characterization of major woody plant communities of region. Prereq: 6 hrs botany. Recommended prerequisite: Botany 3010-20 or equivalent. Su, A


4240 Paleobotany (4) (Same as Geology 4240.)

4310 Plant Ecology (4) Interactions between individuals, species, communities and their environments. Circulation of energy and matter in ecosystems. Application of field research techniques. Prereq: 3010 or equivalent. F, A

4319 Field Measurements in Plant Ecology (3) Practice in use of field and laboratory instruments for measurement of environmental factors, plant functions, and/or community characteristics. Data collection, analysis, and interpretation of data. Visits to highly instrumented field sites. Prereq: 3030 or equivalent; 1 year physics and chemistry recommended. Su

5000 Thesis (1-15) E

5002 Non-Thesis Graduate 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

5003-04 Non-Thesis Research (3) Library, field, or laboratory research under supervision of staff members. Not for thesis candidates.

5011 Mycology (4) Intensive survey of fungi, including the genera, utilizing lecture, laboratory and field information. Occasional field trips. Prereq: 3010. 3 hrs and 1 lab. Sp

5012 Morphology and Evolution of the Phycocyanetes (3) Similar to 5090, but dealing with Phycocyanetes. Prereq: 5011 or consent of instructor.

5013 Vascular Plant Taxonomy (4) Family characteristics of vascular plants, including principles of phylogeny and classification, based primarily on plants of local flora. Prereq: 3030 or equivalent. 2 hrs and 2 labs. Sp

5055 Phytoplancton 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

5070 Principles of Biological Illustration (3) Principles and application of modern techniques, including photomicrography and photomicrography, drawing graphics, and other methods for recording and preparing for publication of data in pictorial or graphic form. 1 hr and 2 labs. W

5080 Pteridology (4) Evolutionary study of lower vascular plants: morphology, cytology, life cycles and classification. Biosystematic studies and recognition of local species. Prereq: 2020-30 or consent of instructor. 2 hrs and 2 labs or field trips. F, A

5089 Morphology and Evolution of Basidioconetes (4) Structure and function of somatic and sexual life cycles as applied to evolution in group. Cultures and specimens in laboratory. Prereq: 3010 or equivalent. F

5120 Agrostology (4) Collection, identification, classification, and phylogeny of tribes of grasses. Prereq: 3030 or consent of instructor. 2 hrs and 2 labs. F, A

5150 Advanced Morphology of Flowering Plants (4) Vegetative and reproductive organography; regeneration physiology; tissue culture; cell fractionation and isolation of subcellular component; differentiation and regulatory centrifugation and microcentrifugation. In tended for graduate students in the biological sciences. Prereq: 3110 and at least 6 additional hrs in biological sciences. Sp, A

5210 Advanced Plant Physiology (3) Plant cell metabolism of carbon, nitrogen and sulfur assimilation, respiration and biosynthesis of specialized plant products such as terpenoids, alkaloids and pigments. Prereq: Chemistry 3031. F

5220 Advanced Plant Physiology (3) Physiology, response of plants to light: photochemistry, photosynthesis, and phytochrome mediated responses. Water and solute uptake, loss, and movement; translocation; and fundamentals of mineral nutrition. Prereq: 5210 or Biochemistry 4120 and a cell physiology course. Recommended prerequisite: 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 prerequisite: 5220. Sp

5240 Quaternary Problems (4) (Same as Geology 5290 and Zoology 5290.)

5310-20-30 Special Problems in Botany (1-5, 1-4, 1-6)

5340 Plant Geography (4) Distribution of ecosystems emphasizing the factors which control the position, climatic and historical aspects. Prereq: 4310. 2 hrs and 2 labs. W

5350 Analysis of Plant Communities (4) Plants as ecosystems components considered from standpoint of genecology, ordination, and ecosystem function. Prereq: 4310. 2 hrs and 2 periods (field trips). Sp

5360 Marine Ecology (3) Relationships of marine organism 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.

5410-20-30 Seminar in the Teaching of College Botany (1, 1, 1) Objectives in teaching of general botany. Supervised teaching in general course; seminar in testing, concepts, and materials. Required of teaching assistants. Prereq: Consent of instructor. S/NC only. F

5440 Seminar in Botany (1) Readings and discussions of current literature and/or selected topics in botanical research. May be repeated. Maximum 12 hrs. S/NC only. E


5780 Plant Cytology (4) Intensive consideration of cellular organization, structure, and function, with emphasis on emphasis on correlation where possible of ultrastructure, biochemistry and function of subcellular organelles. Principles of cytology, cytogenetics, analytical and electron microscopic techniques; cell fractionation and isolation of subcellular components; differentiation and cytophysiology; photomicrography and microcinematography. Intended for graduate students in the biological sciences. Prereq: Biology 4110 and at least 6 additional hrs in biological sciences. Sp, A
5820-21-22-23-24 Methods and Instrumentation in Laboratory Investigations (1, 1, 1, 1, 1) Laboratory course providing project experience and theoretical background in various research methods including: (1) experimental design, (2) clinical chemistry, (3) electrophoresis, polarography, zonal and ultracentrifugation, gas chromatography, automatic analyzers, microscopy, culture methods, use and detection of radioisotopes, and others. Prereq: Course in plant physiology, Chemistry 3211-21-31 or equivalent. Prereq: 2210-20-30 or equivalent. S/NC only. E


5850-51-52-53-54 Methods and Instrumentation in Field Investigations (1, 1, 1, 1, 1) Intensive field work using appropriate methods and instrumentation. Topics vary according to needs of student. May be repeated with consent of instructor. S/NC only.

5870 Experimental Plant Genetics (5) Genetics of plant systems, development of a systematic program using mechanisms of gene action, controlling elements, transformation, plastidic inheritance, and adaptation. Credit/No Credit in Biological Energy 3110 and Chemistry 3251. 3 hrs and 1 lab. W

5910-20 Developmental Plant Morphology (3, 1) Developmental morphology of plants from aspect of phenomena of morphogenesis-correlations, polarity, synonomy of differentiation, regeneration, tissue abnormalities, abnormal growth, environmental and genetic factors. Prereq: 3010-20 or 4120, and 3210 or 5210 or 5340. 5910 for 1 hr and 1 lab for 5910 or 5920. F. A. W. A.

6000 Doctoral Research and Dissertation (2-15) E

6010 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: 3020-30, 4120, 5140-50, 5810-20 or consent of instructor. May be repeated with consent of department.

6080 Advanced Topics in Cryptogamic Botany (2-4) Advanced studies and current research in experimental physiology, mycology, bryology, phycology, or developmental morphology of cryptogams. May be repeated with consent of department.

6210 Photobiology (3) Interaction of nonionizing radiation with living systems. Prereq: Physics 2210-20 or 5140. Credit/No Credit in 4110.

6310 Advanced Topics in Cytology and Cell Biology (2-3) Requirements and interests of students determine topics, such as actions of chemicals on actively dividing cells, development, regeneration, tissue abnormalities, abnormal growth, environmental and genetic factors. Prereq: 3010-20 or 4120, 5140-50, 5810-20 or consent of instructor. May be repeated with consent of department.


6420 Advanced Topics in Genetics (2-4) Literature survey of selected topics from all areas of genetics. Prereq: 3110; Biochemistry 4110-20. May be repeated with consent of department.

6520 Seminar in the History of Botany (2)

6820 Advanced Topics in Plant Physiology (4-2) Requirements of student determine content, including growth and growth hormones; minor element nutrition; 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; biogeochecmistry; biolimnology; gene and paleocology; radiation ecology; 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 the morphology and evolution of vascular plants; bibliosystemsatics (systematic literature and code of nomenclature); current taxonomy; current research in systematics; systems of classification. Seminars or lectures and labs depending on subject. Prereq: 5920 or 5930. May be repeated with consent of department.

Chemistry

MAJOR DEGREES

Chemistry

M.S., Ph.D.

Professors:
G. Mamatov (Head), Ph.D. Louisiana State;
N. S. Bowman, Ph.D. Princeton; C. A. Buuelh, (Emeritus), Ph.D. Ohio State; W. E. Bull, Ph.D. Illinois; J. D. Chambers, Ph.D. Kansas; J. A. Dean (Emeritus), Ph.D. Michigan; J. F. Eastham, Ph.D. California (Berkeley); W. H. Fletcher, Ph.D. Minnesota; W. C. Keenan, Ph.D. Texas; J. L. Adcock, Ph.D. Texas; J. D. Alexandratus, Ph.D. Wisconsin; G. D. O'Keefe, Ph.D. California (Berkeley); J. R. Peterson, Ph.D. California (Berkeley); G. K. Schwelzter, Ph.D. Illinois; D. A. Shirley (Emeritus), Ph.D. Michigan; A. V. Smith (Emeritus), Ph.D. Harvard; W. T. Smith (Emeritus), Ph.D. Ohio State; W. A. Van Hook, Ph.D. Johns Hopkins; E. L. Wehry, Ph.D. Purdue; T. F. Willam, Ph.D. London; J. H. Wood (Emeritus), Ph.D. North Carolina State.

Associate Professors:
J. E. Bloore, Ph.D. Manchester; F. A. Grimm, Ph.D. Cornell; G. W. Babakalis, Ph.D. Purdue; J. F. Kinzie, Ph.D. Akron; C. A. Lane, Ph.D. California (Berkeley); R. M. Magid, Ph.D. Yale; R. M. Pagni, Ph.D. Wisconsin; F. M. Schell, Ph.D. Indiana.

Assistant Professors:
J. L. Adcock, Ph.D. Texas; J. D. Alexandratus, Ph.D. California (Berkeley); J. D. Kovac, Ph.D. Yale; L. J. Magid, Ph.D. Tennessee; M. J. Sepaniak, Ph.D. Iowa State; G. Woods, Ph.D. North Carolina 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, and organic chemistry with a satisfactory record. Students majoring in Chemistry for the Master's degree in the Ph.D. program may be admitted with appropriate deficiencies which must be removed without graduate credit. Students majoring in Chemistry, the prerequisite is two years of chemistry including quantitative analysis.

THE MASTER'S PROGRAM

The department offers specialization in nine areas for the M.S. degree: analytical chemistry, environmental chemistry, energy, inorganic chemistry, organic chemistry, polymer science, and physical chemistry. The requirements for the M.S. degree in Chemistry consist of the satisfactory completion of:

1. Research and a thesis to give 9 to 18 hours of graduate credit (5000).
2. Chemistry 4160-70, 5531, 5410-20, Polymer Engineering 4910.
3. Sufficient additional graduate course work in chemistry and/or related fields to make an overall total of 45 hours.

4. Participation in Chemistry Seminar (5911-21-31) and the Polymer Seminar Program during the entire period of graduate study.
5. A final oral examination.

The requirements for the M.S. degree in Chemistry with specialization in environmental or energy-related problem to give 9 to 18 hours of graduate credit.

2. Chemistry 4160-70 and two of the following: 5511, 5521, 5531.
3. Sufficient additional graduate course work in chemistry and/or related fields to give a total of 45 hours. For emphasis in environmental engineering, these additional courses must include Chemistry 5220, 5250-59-60-79-79, Ecology 5310, and Environmental Engineering 4030. For emphasis in energy engineering, these additional courses must include Chemistry 5220, 5250-59-60-79-79, Ecology 5310, and Environmental Engineering 4030. All course selections must be approved by the appropriate department committee.

4. Participation in seminar (5911-21-31) during the entire period of graduate study. (No more than 3 credit hours of seminar may be applied to the above requirements.)

5. A final oral examination.

THE DOCTORAL PROGRAM

The department offers specialization in nine areas for the Ph.D. degree: analytical chemistry, chemical physics, environmental chemistry, energy, inorganic chemistry, organic chemistry, polymer science, and theoretical chemistry. For the Ph.D. degree in Chemistry with specialization in analytical, inorganic, organic, physical, or theoretical 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. Chemistry 4160-70 and two of the following: 5511, 5521, 5531.
3. Participation in seminar (5911-21-31) during the entire period of graduate study.

At least thirty-nine hours of graduate course work including at least 6 hours at the 8000 level and one of the following groups: (a) for analytical 5250-59-60-79-79; (b) for inorganic, 5420, 5710-20-30; (c) for organic, 5110-20-29-30-35 and at least 9 hours from:
the following courses: 5250-60-70, 5340-50, 5410-20-30-50, 5710-20-30-50 (d) for physical, 5340-50, 5410-20-30-50; (e) for theoretical, 5340-50, 5410-20-30-50, Physics 5210. Graduate course work in related fields may be used for undesignated course work in this requirement upon approval of the student's faculty committee.

5. A comprehensive advanced examination in the field of specialization.
6. Demonstration of a reading knowledge of one of the following languages: French, German, Russian, or an approved alternate.
7. A final oral examination.

The requirements for the Ph.D. degree in Chemistry with specialization in environmental engineering include the satisfactory completion of:

1. Research and a dissertation to give at least 36 hours of graduate credit.
2. Chemistry 4160-70 and two of the following: 5511, 5521, 5531.
3. Participation in seminar (5911-21-31) during the entire period of graduate study and a six-month internship in a governmental or industrial organization.
4. Thirty-nine hours of additional graduate course work including at least 6 hours at the 6000 level and at least 12 hours from the Department of Chemistry offerings.
5. A comprehensive advanced examination in polymer science.
6. Demonstration of a reading knowledge of one of the following languages: French, German, Russian, or an approved alternate.
7. 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: 3111-20-30. Corresponding laboratory (3219-29-39) is a coreq for students not having credit for the lecture.

**3219-29-39 Organic Chemistry Laboratory (1, 1, 1) Experiments on topics discussed in 3211-31. Corresponding lecture (3211-21-31) is a coreq for students not having credit for the lecture.


**3511-21-31 Principles of Organic Chemistry (3, 3, 3) Structure and reactivity of aliphatic and aromatic compounds of carbon and their reactions, reaction mechanisms, spectroscopic and other physical properties. Must be taken in sequence. Prereq: 3211-21-31. Corresponding laboratory (3519-29-39) as a coreq; latter is recommended.

**3529-39 Organic Chemistry Laboratory (1, 1, 1) Experiments on topics discussed in 3521-31. Similar to 3229-39 except designed for students who have need for operating knowledge of various spectroscopic and chromatographic techniques. Corresponding lecture (3521-31) is a 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. Sp.
5140 Introductory Polymer Chemistry (3) Fundamental principles, role of chemistry in interdisciplinary field of polymer science; reliance of molecular structure to bulk properties of polymers. Prereq: 1 yr each undergraduate organic and physical chemistry. Sp.

5150 Kinetics of Polymerization (3) Kinetics of formation and molecular weight distributions of polymers, homogeneous and heterogeneous step growth polymerizations. Prereq: 5140 and 4160-70 or equivalent.

5160 Organic Chemistry of Polymers (3) Synthesis of monomers; mechanism, stereochemistry, and sequence distribution of polymerizations. Formation of block, graft, and network polymers. Reactions on polymers, including degradation. Prereq: 5140 and 5531. A

5170 Physical Chemistry of Polymers (3) Rubber elasticity; solution properties of macromolecules; structural, configurational, and conformational statistics of polymers. Prereq: 5150. A

5220 Analytical Chemistry of Environmental Pol- lutants and Application of modern analytical chemistry to problems in aquatic and atmospheric pollution. Prereq: 5250-60-70 or consent of instructor. Sp.

5240 Chemical Instrumentation (4) Principles of chemical instrumentation. Practice in design and construction of chemical instruments; special project. Prereq: Consent of instructor.

5250-60-70 Advanced Analytical Chemistry (3, 3, 3) 5250—Absorption and emission spectrophotometry; structure elucidation by IR, NMR, UV, and mass spectra; 5260—Chemical separation methods: solvent extraction, chromatography, electrolytic precipitation; stoichiometry; x-ray methods; 5270—Electroanalytical, magnetic and thermal analytical methods; on stream and automatic analysis. Prereq: 1 yr of physical chemistry. F, W, Sp.

5259-69-79 Advanced Analytical Chemistry Laboratory (1, 1, 1) Experiments in use of chemical separation methods and instrumental methods covered in preceding lecture course. Prereq: 1 yr of physical chemistry. Prereq or coreq: 5250 for 5259; 5260 for 5269; 5270 for 5279. F, W, Sp.

5340 Quantum Chemistry (3) Postulate approach to fundamental principles of quantum mechanics. Accurate solutions to Schrodinger equation; approximate (ab initio and semiempirical) molecular orbital methods; calculation of molecular properties. F, W.

5350 Quantum Chemistry (3) Electronic excited states; quantum chemistry; perturbation theory; reactivity of organic molecules. Prereq: 5340. W


5511 Survey of Inorganic Chemistry (3) Atomic structure, wave mechanical atoms, ion and covalent bonding, periodic relationships of elements, introduction to coordination chemistry, and descriptive chemistry of the elements. F

5521 Survey of Analytical Chemistry (3) Volumetric and gravimetric analysis; acid-base, oxidation-reduction, complexation and precipitation equilibria; spectrophotometry, electroanalytical, and separation methods. F

5531 Survey of Organic Chemistry (3) Bonding in organic molecules; chemistry of hydrocarbons, aldehydes, ketones, ethers, and esters; functional oxygenated derivatives, carboxylic compounds, stereoisomerism, aromatics, and spectral analysis of organic molecules by infrared, ultraviolet, nuclear magnetic resonance and mass spectral techniques. F

5550 Industrial Chemical Research (3) Practice of modern industrial research taught by case studies and visiting lecturers from industry. Course content varies, selected to illustrate good past and current industrial research practices. Prereq: Completion of a 5000 chemistry course sequence. F, W, Sp.

5610-20-30 Chemical Basis of Energy Conversion (1, 1, 1) Chemistry of various energy and fuel interconversion systems. Introduction to homogeneous and heterogeneous catalysis, thermodynamics of energy conversion systems, fossil fuels chemistry, and electrochemical and photochemical conversion. Prereq: 5410 and one 5000 sequence. F, W, Sp.


5810 Nuclear Chemistry (3) Nuclear properties, radioactivity, radioactive decay processes, nuclear structure and models, nuclear reactions, radiation and safety, radiation detection. Prereq: 1 yr of physical chemistry. A

5911-21-31 Chemistry Seminar (1, 1, 1) Departmental research seminar. Selection of literature general topics. May be repeated. Registration required each quarter except summer for resident graduate students. SNC for permission only. F, W, Sp.

6000 Doctoral Research and Dissertation (3-15) E

6111 Selected Topics in Organic Chemistry (3) Subject matter varies among important topics of current significance. Prereq. Consent of instructor. May be repeated. Maximum 9 hrs. A

6130 Natural Product Chemistry (3) Structure, chemistry, and synthesis of naturally occurring substances of biological or environmental significance. Course content may vary with each offering to reflect areas of current chemical interest. Prereq. Two of 5110-20-30-35.


6210 Advanced Analytical Spectroscopy (3) Newer methods of modern spectroscopy. Application of computer programs to transform methods, lasers in spectroscopy, fiber optics, introductory nonlinear optics, and spectroscopic techniques for remote sensing. Prereq: 5300. F

6211 Selected Topics in Analytical Chemistry (3) Subject matter varies among important topics of current significance: environmental chemistry, photochemistry, and spectroscopy. Course content includes: new electronic analytical methods, bioanalytical methods, and microcomputer and microprocessor applications in chemical instrumentation. Prereq. Consent of instructor. May be repeated. Maximum 9 hrs. A

6311 Selected Topics in Polymer Chemistry (3) Subject matter varies among important topics of current significance. Prereq. Two of 5140-50-70-70 or consent of instructor. May be repeated.

6320 Natural Polymers (3) Structure, modification, and nonbiochemical utilization of natural polymers and synthetic analogues. Prereq: 5140 and 5510 for 5141 or two of 5110-20-30-35.

6411 Selected Topics in Physical and Theoretical Chemistry (3) Subject matter varies among important topics of current significance. Prereq. Two of 5410-20-30-35 or 5420 or 5450. May be repeated. A

6420 Nuclear Magnetic Resonance (3) Theory of nuclear magnetic resonance spectroscopy with emphasis on high-resolution methods. Applications to problems in molecular structure and behavior. Prereq. Two of 5110-20-30-35.

6430 Photochemistry and Radiation Chemistry (3) Fundamental physical and chemical processes pursuant to excitation of molecules by photons and electrons, multiphoton processes and uses of laser sources; fluorescence and phosphorescence; radiationless transitions as studied by optospectroscopy; chemical reactivity of excited states; ion-molecule and free radical reactions; electron capture and electron-transfer processes. Prereq. 5410.

6450 Electrochemistry (3) Electrical double layer, electrode kinetics; transport properties of electrolytes; electroanalytical methods. Prereq: 5430 or 5270.

6475 Electric Structure of Radicals (3) Applications of electron spectroscopy to study of molecule- conformation, structure, and bond in organic and inorganic radicals; comparison of experimental results with theoretical predictions based on valence rules and on INDO molecular orbital calculations. Prereq: 5430-50 and 6820.

6480 Statistical Thermodynamics (3) Application of statistical mechanical methods to systems of chemical interest such as isotope effects on equilibrium and rate processes, phase equilibria, condensation phenomena. Prereq. 5410, 5430.

6495 Advanced Chemical Kinetics (3) Mechanism of elementary chemical reactions at molecular level including topics such as dynamics of molecular collisions, potential-energy surfaces, reactions crossings, "direct" vs. "complex" modes of reaction, photofragmentation, energy partitioning and transfer, chemiluminescence, and chemical lasers. Prereq. 5430.

6510 Thermodynamics of Solutions (3) Theory of regular solutions and of electrolyte solutions; measurement of activity coefficients and other solution properties; selected topics from literature. Prereq. 5410.

6520 Magnetic Resonance (3) Principles of magnetic resonance spectroscopy underlying nuclear magnetic resonance and electron spin resonance. Chemical applications to solid and liquid systems. Prereq. 5430.

6711 Selected Topics in Inorganic Chemistry (3) Subject matter varies among important topics of current significance: photoelectron spectroscopy, transition metals, uranium chemistry, organometallic compounds, inorganic solution kinetics and mechanisms, crystal chemistry, nonaqueous chemistry, chemistry of halogens and compounds. Prereq. Consent of instructor. May be repeated. Maximum 9 hrs. A


6750 Molten Salt Chemistry (3) Structure, spectroscopic properties, solution thermodynamics, electrochemistry, and phase equilibria of molten metal halides. Prereq. 5410 and 5410 or equivalent.

6810 Vibrational Problems in Molecular Spectra (3) (Same as Physics 6810.)
Familiarity with basic Greek myths is assumed. The change of attitude toward myth from earlier periods. A study of use of myth in literature, history, religion, and society. Readings, lectures, slide-tape discussion. (Same as Religious Studies 3230) F

3210 Early Greek Mythology (3) Comprehensive study of Greek mythology 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

3220 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, slide-tape discussion. (Same as Religious Studies 3230) Sp

3230 Art and Archaeology of the Aegean Bronze Age and Early Greece (3) Troy, the Cyclades Islands, Greek mainland, and Crete. Emphasis on palaces of Crete and Mycenae, Tiryns and Pylos, their fall, the following Dark Age, and rebirth of Greek civilization. Illustrated lectures. F

3240 Cities of the Greek and Roman World (3) Archaeological survey of Greek and Roman cities from 3000 B.C. to 500 A.D. with emphasis on development of city planning and quality of life. Such cities as Mycenae, Athens, Priene, Alexandria, Rome, and Lepcis Magna will be studied. F

4010 Greek Drama in English Translation (3) Survey of dramatic masterpieces of Greek literature. A

4020 Teaching of Latin (3) Carries no language credit. Purposes, techniques, materials, and evaluation; directed observation in public schools; preparation of teaching plans and materials. A

4210 Introduction to Numerical Algorithms and Programming (3) Roots of equations, systems of linear equations, least-squares data fitting, numerical integration, numerical methods for ordinary differential equations. Prerequisite: Consent of instructor. May be repeated. Maximum 9 hrs. A

5350 Shriners 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, Ephaestus, Corinth, Cacus, Pergamum, 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. Sp

5360 Classical Mythology and its Uses (3) Intensive review and survey of Greek and Roman mythology. Emphasis on uses of classical mythology in literature, music, and plastic arts, especially of modern times. A

6100 Studies in Classical Archaeology (3) Variable content course offering subject matter not taught in existing courses, or concentrating on one aspect of existing survey. Prerequisite: Consent of department. A

5620 Problems in Old World Archaeology (3) (Same as Anthropology 5620) A

3715 Discrete Structures (3) Introduction to discrete structures useful in computer science. Sets, logic, relations, functions. Proof techniques, induction. Graphical representations and algorithms. Theory of transducers, type 0, 1, 2 languages. Prereq or coreq: Mathematics 2860. (Same as Mathematics 3715.) F, Sp

3725 Advanced Discrete Structures (3) Advanced topics in discrete structures useful in computer science. Graphs and algorithms for manipulating data, algebraic structures, Boolean algebra, lattices, groups, rings, and fields. Prereq: 3715 or equivalent. (Same as Mathematics 3725.)

4050 Number Systems for Digital Computers (3) Floating-point number representation, mixed-radix number representation, multiple-modulus residue number representation, error analysis, floating-point computation, finite fields and exact computation using digital computers. Prereq: 3155. A


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 for organization and analysis of scientific data. SPSS and SAS programs for standard statistical analyses: frequency distributions, percentiles, data reduction correlation 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 an 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.

4340 Interactive Statistical Data Processing (3) Statistical data processing using interactive computer system. Time-sharing utility and statistics programs for scientific data. SPSS and SAS programs for standard statistical analyses: frequency distributions, percentiles, data reduction correlation and regression, analysis of variance. Not for credit for computer science majors. Prereq: Statistics 2100 or equivalent and 4310 or knowledge of a procedure-oriented language such as FORTRAN. W

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 SIMULA. Prereq: 4510.

4510 Data Structures and Non-Numeric Programming (3) Not for credit for computer science majors. Prereq: 2710 or 1610 or 3150 or equivalent. E

4520 Systems Programming (3) Computer organization and design of computer systems; representation of information, microprogramming, software systems, instructions and operands, interpreters, macroassemblers. Prereq: 3520 or equivalent. E

4570 Introduction to Data Base Management Systems (3) Hierarchical, network and relational models; logical and physical views of data. Definition and data manipulation languages. Data independence and operational views of data. Prereq: 4510 and 4550 or equivalent, Students may not receive credit for both 4570 and 5570. W

4610 Operating Systems—Concepts and Facilities (3) Detailed examination of major operating systems. Memory, processor, device and data management, input/output, Loaders and relocation, device characteristics, data set organization, SPOOLing. Prereq: 4510 and 4550. Students may not receive credit for both 4610 and 5670.

4620 Operating Systems—Case Studies (3) Alternatives in operating system design, dynamic re-location, paging, segmentation, time sharing, time slicing, protection, concurrency, real time systems. Examples from different operating systems analyzed as appropriate. Prereq: 4610 or equivalent or consent of instructor. W

4660 Compiler Construction (3) Practical experience with design of compilers. Scanning, parsing, semantic analysis, code generation and optimization, error detection and correction. Term project includes a complete compiler for a small block-structured language. Prereq: 4510. W


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 Geography 4750.)

4820 Introduction to Pattern Recognition (3) (Same as Electrical Engineering 4820) W

4830 Digital Image Processing (3) (Same as Electrical Engineering 4830). Sp

4850 Small Computer Systems (3) (Same as Electrical Engineering 4850). E

4910 Analysis and Management of Computer Input/Output Systems (3) Examination of major operating systems. Analysis of computer input/output systems; implementation, justification, personnel in systems, perspective on systems. Prereq: 3520 or equivalent. E

4980-90 Special Topics in Computer Science (1-15) E

5000 Thesis (1-15) E

5090 Immigration to Computer Science (5) Designed for graduate students with limited computer science background to gain confidence in computer science major or minor program. Advanced programming techniques in FORTRAN; control of input/output devices, selected operations on two-level languages programming; introduction to data structures and algorithm analysis. Prereq: 1510 or 1610 or 3020 or 4225. F

5100 Introduction to Computer Science Practice (2) 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 5560.) 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, computer-assisted diagnosis, computer-aided record keeping, automatic history taking, and hospital administration systems. Prereq: 4510. Sp

5430 Advanced Compiler Design (3) Design and implementation of compilers. Optimizing compilers, incremental compilation, run-time organization, data flow analysis, optimization, and error recovery. Prereq: 4660 and 4710. A

5455 Finite Difference Methods for Partial Differential Equations (3) (Same as Mathematics 5455.) F

5485 Finite Element Methods (3) (Same as Mathematics 5485.) W

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 database systems, implementation technology, selection and evaluation techniques, integrity, security, authorization and protection, hardware architectures, and future trends in DBMS area. Prereq: 3150 or 4510 and 4550 or consent of instructor. W

5565-65-75 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 deadlocks. Analysis of operating systems using mathematical models, simulation, and hardware and software monitors. Comparison of good hard heuristic scheduling algorithms with best possible schedules; scheduling anomalies. Case studies of virtual memory systems. Analysis of page swapping and placement strategies. Prereq: 4510 or equivalent or consent of instructor. Sp, A


5730 Computability and Computational Complexity (3) Computability and decidability. Turing machines and halting problem. Register machines. Recursive and recursively enumerable sets; partial and total recursive functions. Time and space bounded computations; the P vs NP problems. Prereq: 4710. Sp, A

5750 Theory of Formal Languages (3) Phrase-structure languages, their generators and processors of type 0, 1, 2 languages and grammars; deterministic context-free languages. Theory of translation. Prereq: 4710. W
5775 Combinatorial Algorithms (3) Algorithms for solving optimization problems in graphs, networks and combinatorics. Prereq: 2100 or 2105. A
5810 Information Organization and Retrieval (3) Organization, storage, searching and retrieval of information in a database of information in order to make off-line or on-line searching for data that is organized. Information retrieval includes the selection of relevant information and the evaluation of the results. Prereq: 3150. F
5860 Data Security (3) Need for security and methods for achieving it; encryption, machine architecture, hardware and software implementation. Prereq: 3150. F
5980-82-84-85 Special Topics in Computer Science (1, 1, 1, 1) Designed for students who are interested in independent research problems. Prereq: 5012 and 5022. F, W, Sp
5910-20-30 Special Topics in Computer Science (1-5, 1-5, 1-5) May be repeated. Maximum 9 hrs.
5940-50 Advanced Small Computer Systems (3, 3) (Same as Electrical Engineering 5940-50.) F
5870 Independent Study in Computer Science (1-3) Special project under faculty guidance. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

Cultural Studies

Asian Studies

3870 Islamic Literature in English Translation (4) Survey from origins to modern period of major Islamic literatures, especially Arabic, Persian and Turkish. Prereq: 3520 or consent of instructor. F
4010-20-30 Readings in Asian Literature (4, 4, 4) Prerequisite: Mastery of intermediate level of Japanese, Chinese, Sanskrit or Arabic and consent of instructor. F
4012 Selected Topics in Asian Literature (4) Content varies. May be repeated. Maximum 12 hrs.
4531-32-33-34 Advanced Chinese (4, 4, 4, 4) Taped language program. Prereq: 3531-32 or equivalent or consent of instructor. Must be taken in sequence.
4531-32-33 Advanced Japanese (4, 4, 4) Reading in graded primer with attention paid to finer points of grammar. Conversation, drill and composition practice with native speaker. Must be taken in sequence. Prereq: 3531-32-33.

Black Studies

3140-50-60 Directed Readings in Black Studies (1, 1, 1) Designed for students who are interested in doing intensive reading in some area of Black Studies which is defined by the student and the instructor. Prereq: 2010 or 2020 and consent of instructor.
4200 Senior Seminar on Pan-Africanism (4) Explores concepts and philosophers of Pan-Africanism and the implications of this ideology for various societal institutions.
4300 Resource Materials in Black Studies (4) Introduction to basic references such as bibliographies, indices, and listings of audiovisuals in Afro-American history, African history, and children's literature. Prereq: 2010 or 2020 or consent of instructor.
4310 Research in Black Studies (4) Deals with Black experience and research process.
4500 Current Issues and Topics in Black Studies (3) Problems and issues in area of Black Studies. Content and credit determined by instructor. May be repeated. Maximum 12 hrs.
4880 Afro-American Psychology (4) (Same as Psychology 4880.)

Comparative Literature

4012-22-32 Special Topics in Comparative Literature (3, 3, 3) Content varies; may be repeated. F, W, Sp
4050-60-70 Dante and Medieval Culture (3, 3, 3) (Same as Italian 4050-60-70.) A, A
5012 Comparative Theories of Literature (3) Croce, Richards, Frye, Wellek, and others. Prereq: Completion of three literature courses in foreign language above 3000, or equivalent. F
5022 Approaches in Comparative Literature (3) French and American schools; "comparative literature" vs "general literature"; Van Tiegham, Carre, Baldensperger, Wellek. Prereq: 5012; completion of three literature courses in foreign language above 3000, or equivalent. W
5032 Studies in Comparative Literature (3) Independent research problems. Prereq: 5012 and 5022. Sp

Cultural Studies

5101 Foreign Study (1-12) See page 97.
5102 Off-campus Study (1-12) See page 97.
5103 Independent Study (1-12) See page 97.

Linguistics

4060 Topics in Linguistics (3) Content varies. May be repeated. Maximum 9 hrs.
4060-30 Historical Linguistics, Neogrammarian School, and Growth of Structuralism (3, 3) 4020—Traces development of scientific approach to linguistics. 4030—Beginner's Bible through nineteenth century. 4033—Traces change in linguistic interest brought about by Saussure's Coin and growing impact of anthropology and behaviorism on linguistic studies.
4250 Introduction to Descriptive Linguistics (3) (Same as French, German, Russian, Spanish 4250.)
4260 Introduction to Historical and Comparative Linguistics (3) (Same as French, German, Russian, Spanish 4260.)
4270 Introduction to Romance Linguistics (3) (Same as French, Spanish 4270.)
4271 Introduction to Slavic Linguistics (3) (Same as Russian 4271.)
4460 Sociolinguistics (3) (Same as English 4440.)
4450 Dialectology (3) (Same as English 4450.)
4460 Special Topics in English Linguistics (3) (Same as English 4460.)
4471-81 English as a Second or Foreign Language (3, 3) (Same as English 4471-81.)

Economics

See College of Business Administration.
subjects other than English. Normally a student with the M.A. from another university may transfer at least 36 quarter hours. After all, or most, of the course work has been taken and after the two language requirements have been satisfied, the student will take four comprehensive examinations from several areas divided as the department directs. Successful completion of these examinations will be followed by the writing of the dissertation and by an oral examination in the field of the dissertation.

Any course in the 5000 or 6000 series may be repeated for credit with the permission of the department.

1211 Written and Oral English for Foreign Students (3) Rapid review of English grammar structures and pronunciation with intensive writing and written drill. Required during the first quarter of residence of all foreign students (graduates, undergraduates, and transfer students) who are not excused from it on the basis of the English Proficiency Examination required of every new foreign student. A, B, C, I, F, W grading. Students registered for this course are permitted to register for only 2 other courses. E

1211 Written and Oral English for Foreign Students (3) Rapid review of English grammar structures and pronunciation with intensive writing and written drill. Required during the first quarter of residence of all foreign students (graduates, undergraduates, and transfer students) who are not excused from it on the basis of the English Proficiency Examination required of every new foreign student. A, B, C, I, F, W grading. Students registered for this course are permitted to register for only 2 other courses. E

2070 Modern British Poetry (3) From Housman to Thomas and more recent poets. A

2080 Modern American Poetry (3) From Robinson to Stevens and more recent poets.

3110-20-30 Romantic Poetry and Prose (3, 3, 3) 3110—Emphasis on Wordsworth and Coleridge. 3120—Emphasis on Byron, Blake, or Scott. 3130—Emphasis on Shelley and Keats. F; W; Sp

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) Survey of literature dealing with leading movements in politics, science, religion, and the arts. 3210—1850 to 1914. 3220—1914 to 1930. A

3411-12-20 Modern Drama (3, 3, 3, 3) 3411—Contemporary since 1930. 3420—British. 3430—American.

3510 Sixteenth-century Prose and Poetry (3) More and Wyatt to Spenser. A

3520 Elizabethan Drama (3) Marlowe, Jonson, and others. A

3530 Jacobean Drama (3) Beaumont and Fletcher to Massinger and Shirley. A


3580 Restoration and Eighteenth-century Prose (3) Defoe, Addison, Steele, Swift, and others.

3570 The Age of Johnson (3)

3710 Literature of the English Bible (3) Types of Old Testament literature, excluding Wisdom literature. A

3711 Literature of the English Bible (3) Old Testament Wisdom literature and types of New Testament literature. A

3721 Introduction to Folklore (3) Essential terms and concepts in modern folklore—folk life study. Emphasis upon British and American materials; folk tale, folk song, myth, legend, proverb, riddles, superstitions, dance, games, and architecture. A

3910-20-30 Comparative Literature (3, 3, 3) 3910—1600 to 1620—Ancient. 3920—Medieval and Renaissance. 3930—Modern. A

3940 The Novel of the Contemporary Western World (3) Proust, Joyce, Mann, and others. A

4010-20 Shakespeare (3, 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 drama, lactic romances. E

4042-43 Topics in Genre and Mode (3, 3) Content varies. Special topics in principal forms and modes of British and American Literature, e.g., comedy, tragedy, epic, lyric, satire, etc. May be repeated with consent of department. Maximum 6 hrs each.

4045-46 Topics in Literary Theory and Criticism (3, 3) Content varies. Special topics in theoretical and practical approaches to British and American Literature. May be repeated with consent of department. Maximum 6 hrs each.

4050-60-70 American Novel (3, 3, 3) 4050—From earliest sentimental novels through Brown, Cooper, Irving, Twain, Melville, Dreiser, and others. 4060—Henry James and Mark Twain through early works of Faulkner and Hemingway. 4070—Early thirties to present. A

4090 Topics in Film Study (3) Content varies. In-depth study of particular directors, films, genres, national cinema movements, or other topics. May be repeated with consent of department. Maximum 6 hrs. A

4140-50 Technical Writing (3, 3) 4140—For students planning careers in the physical, life and health sciences, engineering, agriculture, and forestry. Writing of proposals, laboratory and progress reports, abstracts and journal articles. 4150—Writing of scientific feature articles in which data are marshaled and analyzed for human interest. F; W; Sp

4250 Advanced Fiction Writing (3) Further development of skills acquired in basic Writing Fiction course. Prerequisite: 3450 or consent of instructor.

4254 Writing the Detective and Mystery Story (3) Instruction and writing cover entire crime field—suspense, mystery, procedural, private eye, spy, adventure fiction. Recommended prerequisite: 3450-70-60 or consent of instructor.

4256 Writing Science Fiction and Fantasy (3) Survey of general development and basic texts of Science Fiction, Speculative Fiction and Fantasy. Exercises in writing in genres, in accordance with techniques learned in basic Writing Fiction course.

4270 Advanced Poetry Writing (3) Further development of skills acquired in basic Writing Poetry course. Prerequisite: 3470 or consent of instructor.

4310-20-30-40 The British Novel (3, 3, 3, 3) 4310—Defoe to Jane Austen. 4320—Scott to Thackeray. 4330—George to Galsworthy. 4340—James Joyce to present.

4400 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. Prerequisite: 3330 or consent of instructor. (Same as Linguistics 4440.)

4450 Dialectology (3) Theories and methodologies of dialect research, fieldwork, and analysis. Prerequisite: 3340 or consent of instructor. (Same as Linguistics 4450.)

4455 Varieties of English (3) Theories, methodologies, and findings of English and American dialectology with emphasis on implications for cultural pluralism. Prerequisite: 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) 4471—Applied linguistics in teaching and learning English as a second or foreign language. Prerequisite: 3470 or consent of instructor. 4472—Second year of a foreign language. Prerequisites: 4481. Materials and methods of language teaching. Analysis 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. Prerequisite: 4471. (Same as Linguistics 4471-81) W; Sp

4510-20-30 Black Literature (3, 3, 3) Trends and developments.

4651 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

4652 Southern Literature in the Twentieth Century (3) Modern Southern literary renaissance, the fugitives and Agrarians, Faulkner and more recent writers such as Welty, O'Connor, and Porter. A

4660 Emerson and Thoreau (3)

4680 American Humor through Mark Twain (3)

4721-31-41 Ballad and Folk tale (3, 3, 3) 4721—Study of traditional English and Scottish popular ballads and their North American variants; 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) 4930—The Canterbury Tales. 4940—Trollope and Crassey and early poems.

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Requirement (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

5101 Foreign Study (1-12) See page 97.

5102 Off-campus Study (1-12) See page 97.

5103 Independent Study (1-12) See page 97. E

5110 Teaching Expository Writing (1) Using essays and personal experience as bases for Freshman Composition. Weekly sessions on how to prepare and teach such a course. Grading of sample papers; supervised teaching; observation of other sections. Required of all first-year Teaching Assistants. S/N only. F

5120 Teaching Writing about Literature (1) Variety of literary works as subjects for student response and analysis. Same format as 5110. S/N only. W

5130 Teaching Business and Technical Writing (1) Forms and strategies appropriate to memos, letters, abstracts, reports, and proposals. Same format as 5110. S/N only. W

5150 Old English Prose (3) A

5170-80 History of the English Language (3, 3) 5170—Phonetic transcription, Old English, development of inflection and syntax. 5180—Middle and Early Modern English, developments in pronunciation and vocabulary. F; W

5210-20-30 Reading in American Literature from the Colonial Period to the Present (3, 3, 3) F; A; W; Sp; A

5240 Readings in Black American Literature (3) Critical analysis of poetry, prose, drama, criticism;
historical and cultural background; discussion of rel-
evance or irrelevance of race as influence on text
and reader.

5310 Rhetoric and Composition: Theory and
Practice (3) Concentration on stylistics and types of
expository writing.

5410-20 Readings in Middle English Literature (3,
3)

5510-20 Readings in Literary Criticism from Plato
and Aristotle to the Present Day (3, 3)

5610-20-30 Reading in English Literature of the
Nineteenth Century (3, 3, 3)

5690 Film History, Rhetoric, and Criticism (3) Film
as narrative art form: historical development of film;
the "rhetoric" of film; critical approaches to film
study, including genre, author, formalist, and histor-
ical; critical analysis of individual films.

5710-20-30 Readings in English Literature of the
Eighteenth Century (3, 3, 3)

5810-20-30 Readings in English Literature of the
Renaissance (3, 3, 3)

5860 Introduction to Literary Research (3) Critical
examination of aims of English studies, profession of
English teacher, theory of literature, and methods of
research, including collecting of information, evalua-
tion of material, and transmitting of results of scho-
norship.

5910-20-30 Readings in English and American
Literature of the Twentieth Century (3, 3, 3)

6000 Doctoral Research and Dissertation (3-18)

6110-20-30 Studies in Elizabethan Literature (3,
3, 3) A

6140 Studies in Old English Language and Litera-
ture (3) For students who know Old English well and
who wish to do research in literature, structure of
language, paleography, Anglo-Latin backgrounds
and sources, and related topics.

6150 Old English Poetry (3) Prereq: 5150.

6160 Beowulf (3) Prereq: 5150, 6150.

6170 Studies in Middle English (3)

6181-82-83 Studies in English Language (3, 3, 3)

6210-20-30 Studies in American Literature (3, 3,
3)

6241-42 Studies in Colonial American Literature
(3, 3, 3) 6241—From Thomas Hallow through increase
and Cotton Mather. 6242—From Jonathan Edwards
through adoption of Constitution.

6270-80 Studies in American Fiction (3, 3)

6310-20-30 Studies in Victorian Literature (3,
3, 3)

6410-20-30 Studies in Chaucer (3, 3, 3)

6510-20-30 Studies in Spenser and Milton (3,
3, 3)

6550 Studies in Mode and Genre (3) Content
varies. May treat drama, novel, short story, poetry,
or satire; the comic, the tragic, etc., depending on pro-
ductor.

6590 Special Topics (3) Content varies. Humor, his-
tory of ideas, biography, autobiography, literature of
travel, literature and extra-literary disciplines, etc.

6610-20-30 Studies in Eighteenth-century Litera-
ture (3, 3, 3)

6610-20-30 Studies in Drama and Theatre (3, 3,
3)

6660 Textual Bibliography and Criticism (3) Study
of evidence gathered from printing process to make
critical judgements about text of literary work. Pre-
req: 5660 or consent of instructor.

6910-20-30 Studies in Twentieth-century Litera-
ture (3, 3, 3)

French
See Romance Languages

Geography

Major

DEGREES

Geography

M.S., Ph.D.

Professors:

S. R. Jumper (Head), Ph.D. Tennessee; C. S. Aiken,
Ph.D. Georgia; E. H. Hammond, Ph.D. California
(Berkeley); E. McWilliam, Ph.D. Syracuse;
T. H. Schmidme, Ph.D. Wisconsin.

Associate Professors:

T. L. Bell, Ph.D. Iowa; L. W. Brinkman, Jr., Ph.D.
Wisconsin; J. R. Carter, Ph.D. Georgia;
C. T. Palaquon, Ph.D. Denver (UT Space Institute);
J. B. Rehner, Ph.D. Louisiana State.

Assistant Professors:

R. Foresta, Ph.D. Rutgers; L. Pulipher, Ph.D.
Southern Illinois; B. Ralston, Ph.D. Northwestern.

The Department of Geography offers the degrees of Master of Science and Doctor of
Philosophy with concentrations in geography of
development, physical geography and human
systems, rural and nonmetropolitan geography,
Anglo-America, and and rural and

The Master's Program

The department requires a minimum of 45
quarter hours beyond completion of a sound
undergraduate major program. At least one-half of the total courses in the graduate
program must be at or above the 5000 level, of
which no more than 9 hours may be thesis
courses, and must include 5150, 5160, and (at
each offering during residency) 5100. Thesis
and final examination required.

The Doctoral Program

The doctorate is a research degree and is granted only to those persons who
demonstrate proficiency in conducting
independent research. Students must have
achieved the equivalent of a comprehensive
Master's program before they will be admitted to the
Doctoral program. Course requirements
for the degree shall be determined by the student's faculty committee in accordance
with specific interests and needs. The
program of study must include sufficient
course work within the department, but
outside the areas of specialization, to give a
broad foundation and understanding of the
discipline. The program must include 5160,
5170, 5720, and (at each offering during residency) 5100. A minimum of 15 hours
in credit must be earned in related fields outside
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 dissertation committee.
Comprehensive examinations required for
admission to candidacy include a written
comprehensive, written examinations on two
special fields, and an oral examination on the
student's program, the special fields, and the
dissertation proposal. Also required is a final
oral examination on the dissertation and on
other aspects of the program as determined by
the student's doctoral committee.

3410 Intermediate Economic Geography (4) Con-
cepts, theories, and practices in location planning.

Locational patterns in agriculture, manufacturing,
and service activities. For W

3430 Urban Geography (4) Concepts and theories
centering development and significance of sys-
tems 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 time
to time and from place to place, with particular em-
phasis upon energy and metallic resources. For Sp

3520 Climatology (4) General circulation system
leading to weather. Climatic change and modifica-
tion, interrelationship of climate and human
activity. W or Sp

3530 The Land-Surface System and Man (4) Na-
ture and regional variations in relationships among
surface form, water, vegetation, and surface mate-
rials. Human as evaluator and agent of change. F, Su

3510 Political Geography (4) Importance of geo-

graphical factors for understanding spatial pat-
tionships within and between nations; spatial im-
plications of political decision-making process;
geography of administrative units. F

3660 Cultural Geography (4) Basic concepts of cul-
ture; methods and background of cultural geo-

raphy; world patterns of cultural phenomena. Sp

3790 Geography of Middle America (4) Covers
Mexico, Central America, and the West Indies. F

3800 Geography of South America (4) W

3870 Geography of Asia (4) A survey of the physi-
cal, 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 as they interrelate to give distinctive
character to regions of United States and Canada. F

3920 Geography of the American South (4) Geog-

raphical appraisal of southeastern United States, in-
cluding physical environment and human resources.
Origin and development of contemporary economic
and cultural traits of the area. W

3940 Geography of Appalachia (4) Interrelation of
physical, economic, and social patterns to give dis-
tinctive character to the region and its parts, espe-
cially Southern Appalachia. Appalachia in perspec-
tive in the context of the eastern United States. F

4075 Geography of Transportation (4) Geographic
examination of transportation systems, emphasizing
transport of people on highways and by public facil-
ities. Relationship of transportation systems to
changing geography of cities and urban hinterlands. Sp

4100 Quantitative Methods in Geography (4) Geo-

graphic applications of statistical techniques, point
pattern analysis and analysis of areal units. Prereq: Mathematics 3000 or consent of instructor.

W

4210 Problems in Geographic Method (4) Exam-
ple of problems and approach in geographic analy-
sis and synthesis. Emphasis on the use of geographic
data, areal sampling, generalization, 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 de-
development. Emphasis upon changing population pat-
terns, development of agricultural regions and pat-
terns of urban development. Sp

4510 Principles of Geomorphology (4) (Same as
Geology 4510.)

4550 Geography of Soils (4) Soils as physical sys-
tems and their relationship to environments. Inves-
tigation of specific cases of the role of soil in man-
agement of environmental systems.
A modern economic geography. Prerequisite: 3410 or consent of instructor.  

5320 Topics in the Geography of the American South. May be repeated with consent of instructor. Maximum 9 hrs. A

5410 Advanced Topics in Economic Geography (3) Examination of trends, problems, and methods in economic geography. Prerequirement: 3440 or consent of instructor. A

5500 Topics in Geography of Land-Surface System (3) Examination of trends, problems, and methods in land-surface geography. Prerequirement: 3550 or consent of instructor. May be repeated with consent of instructor. A

5610 Topics in Climatology (3) Examination of trends, problems, and methods in modern climatology. Prerequirement: 3520 or consent of instructor. May be repeated with consent of instructor. A

5710 Seminar in Geography (3)

5720 Topics in Quantitative Geography (3) Multivariate analysis applied to problems in geography; research problems utilizing appropriate packaged computer programs; usefulness to geographic research of techniques developed by other disciplines. Prerequirement: 4100 or consent of instructor. A

5740 Advanced Topics in Remote Sensing (3) Applied research using remote sensing and aerial photographic imagery for interpretation and mapping of geographic data. Prerequirement: 4740 or consent of instructor. A

5915 Regional Geomorphology (4) (Same as Geology 5915.)

6000 Doctoral Research and Dissertation (3-15) E

6110-20 Seminar in Economic Geography (3, 3) A

6220-30 Seminar in Urban Geography (3, 3) A

6240-50 Seminar in Historical Geography (3, 3) A

6260-70 Seminar in Cultural Geography (3, 3) A

6310-20 Seminar in Physical Geography (3, 3) A

6410-20 Seminar in Regional Geography of the United States (3, 3) A

6610-20 Seminar in Regional Geography of Latin America (3, 3) A

6710-20 Seminar in Physical Geography (3, 3) A

NOTE: Registration in 6000-level courses may be repeated with consent of department.

Geological Sciences

MAJOR

DEGREES

Geology

M.S., Ph.D.

Professors:

K. R. Walker (Head), Ph.D.; D. Y. Yeates; J. H. Klaasen (Emeritus), Ph.D.; D. Ohio State; O. C. Kopp, Ph.D.; D. Columbus; G. E. McLaughlin, Ph.D.; D. Tennessee;


Associate Professors:


Assistant Professors:


THE MASTER'S PROGRAM

The department requires a minimum of 45 quarter hours including at least 18 hours in courses (other than thesis) numbered above 5000. A minimum of 24 hours in geology courses, in addition to thesis, is required. Students who enter without having had an acceptable field camp are required to take Geology 4440, or an equivalent course elsewhere, as part of the above department requirements. One year of general physics is required, if not taken as an undergraduate. Thesis committee and topic must be approved by graduate program committee. Qualifying examination is given the second quarter.

THE DOCTORAL PROGRAM

Specific course program and thesis topic determined by candidate's faculty committee.

1. Program to be determined by faculty committee. Requirements include a minimum of 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 in the 6000 series. Up to one-third of the required hours may be taken in related fields. A Master's degree is required.

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 include a minimum of 45 hours in the 5000 or 6000 series, of which at least 15 hours must be in the 6000 series. Up to one-third of the required hours may be taken in related fields. A Master's degree is required.

*3160 Introduction to Earth Materials (4) Study of minerals and rocks. Laboratory includes both hand specimen and analytical methods of identification. Prerequisite: 1410. 2 hrs and 2 labs.

*3180 Mineralogy (4) Introduction to crystallography and study of minerals. Laboratory includes hand specimen, chemical and x-ray methods of identification. Prerequisite: 1410. Chemistry 1110-20 or equivalent. 3 hrs and 1 lab.

*3210-20 Invertebrate Paleontology (4, 4) Systematic review of important Metazoa invertebrate fossil groups. 3210—Porifera to Annelida, including ctenodarids, echinoderms, brachiopods, and conodonts. 3220—Mollusca through lesser Chordata, including arthropods and echinoderms. May be taken separately or in sequence. Prerequisite: 3260; Biology 1210-20 or consent of instructor. 3 hrs and 1 lab or field period.

*3260 Paleobiology (4) Introduction to principles and morals of paleontology as applied to interpretation of earth history. Prerequisite: 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. Prerequisite: 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 tec vological environments in which they form. Laboratory emphasizes both hand specimen and microscopic study of important rock types. Prerequisite: 3160. 3 hrs and 1 lab.
4309 X-Ray Diffraction Methods (3) Application of x-ray in identifying crystalline substances, including powder camera, Gandolfi camera and diffract- ometer. Prereq: 4307 or consent of instruc- tor. 2 hrs and 1 lab.

4310 Geologic Mapping (4) Interpretation of maps and methods of geologic mapping. Prereq: 12 hrs of geology. 3 hrs and 1 lab or field period.

4331 Quaternary Geology of North America (4) Quaternary geologic processes, stratigraphy, sedimentology and geomorphology of glaciated and unglaciated North America and oceans. Prereq: 1410 or consent of instructor. 2 2-hr lectures per week.

4332 Quaternary Paleoecology (4) Pollen and plant-macrofossil, characterization of vegetation and climate change during Quaternary. Prereq: Consen- t of instructor. 2 2-hr lectures per week.

4333 Quaternary Field and Lab Techniques (4) Techniques for environmental characterization and reconstructions, pollen and plant-macrofossil identi- fication, description of site stratigraphy and sedimentology. Prereq: 1410, equivalent course, or consent of instructor. 2 hrs and 2 labs.

4370 Tectonic Styles (4) Elements, habitats, and geotectonic causes of basic styles of tectonic de- formation. Current tectonic models, tectonic and seismic phenomena, structural and tectonic geology, geologic and tectonic mapping. Prereq: 3370 or consent of instructor. 3 hrs and 1 seminar or lab.

4440 Field Geology (8) Five-week field course, first field course in geology for advanced undergraduate and first-year graduate students in geology. Employs entire time of students. A report is required. To be submitted no later than end of fall quarter. Prereq: 12 hrs geology and consent of instructor.

4460 Geologic Photography, Photogrammetry and Remote Sensing (4) Introduction to fundamental and practical concepts of photogrammetry, photogrammetric principles, practice, and interpretation of remote sensing data. Prereq: 3370 or consent of instructor. 3 hrs and 1 lab.

4550 Optical Mineralogy (4) Identification of mineral- ization and deposits using thin sections, polished slabs, and other materials. Prereq: 4110 or consent of instructor. 3 hrs and 1 lab.

4559 Mineral Phase Equilibria (4) Principles of phase chemistry and application of phase equilibria studies in rock-forming mineral systems as aid to understanding conditions of formation and modifica- tion of rocks. Prereq: 4610 or consent of instructor.


4770 Evolution of Oceans and Continents (4) In- troduction to origins of and changes that have occurred in earth's crust with emphasis on modern concepts of continent drift and plate tectonics. Pre- req: 1450.

4780 World Geology of Petroleum (4) Geologic habitat of petroleum deposits, methods of explora- tion and reserve assessment, geology and global distribution of known and potential reserves. Prereq: 1410 or equivalent and 3360 or equivalent.

4790 Uranium Deposits (4) Distribution, character- istics, and origin of different types of uranium de-
**Germanic and Slavic Languages**

**MAJORs**

- German Language and Literature

**DEGREES**

- M.A., M.A.T.
- Ph.D.

**Emeritus Professors:**
- H. W. Fuller, Ph.D. Wisconsin; E. T. Hankamer, Ph.D. (German); R. L. W. Nordsieck, Ph.D. Ohio State.

**Professors:**
- H. Kratz (Head), Ph.D. Ohio State; J. E. Fellen, Ph.D. Pennsylvania; R. L. Hillel, Ph.D. Cornell.
- J. C. Osborne, Ph.D. Northwestern; M. P. Rice, Ph.D. Vanderbilt.

**Associate Professors:**
- J. L. Elliott, Ph.D. Michigan; D. M. Fane, Ph.D. Indiana; N. A. Lauckner, Ph.D. Wisconsin; D. E. Lee, Ph.D. Stanford; C. J. Meller, Ph.D. Chicago.

**Assistant Professor:**
- U. Rittenhoff, Ph.D. Connecticut.

**Teaching Program**

The Department of Germanic and Slavic Languages offers three advanced degrees. They are the Master of Arts (M.A.), the Master of Arts in College Teaching (M.A.C.T.) in German, and the Doctor of Philosophy (Ph.D.) in German Language and Literature.

**The Master's Program**

In addition to the general Graduate School requirements as stated on page 18, the department requires 36 quarter hours in approved courses, including at least 18 hours in courses numbered above 5000. In addition to course work, the student is required to write a thesis, for which he/she may get a maximum of 9 hours credit. The minimum quarter hour credit for the M.A. is 45 quarter hours.

**Master of Arts in College Teaching Program**

The M.A.C.T. program is essentially an expanded M.A. program. The minimum requirement is 60 hours of graduate study, including 9 hours of thesis and a 3-quarter-hour seminar in college teaching. The aim of this program is to prepare highly qualified college teachers. Students receiving the M.A.C.T. degree would be well prepared to go to the Ph.D.

**The Doctoral Program**

The student must fulfill the general requirements for the Ph.D. degree set by the Graduate School. The candidate for the Doctoral degree must complete a minimum of 81 quarter hours of course work beyond the Bachelor's degree in addition to 36 hours of doctoral research and dissertation. At least 45 quarter hours of the minimum must be taken in 5000 or 6000 courses. Of these 45 hours, a minimum of 18 hours must be chosen from the seminar (5200) and the literary or philological seminars (6210-20-30-40-50-60 and 6310-20-30). Additional courses must be taken in a cognate field. Students are encouraged to take additional work in allied fields. A minor in an allied field must consist of at least 18 hours of 5000 or 6000 courses. Students must show a fluent command of German, 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 will 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 German language, elementary and advanced readings. Open to graduate students preparing for language examination, and to upper division students desiring reading knowledge of the language. Undergraduate credit only. No credit for students having completed elementary German E.

**2910-20-30 German Literature in English Translation**

(3, 3, 3) Germanic and Slavic Literature, advanced readings. Open to graduate students preparing for language examination, and to upper division students desiring reading knowledge of the language. Undergraduate credit only. No credit for students having completed elementary German E.

**4110-20-30 Studies in Classical and Modern Writers**

(3, 3, 3) Prereq: 6 hrs of major courses. 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.

**3240 Old Norse Literature in English Translation**

(3-4) Reading list and examination. Prereq: 6 hrs of major courses (exclusive of 3010-20-30, or courses in English translation) or equivalent. May be repeated with consent of department.

**4140-50 Selected Topics in German Literature**

(3, 3) Prereq: 12 hrs of major courses. Students desiring for 4 hrs credit will be expected to present an appropriate amount of extra work above that required for 3 hrs. F, W, Sp.

**4160 Studies in German Authors**

(3, 3, 3) Prereq: 12 hrs of major courses (exclusive of 3010-20-30, or courses in English translation) or equivalent. Su.

**4170 Theatrical German (1-3)**

Performance in one or more German plays. Prereq: Intermediate German or equivalent or consent of instructor. May be repeated with consent of department. F, W, Sp.

**4210-20-30 Studies in German Literary Types and Traditions**

(3, 3, 3) Prereq: 18 hrs of major courses. Students desiring 4 hrs credit will be expected to complete an extended reading list. F, W, Sp.

**4230 Introduction to Descriptive Linguistics**


**4240 Introduction to Historical and Comparative Linguistics**

and literary point of view. Development of language in Old High German period.

6140 Old Saxon (3) Phonology, morphology, and syntax of Old Saxon. Representative readings.

6210-20-30-40-50-60 Seminar in German Literature (3, 3, 3, 3, 3, 3) May be repeated. E

6310-20-30 Seminar in German and Germanic Philology (3, 3, 3) May be repeated. E

Russian

3010-20-30 Elements of Russian for Graduate Students and Seniors (3, 3, 3) For graduate students preparing for language examinations and seniors desiring reading knowledge of a second foreign language. Prereq: 2 years of some foreign language in college or consent of department. Undergraduate credit only. No credit for students having completed 1 yr of Elementary Russian.

3210 Nineteenth-century Russian Literature in English Translation (3-4) War and Peace, Anna Karenina, and other works.

3220 Works of Leo Tolstoy in English Translation (3-4) Crime and Punishment, Borisov, Karamazov and other works.


3230 Twentieth-century Russian Literature in English Translation (3-4) Russian modernism and literature under the soviet.

3240 The Russian Drama in English Translation (3-4) Selections from works of Fyodoriv, Grid, 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. Prereq: 9 hrs of 3000 courses (exclusive of 3010-20-30, 3210-20-30-40-50-60-70, 3310) or equivalent. May be repeated.


4250 Introduction to Descriptive Linguistics (3) (Same as French, Spanish, Linguistics, and German 4250) F

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)

4310-20-30 Advanced Studies in Russian Language (3, 3, 3) Intended primarily for students majoring or minor in Russian who are interested in language and linguistics. Includes problems in morphology and syntax, stylistics and translation techniques, and history of Russian language as well as other special problems for advanced students of Russian. May be repeated. Maximum 9 hrs each.

4410-20-30 Directed Readings in Russian (3, 3, 3)

Intended primarily for students participating in program in Russian and East European Area Studies, course will involve individual study relating to student's major field. Prereq: 9 hrs of 3000 courses in Russian (exclusive of 3010-20-30, 3210-20-30-40-50-60-70, 3310) or equivalent.

Greek

See Classics

History

MAJOR DEGREES

History

MAJOR: M.A., M.ACT, Ph.D.

Professors:

P. H. Bergeron, Ph.D. Vanderbilt, E. V. Chmilowksi, Ph.D. Harvard; R. E. Duncan, Ph.D. California (Berkeley), H. S. Finn (Emeritus), Ph.D. Princeton, L. P. Graf, Ph.D. Harvard; A. G. Haas, Ph.D. Chicago, Y. P. Hao, Ph.D. Harvard; R. W. Haskins (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:


Assistant Professors:

S. D. Becker, Ph.D. Case-Western Reserve; J. Bolschedt, Ph.D. Harvard; W. W. Farris, Ph.D. Harvard; T. W. Roblesheus, Ph.D. Virginia

THE MASTER'S PROGRAM

Master of Arts—Plan I: Course requirements include History 5240, and either 5250 or 5290; 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 either 5250 or 5290; two M.A. reading courses; 12 additional hours 5300 or above, at least 2 of which must be 6300 or above. Total hours—45. Plan I and Plan II require evidence of proficiency in one foreign language before the M.A. degree is granted.

MASTER OF ARTS IN COLLEGE TEACHING

Course requirements include History 5240-50-60, 5271-72-73, and Continuing and Higher Education 5110. Students must spend one year as a graduate assistant and one year as a teaching assistant. Total hours, including thesis—60. Students seeking the M.ACT degree may substitute 9 quarter hours of courses numbered 6300 or above for the Master's thesis.

THE DOCTORAL PROGRAM

1. Admission: (a) Acceptable scores on the Graduate Record Examination (General Aptitude and History Achievement).

(b) Students successful in 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 Awards and Review Committee after their first year of work at The University of Tennessee.

1 Distinguished Service Professor. 2 Alumni Distinguished Service Professor.
2. Residence and Course Work: Beyond the Bachelor's degree a minimum of 75 credit hours in course work is required, 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 of 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.) Satisfaction 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 all course work 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, 1798-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) Afro-American

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.

3060-70-80 History of Western Religious Thought and Institutions (3, 3, 3) (Same as Religious Studies 3060-70-80.)

3140-50-60 History of England (3, 3, 3) 3140-To 1688. 3150-1689 through the Reform Bill of 1832. 3160-1832 to the present.

3111 History of France (3, 3) 3111-Eighteenth Century to Civil War Era. 3121-1865 to present.

3411-12 The Reformation (3, 3) 3411-Renaissance. 3412-Reformation, Counter Reformation, and Wars of Religion. 3141-1618. (Same as Religious Studies 3411-12.)

3421-23 Early Modern Europe 1600-1815 (3, 3, 3) 3421-Seventeenth-century Europe. 3422-17th Century. 3157-1618. (Same as Religious Studies 3421-12.)


3445-46 History of France (4, 4) 3445-To 1785. 3446-Since 1781.

3470-80-90 History of Russia (3, 3, 3) 3470-To 1801. 3480-Nineteenth Century. 3490-Twentieth Century.

4010-20-30 The American Colonies and the American Revolution (3, 3) 3610—Settlements to 1754. 3620—1754-1789.


4710-20-30 History of Germany (3, 3, 3) 3710—First Reich to 1713. 3720—Habsburg and Hohenzollern and Formation of Second Reich, 1713-1890. 3730—From a unified to a divided Germany, 1890 to present.

3740 The City in Europe, ca. 1200-1900 (3) 3740—Survey of European urban growth, with comparative analysis of the major periods of urbanization of the thirteenth and nineteenth centuries. Emphasis on the relationship between demographic, economic and social foundations of cities and cultural and political development.

3751-52 Ancient Near Eastern Civilization (3, 3) 3751-Early and Middle Bronze Ages. 3752-Late Bronze and Iron Ages.

3760-70 The Ancient World (3, 3) 3760—Greece. 3770—Rome.

3780-90 History of the Middle East (3, 3) 3780—Rise and spread of Islamic Civilization to the 16th Century. 3790-The impact of the West on the Middle East from the sixteenth century to World War I.

3795 Contemporary Middle East (4) Background of current problems in the area, from World War I to present.

3800 North Africa Since 1830 (3) Morocco, Algeria, Tunisia, and Libya in the nineteenth and twentieth centuries.

3810-20-30 History of East Asia (3, 3, 3) 3810—Traditional China and Japan, ancient to mid-nineteenth century. 3820—Modern China, Japan, and Korea, mid-nineteenth century to 1930s. 3830—Contemporary China, Japan, and Korea, 1930s to present.

3870-80-90 History of Latin America (3, 3, 3) 3870—Exploration, conquest settlement and Colonial life to 1800. 3860—Major countries of South America, 1800 to present. 3890—Mexico, Central America and the Caribbean, 1800 to present.


4015 Studies in History (3-4) Variable content course affording opportunity to offer subject matter not covered in an existing course. May be repeated.

4120-30 History of Colonialism and Imperialism (3, 3) 4120—Background; age of discovery and exploration to nineteenth century. 4130—Nineteenth Century to present.

4250-65-70 European and Cultural History (3, 3, 3) 4250—From Reformation to the Scientific Revolution, 1500-1700. 4260—From the Enlightenment to Wars of P.R. Realism, 1700-1870. 4270—From Subjectivism to Relativism, 1870-present.

4280 Women in European 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.

4290 Women in American History (4) Approaches of 4280 applied to American Society.

4310-20-30 History of American Foreign Relations (3, 3, 3) 4310—To 1901. 4320—1901-1941. 4330—1941 to present.

4350 The United States in World War II (4) Military, diplomatic, and domestic experience.

4370 U.S. Military History, 1754 to the Present (4) Examination of major broad strategic aims and means used to attain them, shifting strategy, tactics and weaponry involved in our wars, and relationship between American society and its armed forces.

4380 Civilian-Military Relationships in the Modern Western World (3) Civilian-military affairs from about 1900 to 1960 in Western Europe and America: emphasis in Western Europe e.g., Dreyfus Affair, Germanic Affair 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 modern international arrangements.

4480 Russian Intellectual History (3) An eighteenth century to present, emphasizing problems of Westernization, nationalism, and revolutionary tradition.

4490 Soviet Foreign Policy (3)

4500 History of Medieval England (3)

4510-20 Tudor-Stuart England (3, 3) 4510—1485-1603. 4520—1603-1714.
DEGREES

Mathematics

MAJOR

DEGREES

Mathematics

M.M., M.A., M.S., Ph.D.

Professors:

G. E. Albert (Emeritus), Ph.D. Wisconsin; J. S. Bradley (Head), Ph.D. Iowa; J. H. Carruth, Ph.D. Louisiana State; R. E. Cline, Ph.D. Purdue; R. J. Daverman, Ph.D. Wisconsin; D. J. Dessart, Ph.D. Louisiana State; R. E. Cline, Ph.D. Purdue; D. A. Gardiner, Ph.D. North Carolina State; R. T. Gregory, Ph.D. Illinois;

E. D. Eaves (Emeritus), Ph.D. Texas; H. Frandsen, Ph.D. Maryland; D. E. Dobbs, Ph.D. Tennessee; A. S. Householder (Emeritus), Ph.D. Chicago; L. H. Husch, Ph.D. Florida State; R. M. McDowell, Ph.D. Duke; H. T. Mathews, Ph.D. Tulane;

D. D. Miller (Emeritus), Ph.D. Michigan; B. S. Rajput, Ph.D. Illinois; K. C. Reddy, Ph.D.

Latin

See Classics

College of Liberal Arts

5216, American History Since 1789; 5217, Latin America; 5218, Far East; 5219, Colonialism and Imperialism; 5221, England; 5222, Russia; 5223, Germany; 5224, France; 5225, Middle East. Open only to Master's candidates in history. S/NC only; E

5240 Introduction to Historical Research (3) Principles and techniques of research in the study of history. Required of all candidates for advanced degrees who do not present evidence of similar training elsewhere. F

5250 European Historiography (3) Introduces the student to the historical literature of leading European nations. W

5260 American Historiography (3) Like 5250 in the American field. W

5271-72-73 The Teaching of College History (0, 0, 0) Introduction to problems of teaching at college level. Place of history in curriculum, types and levels of courses, and techniques of teaching. Prereq: Consent of instructor. Required of candidates for the MACT. Credit will be withheld until the completion of 5273, with grades of "S" or "NC" submitted at end of each of first two quarters. E

5280 Philosophy and Methodology (3) Philosophies of history and their relationship to modern trends in historical methodology. Sp

5290 Quantitative Analysis of Historical Data (3) Prereq: Sociology 5320 and 5330, or consent of instructor. Sp

5300 Topics In History (3)

5310 Topics In Women's History (3)

5320 Topics In Historical Editing (3) Principles and practice of editing documents.

5360 Topics In American Foreign Relations (3)

5410 Topics In Early Modern European History (3)

5440 Revolution and Restoration In Central Europe, 1780-1850 (3) Reform, resistance, and the advent of Liberalism and Nationalism.

5444 Topics In French History (3)

5445 Topics In Nineteenth-century European History (3)

5450 Topics In Twentieth-century European History (3)

5480 Topics In Russian History (3)

5510 Topics In Tudor-Stuart England (3)

5520 Topics In Modern English History (3)

5550 Reaction and Reform In England, 1789-1848 (3)

5560 Anglo-Irish Relations (3)

5640 Topics In American Social and Cultural History (3)

5645 Topics In American Urban History (3)

5650 Topics In the American Westward Movement (3)

5660 Topics In Negro History (3)

5670 Topics In American Colonial History (3)

5675 Topics In the Early National Period of American History (3)

5680 Topics In Nineteenth-century American History (3)

5690 Topics In Twentieth-century American History (3)

5720 Topics In Medieval History (3)

5740 Topics In European Urban History (3)

5750 Topics In Ancient History (3)

5780 Topics In German National Socialism (3)

5790 Topics In Middle Eastern History (3)

5810 Topics In Andean History (3)

5820 Topics In Mexican History (3)

5850 Topics In Chinese History (3)

5860 Topics In Japanese History (3)

5910-20 Topics In Southern History (3, 3) 5910-Old South. 5920-New South.

6000 Doctoral Research and Dissertation (3-15) E

6210-20-30-40 Directed Readings (3, 3, 3, 3) Individual readings directed toward preparation for preliminary examination fields. Open only to candidates for Ph.D. degree who are in residence and who have been in residence at least two quarters. Only one course may be taken in preparation for each of four fields. Depending on field in which he/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 European History (3)

6444 Seminar In French History (3)

6480 Seminar In Russian History (3)

6510 Seminar In English History (3)

6510 Seminar In American Colonial History (3)

6620 Seminar In The Era Of The American Revolution (3)

6630 Seminar In Early National Period Of American History (3)

6635 Seminar In Jacksonian Period (3)

6640 Seminar In Social And Cultural History Of The United States (3)

6650 Seminar In The American Westward Movement (3)

6710 Seminar In Medieval Institutions (3)

6770 Seminar In Central European History (3)

6810 Seminar In Latin American History (3)

6910 Seminar In The Civil War Era (3)

6930 Seminar In Twentieth-century America (3)

6940 Seminar In The History Of The South (3)

NOTE: Registration in topics and seminar courses may be repeated for credit with consent of department.
Indian Institute of Technology (India); P. W. Schneller, Ph.D. Maryland; V. A. Dougalis, Ph.D. California (Riverside); C. G. Wagner, Ph.D. Duke.

Associate Professors:
C. E. Clark, Ph.D. Louisiana State; G. S. Jordan, Ph.D. Wisconsin; K. R. Kimele, Ph.D. Ohio State; G. A. Klassen, Ph.D. Nebraska; Y. Kuo, Ph.D. Cincinnati; H. L. Lew (Emeritus), Ph.D. Duke;
W. H. Row, Jr., Ph.D. Wisconsin; R. Rowlett, Ph.D. Virginia; S. Serbin, Ph.D. Cornell; J. Smith, Ph.D. California (Berkeley); K. Soni, Ph.D. Oregon State; R. P. Soni, Ph.D. Oregon State; J. J. Wallach, Ph.D. SONY.

Assistant Professors:
V. H. M. Ashwell, Ph.D. Delaware; D. F. Anderson, Ph.D. Chicago; L. Barker, Ph.D. Florida State; J. Cohen, Ph.D. Washington; S. Ellett, Ph.D. Cornell; V. A. Douglas, Ph.D. Harvard; L. J. Gross, Ph.D. Cornell; C. Karakashian, Ph.D. Harvard; S. Lenhart, Ph.D. Kentucky; M. Miller, Ph.D. Illinois;
H. Simpson, Ph.D. California Institute of Technology; K. R. Stephenson, Ph.D. Wisconsin; C. Sundberg, Ph.D. Wisconsin.

Math 3050, 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 "O" may be offered as an honors version. In this case, the last digit will appear as an " 8 " and the title will be preceded by the word "Honors" both in the timetable and on the student's transcript. Honors version 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).

MATHER 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 in 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 certified by the applicant.

Applicants for admission to this program must take the Graduate Record Examination (aptitude portion), and have 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. Pass 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, 5 hours can be in an area outside the department and 18 must be in courses in mathematics numbered above 5000.

After two quarters of graduate study, a student whose supervisory committee gives its approval may choose the non-thesis option, for which 45 hours of work in courses numbered above 4000 are required. Of these, 27 hours (at least 24 of which are in mathematics) must be in courses numbered above 5000. Of the 45 hours, 15 in courses approved by the supervisory committee may be taken in fields other than mathematics. For this option it is also required that a written comprehensive examination be passed, and that credit be received for a 3-hour seminar or reading course (5990-5995) in which a term paper or project is required.

A student offering mathematics as a minor for the Master's degree is required to obtain at least 9 hours of resident graduate credit in courses numbered above 4000 and approved by both the major department and the Department of Mathematics.

THE DOCTORAL PROGRAM

For the Ph.D. in Mathematics, the student must meet the following departmental requirements:
1. Pass written examinations covering four subjects, at least three of which must be from the following list:
   a. Algebra 5510-20-30
   b. Functions of a Complex Variable 5110-20-30
   c. Topology 5910-20-30
   d. Functions of a Real Variable 5210-20-30
   e. Linear Analysis 5250-60
   f. Partial Differential Equations 5450-60-70
   g. Ordinary Differential Equations 5870-80-90
   h. Numerical Mathematics 5655-65-75
   i. Mathematical Statistics 5750-60-70
   j. Mathematical Ecology approved as an examination topic for that student by the Graduate Committee and the Applied Mathematics Committee. For a given student and in a given area, the Graduate Committee will appoint a section of faculty whose responsibility is to submit a list of topics and referenda to the Graduate Committee for its approval.

A student selecting only three from the above list will also be required to pass a written examination in an area of applied mathematics (e.g., Fluids, Elasticity, Mathematical Ecology) approved as an examination topic for that student by the Graduate Committee and the Applied Mathematics Committee. For a given student and in a given area, the Graduate Committee will appoint a section of faculty whose responsibility is to submit a list of topics and referenda to the Graduate Committee for its approval.

A student selecting only three from the above list will also be required to pass a written examination in an area of applied mathematics (e.g., Fluids, Elasticity, Mathematical Ecology) approved as an examination topic for that student by the Graduate Committee and the Applied Mathematics Committee. For a given student and in a given area, the Graduate Committee will appoint a section of faculty whose responsibility is to submit a list of topics and referenda to the Graduate 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:
1. The exams to be taken must be approved in advance by the student's supervisory committee.
2. At most 4-n exams may be taken at any one time, where n denotes the number of exams previously passed by the student.

A student may take a collection of written examinations a maximum of four times, but no one failing five exams, counting possible repetitions, will be permitted to take another round of exams.

2. 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.

3. The conditions for the doctoral degree are to include a demonstrated proficiency in one foreign language, normally from among French, German, or Russian; this requirement is to be met prior to the examination in the area of specialization. The student's doctoral committee may require that the student pass a second language exam.

In addition, the department requires that each student take a one year, 6000-level course in mathematics outside of his/her area of concentration. The use of the course selected to fulfill this requirement must be approved by the department head and the student's Doctoral Committee. (Such approval may occur after completion of the course.)

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 before the fall quarter begins, and the winter exams are given early in January.

• 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: 1550-60 or equivalent, W, Sp

• 3060 Elementary Statistical Analysis (3) Elementary probability distributions used in statistics: binomial, Poisson, and normal and their properties; sampling theory; confidence intervals and statistical tests of hypotheses; least squares and linear 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 fields, integral domains, and fields. Emphasis is given to certain ring theoretic properties shared by integers and polynomials 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 yr college mathematics.

3110 Real Number System (3) Laws of arithmetic; rational and irrational numbers; fields. Prereq: 1 yr of college mathematics. Primarily for students in the College of Education. Does not satisfy requirements of major or minor in mathematics.

3140 Mathematical Modeling (3) Survey of construction and development of quantitative models of phenomena used in science and industry. Markov chains, linear optimization, graph theory, and differential and integral equations are used as the underpinning of model and associated scientific problem it approximates. Projects emphasized. Prereq: 2540-50-60.

3150 Introduction to Numerical Algorithms and Programming (3) (Same as Computer Science 3150.) E

3155 Introduction to Numerical Algorithms (3) (Same as Computer Science 3155.) E

*These courses are sometimes offered in special summer institutes for an 8-week period with 4 hrs credit. Such special courses are designed 3051, 3061, etc.
3220 History of Mathematics (3) Survey of development of various branches of mathematics, from ancient to modern times. Prereq: 1960 or 2550 or equivalent.

3310 Advanced Euclidean Geometry (3) Triangles and circles, constructions, modern concepts. Prereq: 1 yr of college mathematics. F.

3320 Non-Euclidean Geometry (3) Foundations of geometric models and hyperbolic plane geometry. Prereq: 1 yr of college mathematics. W.


3510 Intermediate Analysis for Teachers (3) Primarily for students in secondary mathematics education. Course covers elementary calculus from advanced viewpoint with emphasis on proofs of basic theorems. Topics covered include limits of sequences and functions, continuous functions, derivatives, definite integral, and fundamental theorem of integral calculus. Does not satisfy requirements of major or minor in mathematics. Prereq: 1950-60 or 1860. Su.

3550-60 Intermediate Analysis (3, 3) Infinite series, convergence, uniform convergence, Taylor series. Fourier series. Prerequisites: Several variables, linear algebra, and one of the following: 2860 or 4050-60. May be repeated with consent of department. Maximum 9 hrs.

3715 Discrete Structures (3) (Same as Computer Science 3715.) E.


3725 Advanced Discrete Structures (3) (Same as Computer Science 3725.)

3780-90 Introduction to Combinatorial Theory (3, 3) (Same as Computer Science 3780-90.) 
Topics covered include: counting, partitional and allocation, graph theory, finite geometries and finite fields, partitions, block designs. Prereq: 2860 or consent of instructor: F, W, or Sp.

3810 How To Prove It (3) Course is designed to improve understanding of nature and methods of mathematical proof. Emphasis on practice and participation in seminar setting. Variable content but will include construction of proofs on standard topics such as elementary set theory, relations, functions, and mathematical induction. Coreq: 2850 or 2560. E.

3861 Mathematical Models in the Life Sciences (3) Introduction to difference equations and differential equations. Mathematical modeling techniques applied to biological phenomena. Does not satisfy requirements of major or minor in mathematics. Prereq: 2111, or 3060 or consent of instructor. May be repeated with consent of department. Maximum 9 hrs.

3920-30 Topology of Euclidean Spaces (3, 3) Topics will include topology of line and plane, separation properties, compactness, connectedness, completeness, continuous functions, homeomorphisms, continuity, and topological invariants. Must be taken in sequence. Prereq: 3810, 2860, or consent of instructor: W, Sp.

3990 Studies in Mathematics (1-4) Credit determined by program or consent of instructor. Prereq: 1841-90 or consent of instructor. May be repeated with consent of department. Maximum 9 hrs.

4050-60 Matrix Algebra and Applications (3, 3) Vector spaces, linear transformations, eigenvalues and eigenvectors, similarity and unitary transformations, singular value decomposition and least square problems. Prereq: 2860 or 4050. F.

4060 Calculus of Finite Differences (3) Real differen-
tiation equations, application to problems in engineering and physics. Prereq or coreq: 4610.


4710 Vector Analysis (3) Fundamental operations, basis vectors, dot and cross products, directional derivatives, divergence and curl of vector fields, line and surface integrals of vector fields, and Stokes' theorem. Does not satisfy requirements of major or minor in mathematics. Prereq: 2860. E.

4750-60-70 Introductory Probability Theory (3, 3, 3) Basic probability concepts, random variables, probability distributions, expectation, variance, estimation and hypothesis testing. Prereq: 3150 or 4420 or 4425. (Same as Computer Science 4235.) W, Sp.


4810 Elementary Number Theory (3) Divisibility, congruences, quadratic residues, primitive roots; indices, quadratic reciprocity. Prereq: 2860 or consent of instructor. Sp.

4980 Readings in Mathematics (1-3) Open to superior students with consent of department head. Independent study with faculty guidance. May be repeated. Maximum 9 hrs.

4990 Studies in Mathematics (1-4) Credit determined at registration. Prereq: Recommendation of Mathematics Department faculty member and consent of department. May be repeated. Maximum 9 hrs.

5000 Thesis (1-15) E.

5002 Non-Thesis Graduation Completion (3-15) 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 completion. May not be used toward degree requirements. May be repeated. S/N only. E.

**5011 Elementary Functions from an Advanced Standpoint for Teachers (3-4) Order and completeness axioms of real numbers; limits of sequences, derivatives of functions, Riemann integration, limit points of sequences, limits of functions, uniform continuity, uniform convergence. Power series. Prereq: 3150 or 4420 or 4425. (Same as Computer Science 4235.) W, Sp.

4510-20-30 Introduction to Analysis (3, 3, 3) Real number system, functions, sequences, limits, continuity, uniform convergence, the Riemann integral. Functions of several variables, implicit function theory. Multiple integrals, infinite series, sequences and series of functions, uniform convergence, Taylor series. Should be taken in sequence. Prereq: 2860; one 4000-level mathematics course recommended.


4640 Calculus of Variations: Theory of Extremizing Functions, application to problems in engineering and physics. Prereq or coreq: 4610.
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. Courtney, Ph.D. Syracuse; T. C. Montie, Ph.D. Michigan; J. O. Daniels, Ph.D. Michigan State; W. S. Riggsby, Ph.D. Yale; B. T. Rousse, Ph.D. Guptill (Canada); J. M. Woodward (Emeritus), Ph.D. Atlanta; C. J. Wust, Ph.D. Indiana.

Associate Professors:

D. A. Brian, Ph.D., D.V.M. Mountain State; G. S. Sayler, Ph.D. Idaho.

Assistant Professors:


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.

3810 Food Bacteriology (3) Standard methods for examination, cultivation, and identification of bacteria associated with food fermentation and food spoilage.

3819 Food Bacteriology Laboratory (3) Laboratory methods for examination and identification of bacteria associated with food fermentation and food spoilage.

3820 Yeast and Molds (4) Principles of taxonomy and physiology of yeasts, actinomycetes, and fungi of industrial importance.

3829 Yeasts and Molds Laboratory (4) Techniques for isolation, cultivation, and identification of yeasts and molds.

4110 Physiology of Bacteria (3) Modern concepts of bacterial physiology and metabolism including cell structure and function.

4119 Bacterial Physiology Laboratory (3) Laboratory methods for examination and cultivation of yeasts and molds.

4320 Immunology (3) Principles and methods for isolation, handling and culturing of animal viruses. Prereq: 3519, Coreq: 4430, W.

4339 Medical Mycology Laboratory (2) Laboratory procedures for isolation, handling and culturing of animal viruses.

5000 Thesis (1-15)

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

5011-13-14-15-16 Micro-course in Microbiology (1, 1, 1, 1, 1) Selected, advanced topics in microbiology, concentrated in time and subject matter. Consult departmental listing for topics offered. Prereq: as posted. May be repeated. Maximum 9 hrs. S/NC only.

5130 Topics in Taxonomy (3) Isolation, cultivation and taxonomic relationships of schizomyces, emphasis upon less frequently encountered orders.

5310 Selected Topics in Microbiological Research (1-3) Literature surveys and laboratory methods for development and interpretation of microbiological research. May be repeated.

5350 Advanced Microbiology for Secondary Education Instructors (3) Basic microbiological populations encountered in natural habitats; laboratory methods for isolation and characterization of natural organisms and epidemiological recognition of pathogens. Prereq: Consent of instructor and introductory course in microbiology and general chemistry. Not for degree credit in microbiology.

5360 Topics in Immunology and Immunohemistry (4) Molecular and genetic aspects of immunoglobulin synthesis. Theoretical and practical exercise in immunohemistry. Prereq: 4270, Biochemistry 4110-20 or equivalent.

4541-42-43-44-45-46 Clinical Microbiology (6, 6, 6, 6, 6) Six quarters, 6 quarter hrs each consisting of lectures and clinical laboratory experience. Enrollment by consent of department head.

5510-20-30 Research Problems (1, 1, 1) Research problems dealing with current advances in basic microbiological research. May be repeated.

5720 Microbial Physiology (3) Lectures and seminars dealing with current advances in microbial physiology including growth and cell structure. Prereq: 4110; Biochemistry 4110-20.

5730 Pathogenesis of Infectious Disease (3) Host response to infection. Derangement of host-microbe interaction by microbial invasins, exotoxins, endotoxins and other factors related to virulence. Alteration of genetic and hormonal controls resulting from progressive infection. Prereq: 4520.
and relationship of different styles to the conductor's conduct; study of various periods and composers and development of knowledge and skills in instrumental technique. Prereq: Consent of instructor. May be repeated.

126 College of Liberal Arts
problems of a selected group of students. Supervised teaching. Prereq: 4012-22-32 or consent of instructor.


*5030 Choral Literature Seminar (3) Topics vary.

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: 4060 or equivalent.

5060 Seminar in Choral Performance (3) Rehearsal and performance problems and techniques allied to choral conducting. Particular attention to individual problems. Prereq: 4060 or equivalent.

5061 Choral Conducting (3) Development of choral conducting skills.

*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 nontonal 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 the 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 genre.


5355 Music in the Classic Period (3) Preclassical 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 Tuba (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 6 hrs.

5599 Composition (1-3) Prereq: Consent of instructor.

*5600 Small Ensemble (1)

*5602 Brass 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)

*5680 Concert Choir (1)

*5682 University Chorus (1)

*5687 Women's Chorale (1)

*5699 Accompanying (1)

May be repeated. Maximum 6 hrs.

**Philosophy**

MAJOR

**DEGREES**

Philosophy

M.A., Ph.D.

Professors: J. W. Davis (Head); Ph.D. Emory; R. E. Aguila; Ph.D. Northwestern; L. B. Cebik; Ph.D. Nebraska; R. L. Edwards; Ph.D. Emory; M. H. Moore (Emeritus). Ph.D. Chicago; D. Van de Vate, Jr., Ph.D. Yale.


Assistant Professors: H. P. Hamlin, Ph.D. Georgia; R. Jones, Ph.D. Chicago; J. E. Neil, Ph.D. Ohio State; D. E. Ost, Ph.D. Texas (Austin); S. Reaven, Ph.D. California (Berkeley).

THE MASTER'S PROGRAM

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 shall be in courses numbered above 5000, and of which at least 9 shall be in a subject other than philosophy. The specific number and distribution of courses will be determined by the student's faculty committee.

Two foreign languages, normally French and German, are required. As an alternative to the two-language requirement, candidates for the Ph.D. may elect to demonstrate a substantially more advanced proficiency in reading knowledge of one language.

Requirements for this option may be obtained in the department office.

Registration in any course in the 5000 or 6000 series (except 5050 and 5010-20-30) may be repeated for credit with the consent of the department. That is, courses having the same number, but with different subject matter, may be taken with each separate subject description.
for formal analysis of deductive reasoning (propositional logic and quantification theory.) Sp

3810 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) (Same as Religious Studies 4200.)

4310 Intermediate Ethics (4) Topics in metaethics 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.

4610 Philosophical Analysis (4) Prereq: 8 hrs philosophy or consent of instructor.

4620 Philosophy of Mind (4) Problems of mind and body in relation to consciousness and personal identity. Prereq: 8 hrs philosophy or consent of instructor.

4630 Philosophy of Language (4) Prereq: 8 hrs 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 methods of inquiry and modes of explanation in social sciences. Prereq: 3770 or 2 yrs social science.

4810 Metaphysics (4) Prereq: 8 hrs philosophy or consent of instructor.

5000 Thesis (1-15) E

5050 Symbolic Logic (4)

5080 Philosophy of Logic (4) Nature of logic: epistemological, metaphysical and axiological assumptions and implications in various theories of logic. Prereq: 4510 or equivalent.

5101 Foreign Study (1-12) See page 97. E

5102 Off-campus Study (1-12) See page 97. E

5103 Independent Study (1-12) See page 97. 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—Medieval, before Kant. 5140—Kant. 5150—Nineteenth Century. 5160—Twentieth Century.

5250 Studies in the History of American Philosophy (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: 4370-71 consent of Medical Ethics Committee.

5375 Clinical Medical Ethics (1) Medical terminology, history of medical ethics, case study discussions, clinical observation. Open only to students concentrating in medical ethics. Prereq: 5355 and consent of Medical Ethics Committee. May be repeated. Maximum 8 hrs. S/NC only.

5410 Philosophy of History (4) Theories of history and historical processes.

5430 Philosophy and Literature (4) Mutual influence of philosophy and literature, possibility of a philosophy of literature, philosophy of criticism.

5450 The Problem of the Self (4) Current studies in sociology, social psychology, and philosophy to amend and elucidate traditional philosophical treatments of problem of self.

5460 Philosophy of Mind (4) Relation of mental to physical and role of words in discourse for mental activities such as thinking and feeling.


5550-60 Philosophy of Science (4, 4) Nature of subject matter and method of sciences. 5550—Natural sciences. 5560—Social Sciences.

5610 Recent Developments in Philosophy of Religion (4)

5710 Studies in Metaphysics (4) Metaphysics of philosopher or systematic philosophic tradition.

5810 Social and Political Philosophy (4)

5940 Lakeshore Clinical Residence (6) Seven-week clinical practicum at Lakeshore Mental Health Institute concentrating on ethical issues in mental health care. Open only to students concentrating in medical ethics. Prereq: Consent of Medical Ethics Committee. S/NC only.

5950 Clinical Practicum in Medical Ethics (4-12) Prereq: Consent of Medical Ethics Committee. Open only to students concentrating in medical ethics. S/NC only. E

6000 Doctoral Research and Dissertation (3-15) E

6110-20-30 Seminars in the History of European Philosophy (4, 4, 4)

6150 Seminars in the History of American Philosophy (4)

6250 Seminar in the Philosophy of Religion (4)

6310 Seminar in Axiology (4)

6370 Advanced Topics in Medical Ethics (4) Prereq: 5370 or consent of Medical Ethics Committee.

6510 Seminar in Epistemology (4)

6550 Seminar in Philosophy of Science (4)

6950 Advanced Residence in Medical Ethics (4-12) Prereq: Consent of Medical Ethics Committee.
Physics and Astronomy

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

Physics

Programs:

- W. M. Bogg (Head), Ph.D. Tennessee
- C. R. Bingham, Ph.D. Tennessee; R. D. Birkhoff, Ph.D. Northwestern
- Michigan State, T. A. Callcott, Ph.D. Purdue
- L. G. Christopher, Ph.D. University of Manchester (England); G. T. Condo, Ph.D. Illinois; W. E. Deeds, Ph.D. Ohio State; J. B. Dicks, Ph.D. Vanderbilt; J. L. Fowler, Ph.D. Princeton; K. Fox, Ph.D. Michigan; N. M. Glazar, Ph.D. Ohio State
- E. G. Harris, Ph.D. Tennessee; E. L. Hart, Ph.D. Cornell; D. T. King, Ph.D. Bristol University (England); R. J. Lovell, Ph.D. Vanderbilt;
- R. H. Ritchie, Ph.D. Tennessee; H. C. Schwoeisner, Ph.D. Massachusetts Institute of Technology; J. M. Selin, Ph.D. Chicago; P. H. Staton, Ph.D. Massachusetts Institute of Technology;

Associate Professors:
- W. M. Bogg, Ph.D. Oregon State; R. W. Childress, Ph.D. Vanderbilt; J. Cornett, Ph.D. Colorado State; H. W. Crane, Ph.D. Yale; C. E. Dukett, Ph.D. Providence;
- W. A. Dunnill, Ph.D. Florida; S. Georghiou, Ph.D. Manchester (England);
- S. H. K. Fisch, Ph.D. Tennessee; L. B. Johnson, Ph.D. Yale; R. R. Kohl, Ph.D. Ohio State;
- L. R. Painter, Ph.D. Tennessee; J. D. Pegg, Ph.D. Indiana; L. H. Reddick, Ph.D. Vanderbilt;
- S. Y. Shieh, Ph.D. Maryland; C. C. Shih, Ph.D. Cornell;
- R. Thompson, Ph.D. Duke.

Assistant Professors:
- S. B. Elston, Ph.D. Massachusetts; M. F. Fair, M.S. California; M. W. Guidry, Ph.D. Tennessee;
- T. H. Handler, Ph.D. Rutgers; D. L. Mccorkle, Ph.D. Tennessee.

Lecturers:
- R. L. Becker, Ph.D. Yale.

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 or 4110-20-30, 4210-20, 4230 or 4240-20-30 are courses prerequisite to graduate 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 chemical 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 work in areas generally considered of importance and space flight 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 MASTER'S PROGRAM

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 work includes 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 teach in colleges or universities on the elementary or intermediate level, or for students specifically intending to work toward a Ph.D. Students seeking an M.S. in Physics by this method must apply to the department's graduate committee for permission to enroll under this program. The requirements for the M.S. under this method are the satisfactory completion of 45 hours of course work composed of 27 hours from courses numbered above 4000 (e.g., 5110-20-30, 5210-20-30, 5310-20-30); 9 hours in a minor field (e.g., mathematics); and 9 hours from other courses in physics numbered above 4000 (preferably of advanced nature). In addition, the candidate must pass a comprehensive examination administered by the committee.

The Physics Department is also participating in the program which leads to the Master of Arts in College Teaching degree. In addition to the requirements for either of the Master's programs described above, the MACT degree in Physics requires 15 more hours of graduate work beyond the Master's degree, or an equivalent number of quarter hours. Nine of these hours are specified as follows: 3 hours in a seminar course dealing with general problems of college teaching; 3 hours in a seminar course dealing with special problems in the teaching of physics; and 3 hours in a course dealing with the history and philosophy of physics. The other 6 hours of course work may be elected from any of the physics courses numbered above 5000. During the time leading to the MACT degree, the candidate will be continually engaged in supervised teaching activities.

THE DOCTORAL PROGRAM

All students are expected to take 5210-20-30, 5310-20-30, 5410-20-30, 5510-20-30, 5610-20-30, 6110-20-30 and 6310. Physics 6210-20-30 are normally required of students specializing in nuclear physics, Physics 6500-10 of students in plasma physics, Physics 6610-20 of students in health physics, Physics 6710-20 of students in astrophysics, and Physics 6810-20 of students specializing in molecular spectra. (The Master's degree is not required.)

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 had in 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, 5510-20-30, 5610-20-30, 6110-20-30, and either 6310 or 5720; Chemistry 4160-70, 5430, and any two quarters from 5340-50, 6730 or 6810-20.

Astronomy


Physics


3230 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


3510-20-30 Physical Measurements (3, 3, 3) Theoretical measurement of some physical quantities. Theory supplied where necessary. Prereq: 2310-20 or 2210-20-30, and calculus; 3510 for 3520 and 3530. 3 labs.

3610-20 Electrons (3, 3) Electronic components and circuits of interest to physicists. Prereq: 2310-20 or 2210-20-30 and calculus. 3 labs. F, W, Su

3630 Nuclear Electronics Laboratory (3) Elementary circuits of interest in nuclear instrumentation are designed and built, and their characteristics are tested as a function of various parameters. Prereq: 3610-20. Sp

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 and Physics 2320 for 3710; 2338 or 3710 for 3720-30. E

4040 Foundations of Physics (3) Selected topics from history and philosophy of classical and modern physics. Prereq: 1 yr general physics and consent of instructor. Required of MACT candidates. Sp


4140 Elementary Nuclear Physics (3) General properties of nuclear, two-nucleon systems, nuclear forces, nuclear models, nuclear reactions, nuclear disintegrations and beta-decay, nuclear spin and magnetism. Prereq: 3730 or 4120 Sp

College of Liberal Arts 129


5440 Experimental Methods of Infrared and Raman Spectroscopy (3) Experimental equipment; instruements; detection systems; analytical methods. Analysis vibrating-rotating diatomic molecules. Prereq: 3710-20. Dicussion. W; F.

4510-20-30 Atomic Physics Laboratory (3, 3, 3) Experiments in fundamental properties of atomic physics; measurements; instrumentation; electronics. Prereq or coreq: 3170-20-30. Labs. E.

4540-50 Experimental Nuclear and Radiation Physics (4, 4) Interaction of charged particles and electromagnetic radiation with matter; characteristics of various detectors; statistics of counting, nuclear properties. Experiments illustrate phenomena and test the predictions of the nucleus and nuclear radiation. Prereq: 2330. 1 hr and 6 hrs lab. F, Su.

4580 Principles of Nondestructive Testing (3) Detection and characterization of discontinuities in materials by nondestructive physical measurements. Ultrasonic, electromagnetic, holographic and penetrating radiation techniques are discussed. Prereq: 2310 and consent of instructor. (Same as Engineering Science 4580). W.


5720 Physics of Polymolecular Molecules (3) Introduction to electronic structure of molecules and physical processes of luminescence of these molecules, theoretical and experimental aspects of intermolecular and intramolecular electron excitation energy transfer and charge transfer; applications of excitation energy transfer and charge transfer in such fields as organic molecular excitations and on 5820 Quantum Mechanics (3, 3, 3) Fundamentals principles of quantum mechanics and principal approximation methods. Applications to atomic, molecular, electronic and nuclear structure. Quantum electrodynamics. Prereq: 4130 or 5210; 5310-20-30 or 5410-20-30. Whenever of latter sections are added, prerequisite is considered corequisite. F, W, Sp.

5610 Interaction of Radiation with Gases (3) Interaction of electromagnetic radiation with atoms and molecules; oscillator strength, interaction of charged particles with atoms and molecules; ionization, transitions and light emission. Electron interaction, transport and capture; electron diffusion and beam experiments. Prereq or coreq: 5610-20. F.

5820 Interaction of Electrons with Solids (3) Collisions with free electrons; stopping power; electron slowing down spectra; energy straggling; nuclear scattering; electron diffusion; plasmon effects in irradiated solids; techniques in electron spectroscopy; applications to dosimetry. Prereq or coreq: 6110-20. F.

5911 Special Problems in the Teaching of Physics (1, 1) 1 Design of physics experiments and demonstrations. 2 Construction and analysis of physics tests and examinations, techniques in presentation of physics topics, and related problems. Prereq: Consent of instructor. Required of MACT candidates.

5990 Seminars (1-3) A. Mechanics; B. Radiation; c. Heat and Thermodynamics; d. Electricity and Magnetism; e. Modern Physics. May be repeated with consent of department. Maximum 27 hrs. E.

6000 Doctoral Research and Dissertation (3) E.

6110-20-30 Quantum Mechanics (3, 3, 3) Fundamentals principles of quantum mechanics and principal approximation methods. Applications to atomic, molecular, electronic and nuclear structure. Quantum electrodynamics. Prereq: 4130 or 5210; 5310-20-30 or 5410-20-30. Whenever of latter sections are added, prerequisite is considered corequisite. F, W, Sp.


6320 Special Relativity (3) Lorentz transformation; Einstein postulates; relativistic mechanics; Special Electromagnetic Theory. Prereq: 5310-20-30, 5410-20-30, 5610. F.

6330 General Relativity (3) Tensor calculus; general theory of relativity; gravitational field equations. Prereq: 5320. W.

6420 Advanced Topics in Classical Theory (3) To meet special needs of students. Possible topics: angular-momentum theory, beta-ray theory, theory of atomic spectra, molecular structure and valence theory, theory of radiation, electric and magnetic susceptibilities, high energy processes, scattering and collision processes, theory of fields. Prereq: 5410-20. F.

6493 Advanced Topics in Quantum Theory (3) To meet special needs of students. Possible topics: angular-momentum theory, beta-ray theory, theory of atomic spectra, molecular structure and valence theory, theory of radiation, electric and magnetic susceptibilities, high energy processes, scattering and collision processes, theory of fields. Prereq: 5410-20. May be repeated with consent of department.

6500-10 Electrical Conduction in Gases and Plasmas (3, 3) Electrical conduction in gases at high and low pressures. Characteristics of spark, arc and glow discharge. Collective phenomena in a plasma; plasma oscillation; magnetohydrodynamics; instabilities. Topics of current interest in astrophysics; geophysics and thermonuclear research. Prereq: 3710-20 and either 5410-20-30 or Electc Engineering 5310-20-30. (Same as Electrical Engineering 6500-10.) F, W.

6610 Interaction of Radiation with Gases (3) Interaction of electromagnetic radiation with atoms and molecules; oscillator strength, interaction of charged particles with atoms and molecules; ionization, transition and light emission. Electron interaction, transport and capture; electron swarm and electron beam experiments. Prereq or coreq: 6110-20. F.

6620 Interaction of Electrons with Solids (3) Collisions with free electrons; stopping power; electron slowing down spectra; energy straggling; nuclear scattering; electron diffusion; plasmon effects in irradiated solids; techniques in electron spectroscopy; applications to dosimetry. Prereq or coreq: 6110-20. F.

6630 Interaction of Radiation with Matter (3) Topics in atomic collision theory, Photo-electron interactions; electron-atom and electron-molecule collisions, dielectric theory, stopping power, collective excitations in electronic systems, Cherenkov radiation, electron transport in gases and solids. Prereq or coreq: 6110-20. W.

6710-20 Advanced Solid State Physics (3, 3) Lattice dynamics; phonons; Brillouin zones; heat capacity. Energy band structure of solids; cohesive energy, work functions. Prereq or coreq: 6110-20. F.

6720-20-30 Advanced Solid State Physics (3, 3) Lattice dynamics; phonons; Brillouin zones; heat capacity. Energy band structure of solids; cohesive energy, work functions. Prereq or coreq: 6110-20. F.
Political Science

MAJORS DEGREES
Political Science M.A. Ph.D.
Public Administration M.P.A.

Professors:
T. D. Ungs (Head), Ph.D. Iowa; R. S. Avery (Emeritus), Ph.D. Northwestern; D. H. Carlisle, Ph.D. North Carolina; L. S. Greene* (Emeritus), Ph.D. Wisconsin; C. R. Suedfeld, Ph.D. Chicago; D. D. Nimmo, Ph.D. Vanderbilt; H. Flase, Ph.D. Utah; N. M. Robinson, Ph.D. Syracuse; O. G. Stephenson, Ph.D. Johns Hopkins; D. M. Welborn, Ph.D. Texas.

Associate Professors:
R. B. Cunningham, Ph.D. Indiana; J. Dodd, Ph.D. Tulane; E. Evans, Ph.D. Columbia; A. H. Hopkins, Ph.D. Syracuse; W. Lyons, Ph.D. Oklahoma; L. L. Peterson, Ph.D. Yale; T. McN. Simpson, Ph.D. Johns Hopkins; T. A. Smith, Ph.D. Ohio State.

Assistant Professors:

Registration in any courses in the 5000-6000 series may be repeated for credit with consent of the department.

THE BUREAU OF PUBLIC ADMINISTRATION

The University maintains in the College of Liberal Arts a Bureau of Public Administration for the purpose of promoting sound governmental administration through research, publication, and consultation. The staff is as follows: Professor Ungs (director), Professor Fitzgerald (associate director), and Professors Freeman and Oleslaski (assistant professors).

THE MASTER'S PROGRAM

See general requirements on page 18.

MASTERS IN PUBLIC ADMINISTRATION

Specific requirements for graduation include:
1. The completion of 54 quarter hours of approved graduate courses.
2. At least fifty percent of the credit hours must be in approved courses numbered 5000 and above.
3. Demonstration of command of the material covered in course work through a written comprehensive examination which may be followed by an oral examination.
4. The 54 quarter hours of graduate courses comprise 30 quarter hours of core courses which focus upon general perspectives, analytical skills, and management skills, a recommended internship arranged with a cooperating public agency (9 quarter hours), and 15 quarter hours in an elective specialized track developed by the student with the approval of the coordinator of the M.P.A. Program. The specialized track will often contain a mix of courses from political science and one or more outside fields; examples include general government, public health administration, fiscal administration, social services administration, administration of criminal justice, urban administration, environmental and natural resources administration.
5. Inquiries concerning all programs should be directed to the Department of Political Science, Knoxville, Tennessee 37916.

THE DOCTORAL PROGRAM

Specific requirements for the degree of Doctor of Philosophy in Political Science include:
1. A minimum of 117 quarter hours, following the Bachelor's degree, is required. At least 93 hours shall be in political science. At least 72 hours in political science shall be graduate level hours (i.e. earned in 5000- or 6000-level courses). At least 45 of these graduate level hours shall be at the 6000 level. This figure includes 36 hours of credit for the dissertation.
2. Each Ph.D. candidate must pass an examination in a foreign language. Students specializing in some areas may be required to demonstrate knowledge of a second language or appropriate research tools or both.
3. Admission to candidacy shall be based on a written and oral comprehensive examination which must be passed not later than three quarters before the date on which the degree is granted.
4. The candidate must pass a final oral examination on the dissertation.
5. Successful completion of the degree also depends on course performance and other evidence of professional interest and conduct.

3545 United States Constitutional Law: Sources of Power and Restraint (4) Analysis of judicial review, constitutional powers of President and Congress, federalism, sources of regulatory authority, and constitutional protection of political rights. Recommended prerequisite: 2510-20. F, W


3555 Minority Group Politics in the United States (4) Content varies from quarter to quarter. May be repeated with consent of department. Maximum 8 hrs. W

3556 Introduction to Public Administrative Organization and Management (4) Organization and decision-making theory, line and staff services, politics of organization, leadership, personnel and fiscal management, administrative responsibility. Recommended prerequisite: 2510-20. F, W, Sp


3605 Political Change in Developing Areas (4) Characteristics and problems of political changes with primary focus on developing areas. F, Sp

3615-16 Dynamics of Black African Politics (4, 4) F, W

3621 Contemporary China and Japan (4)

3622 Contemporary South and Southeast Asian States (4) Analysis of selected states, with emphasis on problems of development.

3625-26 Latin American Government and Politics (4, 4) F, W

3627 Government and Politics of the Soviet Union (4, 4) F, W

3635-36 Politics in Western Democracies (4, 4) Political culture, patterns, and institutions of Western democratic systems. F, Sp, A; W

3641 Government and Politics of Middle East and North Africa (4)

3710 State Politics (4) Focus on formal and informal setting of state government; governors, courts, legislatures, and state administrators. Attention will be paid to state government's role in formulating, enacting, and implementing state policy. F

3720 State Government and Policy Making (4) Nature and functions of the institutions of state government: governors, courts, legislatures, and state administrators. Attention will be paid to state government's role in formulating, enacting, and implementing state policy. W

3750 The Urban Policy (4) Analysis of political institutions and processes in metropolitan areas. W

3760 Urban Policy Process (4) Analysis of urban problems and policies in metropolitan areas. Sp

3796 Contemporary Problems of Soviet Foreign Policy (4) Sp

3801 Studies in Ancient Political Thought (4) Classical Greek and Roman political thought. F

3802 Studies in Medieval Political Thought (4) From Augustine to Luther; emphasis on problems and theories of religion and politics. W or Sp

3803 Studies in Early Modern Political Thought (4) Machiavelli through the Enlightenment. W

3804 Studies in Nineteenth- and Twentieth-century Political Thought (4) Political theories of industrial and technological societies; nineteenth and twentieth century. Sp

3880 American Political Thought (4) Examination of role of selected political ideas, doctrines, and thinkers in America, emphasizing their development and relationships to diverse political interests. F

4060 Revolution (4) Characteristics, theories, and consequences of revolution, with particular focus on left-wing revolutions and movements. Sp

4410 Law and the Administrative Process (4) Principles, procedures, of controls over administrators. Sp

4535-36 Political Attitudes, Opinions and Communication (4, 4) Nature, development, formation and distribution of politically relevant attitudes and opinions; role of leadership, persuasion, and communication in opinion-policy process. F, W


4545-46 The Judicial Process (4, 4) The study of courts as components of political systems, and public policy formulation through judicial decision making. Recommended prerequisite: 2510-20. Sp; W

4550 Congress (4) Nature, functions, and processes of U.S. Congress. Sp

4575 Special Topics in United States Government and Politics (4) May be repeated with consent of department. Maximum 8 hrs.

4610 Budgetary Process (4) Fiscal planning, budget and expenditure processes in government, their policy and administrative implications. W or Sp

4620 Public Personnel Administration (4) Development of the merit system in government, career systems, public personnel management functions, organization for personnel management. For W
Assistant Professors:

N. W. Dye, Ph.D., Tennessee; S. Friedlander, Ph.D., Georgia State; J. A. Jones, Ph.D., Nebraska; K. R. Lounsbury, Ph.D., Michigan State; M. A. Wood-Pentz, Ph.D., Syracuse.

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 37916.

THE PSYCHOLOGICAL CLINIC

The Psychological Clinic supports graduate training in clinical psychology. Psychological diagnosis and psychotherapy are offered on an outpatient basis, with medical consultants, to the general public as well as to University students, on referral by a physician.

3720 Ethology and Sociobiology (3) Evolutionary approach to behavior with special reference to controversial issues in application to psychology, social sciences, and biology.

4107 Experience in Individualized Instruction (1-6) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. E

4120 Topics in Social Psychology (4) Intensive 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 audition and vision. Prereq: 3150. Recommended: 3250. 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 process 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 sign and symbols; directed and associative thinking; memory, problem solving, and concept formation: nature, use, and development of language. Prereq: 3210 or consent of instructor. F

4660 The Psychology of Language (4) Theories and descriptions of phonology, syntax, and semantics as applied to psychology and related disciplines. Recommended: 4650 or linguistics background.

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

4710 Physiological Psychology Laboratory (4) Laboratory study 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 Women (4) Study of interaction of cultural and biological factors in determining the behavior of women, with emphasis on physiological mechanisms involved. Sp

4880 Afro-American Psychology (4) Review and analysis of psychological literature on Afro-Americans. Prereq: Consent of Instructor. (Same as Black Studies 4880.)

5000 Thesis (1-15) E

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

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 students in experimental, physiological, and comparative psychology. May be repeated. Maximum 9 hrs. S/NC only.

5050 Methods of Research in Applied Psychology (3) Techniques and principles for designing and conducting psychological research in natural settings.

5070 Seminar in College Teaching (2) Concepts, methods, and materials in introduction of psychology at college level. Emphasis on research. Required of all Ph.D. candidates. S/NC only.

5079 Practicum in College Teaching (2) Supervised participation in college teaching. S/NC only.

5100 Developmental Psychology (3) Prereq: 3550 or Educational Psychology 2430. (Same as Educational Psychology 5100.)

5105 Developmental Assessment (3) Techniques and methods of 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 decision. Intended for graduate students in clinical psychology, social work, and community and mental health professions. Prereq: Consent of instructor.

5111 Seminar in Current Issues in School Psychology (3) Historical, legal, and technological issues in practice of school psychology. Multiple instructors. (Same as Educational Psychology 5111-12-13.) S/NC only. F

5140-50-60 Psychoedulcational 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


5170-80-90 Practicum 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 6 hrs.

5300 Readings and Special Problems in Psychology (1-6) May be repeated. Maximum 20 hrs. S/NC only. E

5319 Field Work in School Psychology: Level I (2) Supervised on-the-job training in school psychology. Limited to students admitted to doctoral program in school psychology who are assigned to program approved field settings. Prereq: 5140-50-60 or equivalent. May be repeated. Maximum 6 hrs. (Same as Educational Psychology 5319.) S/NC only. F, W, Sp

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 (teachers, supervisors, etc.). Includes topics of economics and strategies for self-control.

5340 Group Dynamics (3) (Same as Educational Psychology 5340.)

5350-50-70 Seminar in Psychology (3, 3, 3) May be repeated. Maximum 18 hrs.

5400 Psychophysics and Scaling Methods (3) Prereq: One course in statistics.


5450 Human Problems in Administration (3) (Same as Management 5250.)

5490 Continuing Education in Mental Health (1-4) Topics of interest to persons in mental health and allied fields. Workshop, seminar, or lecture: topic and format to be announced. Prereq: Graduate standing or consent of instructor. May be repeated. Maximum 9 hrs.

5500 Fundamentals of Psychometrics (4) Basic ideas and orientation in psychometrics. All graduate students who plan to take one or more courses in psychometrics required to take course. Prereq or coreq: 4640.

5510 Instrumentation for Psychological Research (3)

5520 Theory of Mental Measurement (3) Reliability, validity, scaling and equating, norms, combining tests into batteries. Prereq: 1 qtr of graduate-level statistics and 5500 or consent of instructor.

5530 Issues in Applied Psychological Measurement (3) Applications of measurement in community and organizational research. Prereq: Statistics 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, differential psychology, comparison of different populations in specific psychological parameters, introduction to use and testing of psychological hypotheses in human and animal behavior; reliability theory and regression theory. Prereq: 1 qtr calculus or consent of instructor.
5550 Advanced Social Psychology (3) Interaction between individual and group, theories of group behavior. Prereq: 3120. May be used for credit in sociology.

5560 Seminar in Social Psychology (3) Prereq: 5550. May be used for credit in sociology. May be repeated. Maximum 9 hrs.

5580 Theories of Personality (3)

5581-82-83 Clinical Psychology I: Human Development and Personality (2, 2, 2) First quarter core of doctoral program in clinical psychology. Students take 3-2-2 hours concurrently, each covering content area from one to three major contemporary points of view. F

5589 Psychological Techniques Laboratory (2) Basic techniques of psychological appraisal. Restricted to doctoral students in clinical psychology.

5591-92-93 Clinical Psychology II: Patterns of Adaptation (2, 2, 2) Second quarter core of doctoral program in clinical psychology. Students take 3-2-2 hours concurrently, each covering content area from one of three major contemporary points of view. W

5601-02-03 Clinical Psychology I: Behavioral Deviance and Psychopathology (2, 2, 2) Third quarter core of the doctoral program in clinical psychology. Clinical Psychology. May be repeated. Maximum 9 hrs. (Same as Educational Psychology 5890.)

5630 Ethics in Professional Psychology (2) Review of ethical concerns in professional psychology. Multiple instructors. Meets 3 hrs per week. Sp

5670 Forensic Psychology (2) Psychologist's role in relation to law, including questions concerning licensing 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; basis 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. Offered in alternate years. Sp, A

5702 Community Psychology (3) Psychological aspects of research, evaluation, intervention, and planning in communities. Community ecology, systems research, community training, secondary prevention, planning of social systems, and relevance of federal policies. Prereq: Consent of instructor.

5713 Learning Modules for Techniques in Professional Psychology (3) Each course is designed to teach skills in assessment, technology, child, and family therapy. Prereq: 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 psychology and the study of psychology.

5760 General Vertebrate Neuroanatomy (3) Lecture and laboratory dealing with structure and function of central and peripheral nervous system. Prereq: 4710, 4719, or consent of instructor. (Same as Zoology 5760.)

5789 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.)


5859-60-79 Practicum in Psychological Appraisals (2, 2, 2) Ordinarily to be taken concurrently with 5589-60.

5890 Counseling Theories and Techniques (3) (Same as Educational Psychology 5890.)

5950-60 Theory and Practice of Consultation (3) Issues in consultation, models of consulting process, and evaluation of consulting techniques. Must be taken in sequence. Coreq: 5959-60 and consent of instructor. (Same as Educational Psychology 5950-60.) W; Sp

5959-69 Practicum in Psychological Appraisal (2, 2) Coreq: 5950-60-70. Prereq: Consent of instructor. Must be taken in sequence. (Same as Educational Psychology 5959-69.) S/NC only. W; Sp

6000 Doctoral Research and Dissertation (3-15) E

6050 Seminar on Methods of Social Research (3) (Same as Sociology 6050.)

6089 Internship in Community Psychology I (3-6) Supervised employment at departmentally approved internship sites. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. S/NC only.

6099 Internship in School Psychology I (3-6) Supervised employment at departmentally approved internship sites. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs. S/NC only.

6160 Seminar in Community Psychology (3) Evaluation, research, intervention, and systems for delivery of services in communities. Prereq: 5702

6161 Seminar in Program Evaluation (3) Techniques for designing and conducting research to evaluate effectiveness of programs. Prereq: Statistics 5000-60-70 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: 6160 and consent of instructor.

6210-20-30 History, Systems, and Theories in Psychology (3, 3, 3) Prereq: M.A. in psychology or equivalent. Must be taken in sequence.

6260-60-70 Seminar in Industrial and Organizational Psychology (3, 3, 3) (Same as Management 6250-60-70.)

6280-90 Factor Analysis (3, 3) Factor analysis; component analysis; introduction to latent structure analysis. Prereq: 4640 and 5500.

6310 Seminar In Motivation and Emotion (3)

6319 Field Work in School Psychology: Level I (2) Supervised on-the-job training in school psychology. Required of students fully admitted to doctoral program in School Psychology assigned to program approved field settings. Prereq: 5950-60. May be repeated. Maximum 6 hrs. (Same as Educational Psychology 6319.) S/NC only. F, W, Sp

6320 Seminar In Research Methods (3)

6320 Seminar In Learning (3)

6340 Seminar in Developmental Psychology (3)

6350 Seminar In Thinking (3)

6360 Seminar In Sensation and Perception (3)

6370 Seminar In Theoretical Psychology (3)

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

6385 Hypnosis and Imagination (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, psychotherapy, 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 research on methods of evaluating the status of individuals seeking clinical aid.

6400 Seminar on Changing Concepts in Clinical Psychology (3) New field in relation to their impact on experimentation and systems of thought. Prereq: M.A. in psychology or equivalent.

6450 Seminar in Psychopathology (3) Prereq: Consent of instructor.


6411-12-13-14 Psychotherapy: Elective Concentration Learning Laboratory (2, 2, 2) Typically four psychotherapy concentration areas offered each quarter. Clinical students in core psychotherapy sequence must elect at least one of these in each quarter of sequence. May be repeated. Limited to clinical psychology students enrolled in core psychotherapy sequence or consent of instructor.


6450-60 Advanced Psychometrics (3, 3) Construction and standardization of psychological tests, questionnaires, and rating scales, theory of errors or measurements; item analysis, scaling, equating, and norms development. Prereq: 4650, 5440, and 5560. May be repeated. Maximum 9 hrs.

6491 Continuing Education in Professional Mental Health (1-4) Topics of interest to persons in mental health and allied fields. Workload, 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.

6491-2-3 Field Placement in Clinical Psychology (2, 3, 4, 1-8, 1-8, 1-8) Supervised clinical experience. Required of and limited to students fully admitted to Ph.D. program in Clinical Psychology. May be repeated. Maximum 8 hrs per course. S/NC only. W, Sp; F

6500 Seminar in Psychometrics (3) Seminar for advanced graduate students in psychometrics or quantitative psychology, to deal with advanced theories, methodologies, and their applications. Prereq: 4640, 5500 or equivalent, and consent of instructor. May be repeated. Maximum 9 hrs.

6550 Seminar in Advanced Social Psychology (3)

6555 Seminar in Mental Health Administration (3) Theory and problems in organization and management of mental health administration.

6702 Social Ecology (3) Seminar on current topics: ecological psychology, quality-of-life, social impact assessment, and environmental classification. Prereq: Consent of instructor.

6710 Seminar in Physiological Psychology (3)

6720 Seminar in Comparative and Ethological Psychology (3)

6730 Methods of Ethological and Naturalistic Research (3) Current laboratory and field techniques. Prereq: 4729, 5750, 6720, or consent of instructor.

6780 Advanced Psycholinguistics (3) Language from psychological and associated points of view, methodological and theoretical problems.

6800 Field Work in Industrial and Organizational Psychology (1-15) (Same as Management 6800.)

Note: Psychology 5300, 6310-400, 6419-29-39, 6710-20-30, and 6900 may be repeated for credit with the approval of the department.
Radiation Biology (Interdepartmental)

5000 Thesis (1-15) E

5300 Graduate Research Participation (3-9) May be repeated. Maximum 12 hrs. E

5610-20 Foundations of Radiation Biology (4, 4) (Same as Zoology 5610-20.)

5780 Radiation Physiology (4) (Same as Zoology 5780.)

6000 Doctoral Research and Dissertation (3-15) E

6910 Seminar in Radiation Biology (2) (Same as Zoology 6910.)

Religious Studies

Professors:
C. H. Reynolds (Head), Ph.D. Harvard; D. L. Dun-gan, Th.D. Harvard; W. L. Humphreys, Ph.D. Union; D. E. Ling, Ph.D. Vanderbilt; F. S. Lueby, B.D. Col-gege Rochester; R. V. Norman, Jr., Ph.D. Yale.

Assistant Professors:
R. R. Ears, Ph.D. Vanderbilt; J. L. Fitzgerald, Ph.D. Chicago; J. Kim, Ph.D. Chicago.

An M.A. in Philosophy with a concentration in religious studies is available for graduate work in this related field. Details of this program are available in the office of either department. Graduate courses in religious studies further provide opportunity for students in a variety of disciplines to pursue work in religious studies as a graduate concentration.

3060-70-80 History of Western Religious Thought and Institutions (3, 3, 3) 3060 — First Century to Fifth Century 3070 — Sixth Century to Fifteenth Century 3080 — Sixteenth Century to 1900. (Same as History 3060-70-80.) A

3210 Early Greek Mythology (3) (Same as Classics 3210.) W

3220 Early Greek Mythology in the Classical Period (3) (Same as Classics 3220.) W

3230 Roman Mythology (3) (Same as Classics 3230.) Sp

3270 Russian Philosophical and Theological Thought (4) (Same as Philosophy 3270 and Russian 3270.)

3411-12 The Reformation (3, 3) (Same as History 3411-12)

3440 Religion of Primitive Peoples (3) (Same as Anthropology 3440).

3650 Philosophy and Religion in India (4) (Same as Philosophy 3650.) F

3660 Buddhist Philosophy and Religion (4) (Same as Philosophy 3660.) W

3671 Religion and Philosophy in China (4) (Same as Philosophy 3671.)

3690 Philosophy of Religion (4) (Same as Philosophy 3690.)

4111-21 Modern Religious Philosophies (4, 4) Examination of the religious implications of major thinkers and movements. 4111—Nicolas of Cusa to Hume. 4121—Kant and the nineteenth century. Prereq: 9 hrs of philosophy other than logic. (Same as Philosophy 4111-12.)

4200 Classical Indian Systems of Philosophy: The Moksha Tradition (4) Basic writings and philosophic problems of the traditions of Samkhya, Yoga, and Vedanta. Prereq: 3650 or 3660. (Same as Philoso-phy 4200.)

4210 Topics in Ancient Israelite and Ancient Near Eastern Religions (4) Prereq: 3110-20, or consent of instructor. May be repeated. Maximum 8 hrs.

4310 Jesus and Paul Compared (4) Jesus' teaching and activity in the context of first-century Palestine Judaism; analysis of what the Apostle Paul made of the tradition of and about Jesus. Recommended prereq: 2610 or 2611.

4370 Theoretical Issues in Medical Ethics (4) (Same as Philosophy 4370.)

4410 American Religious Thought (4) Select figures, movements and problems in American religious thought from colonial period to present.

4450 Topics in American Religion (4) Prereq: One of the following: 3510, 3520, 4410, or consent of instructor. May be repeated. Maximum 6 hrs.

4540 Social and Religious Change (4) (Same as Sociology 4540.)

4610 Topics in Western Religious Thought and Institutions (4) Select figures, issues, and institutions. Seniors and graduate students only, except by consent of department. Prereq: 3060-70-80. May be repeated. Maximum 12 hrs.

4640 Topics in Early Christianity and Hellenistic Religious Thought (4) Select figures, issues, and institutions. Seniors and graduate students only, except by consent of department. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

4670 Topics in Eastern Religions (4) Select figures, issues, and institutions. Seniors and graduate students only, except by consent of department. Prereq: 3650-60-71-72. May be repeated. Maximum 12 hrs.

4810-20-30 Readings and Research in Religious Studies (3-4, 3-4, 3-4)

4840 Readings in Selected Languages Related to Religious Studies (3-4) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

4840 Sociology of Religion (4) (Same as Sociology 4490.)

4950 Theory of Religion (4) Students for construction of a theory of religion drawing on resources from fields of psychohistory, sociological psychology, sociology of religion, cultural anthropology, theology and com-parative religion. Senior or instructor. May be repeated. Maximum 8 hrs. (Same as Sociology 4960.)

4960 Tradition, Change and Modernity in Asia (4) Comparative study of processes of religious and social change seen in historical context in Asian societies. Comparative focus will vary each year (e.g., China and Japan, India and South Asia). May be repeated. Maximum 8 hrs. (Same as Sociology 4960.)

5101 Foreign Study (1-12) See page 97.

5102 Off-campus Study (1-12) See page 97.

5103 Independent Study (1-12) See page 97.

5310-20 Topics in Religion and Society (4, 4)

5355 Orientation to Medical Ethics (2) (Same as Philosophy 5355.)

5510-20 Topics in the History of Religion (4, 4)

5710-20 Topics in Religious Thought (4, 4)

Roman and Greek Philology

MAJORS DEGREES

French M.A. M.A., Ph.D.

Spanish M.A., Ph.D.

Professors:

Associate Professors:
W. H. Heftin (Head), Ph.D. Florida State; W. F. Byers (Emeritus), Ph.D. Wisconsin; R. M. DeRycke, Ph.D. Illinois; K. D. Levy, Ph.D. Kentucky; C. Pinsky, Ph.D. California (Berkeley); Y. M. Wasihburn, Ph.D. North Carolina.

Assistant Professors:
A. S. Allen, Ph.D. California (Berkeley); T. R. Arrington, Ph.D. Kentucky; E. C. Copenhaver, Ph.D. Yale; D. M. DiPuccio, Ph.D. Kansas; M. H. Handelsman, Ph.D. Florida; B. S. West, Ph.D. North Carolina.

The Department of Romance Languages offers two advanced degrees: the Master of Arts (M.A.) in French and Spanish; and the Doctor of Philosophy (Ph.D.) in Spanish.

THE MASTER OF ARTS PROGRAM

The student may select either Plan A or B:

Plan A

1. Completion of a minimum of 36 quarter hours of which 24 must be taken in courses numbered above 5000, including 5011 (French or Spanish, as appropriate).
3. A written examination covering the course work and selected items from a master reading list.
4. A final oral examination covering the thesis.

Plan B

1. Completion of 45 quarter credits of which 33 must be in courses beyond 5000, including 5011 (French or Spanish, as appropriate).
2. Three term papers that have been accepted as satisfactory by the Advisory Committee.
3. A written examination covering the course work and selected items from a master reading list.

THE DOCTORAL PROGRAM

Residence and Course Work:

Completion of at least three consecutive quarters of full-time residence, a minimum of 81 credit hours in course work beyond the Bachelor's degree or its equivalent, and a dissertation (36 credit hours).

No less than 54 quarter hours should be taken in courses pertaining to the student's major field; of these a minimum of 18 hours are to be taken in courses above 6000, a maximum of 12 hours may be taken in courses of the 4000 level and the rest in courses above 5000. All students must complete the series in methods of research (5151-61-71) for a total of 3 credits. The minor shall consist of at least 18 hours of which at least 12 hours must be numbered above 5000 and the rest above 4000, and should represent a meaningful supplement 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 proficiency 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, Latin, Greek, 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 pages 19-20.

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 and writing skills in 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 Translation (3, 3, 3) Translation into English; 4002—Consecutive translation to and from English; 4003—Simultaneous translation. Training of students with intermediate or advanced knowledge of French for consecutive and simultaneous oral translation from French into English, and vice versa on a variety of practical subjects such as business, economics, politics, and sciences. Given mainly in language lab with additional classroom supervision by instructor. Prereq: 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

4110-30-30 French Literature of the Seventeenth Century (3, 3, 3) Prereq: Intermediate French or equivalent. A

4150 Théatrical French (1-3) Performance in one or more French plays. Prereq: Intermediate French or equivalent and consent of instructor. May be repeated with consent of department. A

4160-70-80 Advanced Conversation (2, 2, 2) Intensive training in prepared and spontaneous conversations. Subjects range from travel and current events to literature and aspects of national culture. Prereq: Completion of 9 hrs of courses on 3000 level. F; W; Sp

4210 Phonetics (3) Prereq: 2130, 2520, or equivalent. F; W; Sp

4220-30 Advanced Grammar (3, 3) Prereq: 2130, 2520, or equivalent. W; Sp

4250 Introduction to Descriptive Linguistics (3) Phonetics and phonemics, morphology and syntax. Types of languages, linguistic groups, dialects and dialect geography. Application of descriptive linguistics—field linguistics, dialect study; its practical use in learning languages and in language teaching; introduction to transformational grammar. Prereq: 9 hrs of upper division English or 9 hrs of upper division courses in a modern or ancient language of German and French 3010-20-30, courses in literature, in translation, and general courses in Latin and Greek requiring no knowledge of these languages), or consent of department. (Same as German, Russian, Spanish and Linguistics 4250.) F

4280 Introduction to Historical and Comparative Linguistics (3) Same as German, Russian, Spanish and Linguistics 4280.) 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) Prereq: Intermediate French or equivalent. A

4520-60-70 Medieval French Literature (3, 3, 3) Medieval works in modern French texts. Prereq: Intermediate French or equivalent. A

4510-20-30 French Civilization (3, 3, 3) Prereq: Intermediate French or equivalent. A

4501-20-30 French Literature of the Nineteenth Century (3, 3, 3) Prereq: Intermediate French or equivalent. A

4640-50-60 French Literature of the Sixteenth Century (3, 3, 3) Prereq: Intermediate French or equivalent.A

4710-20-30 French Literature of the Twentieth Century (3, 3, 3) Prereq: Intermediate French or equivalent. A

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/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 97. E

5102 Off-campus Study (1-12) See page 97. E

5103 Independent Study (1-12) See page 97. E

5100-30-30 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. A

5151-61-71 Bibliography and Methods of Research (1, 1, 1) (Same as Italian and Spanish 5151-61-71) S/NC only. A

5210-30-30 French Literature of the Sixteenth Century (3, 3, 3) A


5241 French Theatre of the 18th and 19th Centuries(5,8),(995,993) (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 (3, 3, 3) 5450—German and English Influences on French Romanticism and generation of the poets of "le mal du siècle." 5450—Victor Hugo; the Parnassians. A

5470 Baudelaire and the Symbolists (3) Les Fleurs du mal and Petits poèmes en prose with emphasis on theories of color and "correspondances" and their influence on Symbolist school. A

5501-20-30 Trends in Contemporary French Literature (3, 3, 3) A

5560-60 Advanced Syntax and Stylistics (3, 3) Readings and written imitations of modern literary styles in form of compositions, sketches, and original stories. A

5670 Problems in Romance Linguistics (3) Topics vary. May be repeated with consent of department. Prereq: 4270 or equivalent. (Same as Spanish 5670.) A

5710-20-30 Seminar in French Literature (3, 3, 3) Topics vary. May be repeated with consent of department. Su

5910 Literary Criticism: The Foundations of Romance Criticism (3) (Same as Spanish 5910.) A

Italian
3210-20-30 Civilization and Culture (3, 3, 3) Prereq: Intermediate Italian or equivalent. Recommended for literature majors. F; W

4010-20 Italian Drama in English Translation (3-4, 3-4, 3-4) 4010—La commedia dell'arte and major works of Machiavelli, Metastasio, Alfieri, Goldini. 4020 Twentieth-century theatre; operatic drama, the Grottesco, Pirandello, D'Annunzio, Croce, Moravia. No change in credit hours after add deadline. Option of 4 hrs credit must present appropriate amount of extra work above that required for 3 hrs. A

4510-60 20 Dante and Medieval Culture (3, 3, 3) Readings and lectures in English for students majoring or minorin in other departments. Readings, reports, and term papers in Italian for students majoring or minorin in Italian. (Same as Comparative Literature 4505-60-70.) A

4220 Petrarch (3) Prereq: 3130, 3520 or equivalent. A

4230 Boccaccio (3) Prereq: 3130, 3520 or equivalent. A

4330 History of Italian Language (3) Prereq: 3130, 3520 or equivalent. A

4410-20-30 Literature of the Rinasimento (3, 3, 3) From Pucil to Tasso, the Quattrocento and the Cinquecento. Prereq: 3130, 3520 or equivalent. A

4530 The Modern Novel (3) Prereq: Intermediate Italian or equivalent. A

4540 The Modern Theatre (3) Prereq: Intermediate Italian or equivalent. A

4610 Contemporary Theatre (3) Prereq: Intermediate Italian or equivalent. A

4620 Contemporary Poetry (3) Prereq: Intermediate Italian or equivalent. A

4630 Contemporary Prose (3) Prereq: Intermediate Italian or equivalent. A

4760 Italian Folklore (3) Folk arts, music, traditions, rituals and lore of Italy from Middle Ages to present. (Same as Anthropology 4760.)

5011 Techniques in Literary Analysis (2) Intensive course in explication de texte. A

5101 Foreign Study (1-12) See page 97. E

5102 Off-campus Study (1-12) See page 97. E

5103 Independent Study (1-12) See page 97. E

5151-61-71 Bibliography and Methods of Research (1, 1, 1) (Same as French and Spanish 5151-61-71) S/NC only. A

5910-20-30 Readings in Italian Literature (3, 3, 3) Topics vary and may be repeated with consent of department. A
5710-20-30 Seminar in Italian Literature (3, 3, 3)
Topics vary and may be repeated with consent of department.

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 97. E
5102 Off-campus Study (1-12) See page 97. E
5103 Independent Study (1-12) See page 97. E

Spanish
4030 Masterpieces of Spanish Literature in English Translation (3) No foreign language credit. A
4059-70 Hispano-Arabic Literature and Culture (3, 3, 3) A
4110-20-30 Spanish Literature of the Golden Age (3, 3, 3) A
The picaresque novel: Cervantes; the Comedia. A
4160-70-80 Advanced Conversation (2, 2, 2) Intensive training in preparing and spontaneous conversations. Subject exchange 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 (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.)
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 equivalent. F
4420-30 Latin American Civilization (3, 3) Prereq: Intermediate Spanish or equivalent. W; Sp
4450-70 Studies in Modern Spanish Style (3, 3) Prereq: 2130-30 or consent of instructor. A
4510 Special Topics in Nineteenth Century Spanish Literature (3) Prose, poetry and theatre of Spain in the nineteenth century. Genre, movement, or combination of several literary aspects. Prereq: Intermediate 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, 3) 4710—Non-dramatic prose fiction. 4720—Drama. 4730—Lyric poetry. Prereq: Intermediate Spanish or equivalent. A
4810-20-30 Topical Survey of Spanish American Literature (3, 3, 3) 4810—Prose fiction: major examples of the short story and novel. 4820—Poetry: landmark figures of past and present. 4830—Drama and essay: the modern period. A
5000 Thesis (1-15) E
5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. F; Sp
511 Techniques in Literary Analysis (3) Required for either Plan A or Plan B of M.A. program. An intensive course in explication de texte. F
5070-80-90 Hispano-Arabic Literature and Culture (3, 3, 3) 5070—General culture history, philosopy in Arab Spain. 5080—Development of traditional marketplace story, or epicodic prose narrative, into modern novel of character after invention of printing. 5090—Mutual influence of traditional Arabic poetry and popular and native Spanish choral lyric; development of classical(nowaitahal, the colloquial, rajal, and the literary miniatures). 5091—Spanish and Spanish. (Same as Arabic 5070-80-90.) A
5101 Foreign Study (1-12) See page 97. E
5102 Off-campus Study (1-12) See page 97. E
5103 Independent Study (1-12) See page 97. 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 assimilating literary 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 Methodology of Research (1, 1, 1) (Same as French and Italian 5151-61-71). F; Sp
5211-21 Don Quixote (3, 3) Must be taken in sequence. A
5212-32 Golden Age Prose (3, 3) 5212—La Celestina; critical study of Fernando de Rojas' life and work. Celestinaeque: Feliciano de Silva's Seguidillas de calafia. 5230—Guzman de Alfaro and Spanish picaresque genre. A
5250-60 The Generation of '98 (3, 3) Angel Gaviot, Giner de los Rios, Baroja, Unamuno, Valle Inclan, Benavente, Azorin, Perez de Ayala. A
5270 The Contemporary Novel (3) Civil War and post-Civil War period. A
5310-20 Directed Readings (3, 3) E
5311-21 Special Topics in Spanish or Spanish American Literature (3, 3) May be repeated. A
5340 Problems in Hispanic Culture (3) Prevaling social, political, artistic, literary and ideological conditions and patterns of any area or period within Spanish or Latin American literature. May be repeated with consent of department. Maximum 6 hrs. A
5510 Special Topics in the Spanish Theatre after the Golden Age (3) Spanish theatre from eighteenth century to present. May be repeated with department approval. A
5550-60 The Golden Age Theatre (3, 3) Spanish theatre from eighteenth century to present. May be repeated with department approval. A
5551-60-71 Bibliography and Methods of Research (1, 1, 1) (Same as French and Italian 5151-61-71). F; Sp
5610 Spanish American Prose to 1900 (3) Novel, chronicle, essay. A
5611-21 Spanish American Lyric Poetry (3, 3) A
5620-30 The Modern Novel in Spanish America (3, 3) A
5631 Spanish American Essay (3) A
5632 The Spanish American Short Story (3) Short story as major literary genre in Spanish America. Reading and criticism of works of authors such as Dario, Quiroga, Borges, Arreola, and Rufio. A
5633 Twentieth-century Latin American Theatre and Film (3) Readings from works of Carlos, Solorzano, Rodolfo Usigli, Conrado Nale Roxlo, Roberto Ross, 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
5640 Latin American Women Writers (3) Feminine point of view, modern image of woman, malefemale relationship in a context for woman's destiny. Readings from poetry and fiction, including such authors as Alfonso Storni, Delmira Agustini, Gabriela Mistral, Silvina Bullrich, Silvina Ocampo and Rosario Castellanos. A
5650-60 Advanced Syntax and Stylistics (3, 3) Readings and written imitations of modern literary styles in compositions, sketches, and original stor-}

Russian
See German

Sociology
MAJOR DEGREES Sociology
M.A., M.A.T., Ph.D.
Professors: D. R. Ploch (Head), Ph.D. North Carolina; J. A. Black, Ph.D. Iowa, D. J. Champion, Ph.D. Purdue, L. Ebersole, Ph.D. Pennsylvania; N. Shover, Ph.D. Illinois; S. Wallace, Ph.D. Minneapolis.

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 18. 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 19. Additional specific requirements for the degree of Doctor 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.
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 not 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 pass an oral examination on the doctoral dissertation. The oral examination by 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 social origins and consequences of law and legal processes. Particular 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 factors and social structure; trends in fertility, mortality, population growth, migration, distribution, and composition; 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 sociological perspective on contemporary correctional programs, and provides overview of evaluative research in corrections.

4160 Theory of Attitudes and Values (4) Organization, functions and measurement of attitudes and values; application to attitude change; and relations to attitudes, values and behavior.

4310 Criminology (4)

4330 Urban Ecology (4) Examination of public, private, collective, and individual space. Classical school of ecology, its neoclassical revisers, social action theory, and cognitive symbolic ecology emphasized.

4410 Educational Sociology (3) (Same as Curriculum and Instruction 4410.)

4530 Community Organization (4) Structure; function; linkages; change and development and important community studies reviewed and discussed. Emphasis on sociological analysis, not on the implementation of change.

4540 Social and Religious Change (4) Critical review of historical and contemporary theories and methods employed in study of social change. Attention given to both macro and micro group change. (Same as Religious Studies 4540.) A

4560 Formal Organization (4) Analysis of bureaucratic structure, division of labor, delegation of authority, channeled communication under a system of rationality.

4820 American Minority Groups (4) Minority groups and social structure in American sociology. Analysis of intergroup relations with attention given to both past and present relationships of selected groups to broader society.

4930 Social Movements (4) Development, organization, and function of social movements; attention is given to the ideology, leadership and organization of political, religious and other types of social movements.

4940 Sociology of Religion (4) Interrelationship of society, culture, and religion. (Same as Religious Studies 4940.) A

4960 Tradition, Change and Modernity in Asia (4) (Same as Religious Studies 4960.)

5000 Thesis (1-15) E

5002 Non-Thesis Graduation Completion (3-15) Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. Maximum 6 hrs. S/NC only.

5010 Professional Seminar (1) Limited to sociology graduate students. May be repeated. Maximum 4 hrs. S/NC only. W, Sp

5040 Methodological Issues in Social Research (3)

5050 Seminar in Political Sociology (3) Political system from societal, organizational, and group perspectives.

5069-70 Special Social Investigation (3, 3) Directed readings and/or research projects. E

5125 Seminar in Environmental Sociology (3)

5200 Seminar in Collective Behavior and Social Movements (3)

5210 Social Theory (3) F

5220 Social Control (3)

5290 Seminar in Sociology of Medicine (3) May be repeated with different instructors. Maximum 6 hrs.

5251 Historical Demography (3) Family reconstitution, aggregate analysis, strategies for examining documents containing information on population. Research findings on historical patterns of change in fertility, mortality, migration and different types of family structure. A

5310 Seminar in Methods of Sociological Research (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 analysis of sociological data; assumptions underlying procedures; advantages, disadvantages, and special applications. Must be taken in sequence. F, W

5420-30 Social Theory (3, 3) W: Sp

5520 Crime, Law, and Social Control (3)

5530 Seminar in Community (3)

5550 Seminar on Community Power (3) Analysis of theories and methods used in studying social power in communities.

5560-70 Field Research in Deviance (3, 3)

5580 Sociology of Mental Disorders (3) Relationship between formal sociological models and substantive theories of mental illness. Historical development of theoretical conceptualizations. Interdependence of theory and therapeutic techniques. Epidemiology of mental disorders. Review of major studies.

5590 Social Differentiation and Stratification (3) Various sources of differentiation in society, their relation to conflict in society, and their relationship to class structure in society.

5610 Seminar in Occupations (3) Occupations and their relations to individual and society; technology and occupations; unequal rewards and occupations; social organization and occupations.

5620 Seminar in Occupations (3) Continuation from material in Sociology 5610; interface between occupations and settings in which they are performed.

5630 Seminar in Occupations (3) Research participation; directed projects on subjects developed in 5620. Prereq: Sociology 5620.

5640 Theories of Social Psychology (3) Current and classical theoretical perspectives in social psychology. May be used for credit in psychology.

5670 Social Organization (3) Structure and function of human groups, with special attention to voluntary associations and administrative organizations.

5720 Social Interaction (3) Critical assessment, through reading and actual research, of contemporary theoretical orientations to study of small groups. Research designed to test selected theoretical problems. May be repeated. Maximum 6 hrs.

5730 Seminar in Research Problems in Inter...
The Department of Speech and Theatre offers the Master of Arts degree in Speech and Theatre with area concentrations in speech communication and theatre and the Master of Fine Arts 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 Redactor 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 Director of Graduate Studies, Department of Speech and Theatre.

MAJOR 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 23 hours of which must be earned in courses numbered 5000 or above. Only 9 hours of thesis credit (Speech and Theatre 5000) may be included in the 45-hour minimum for the degree. Speech and Theatre 5110 is required of all M.A. students. Area concentration requirements are as follows:

**Speech Communication**

(1) Enrollment in Speech 4999 during each quarter of full-time graduate study.
(2) 12 hours in rhetorical and communication theory.
(3) 9 hours in public and interpersonal communication.
(4) 3 hours (not inclusive of Speech and Theatre 5110 and Speech 4999) in methods and materials in 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.

MASTER OF FINE ARTS DEGREE

CURRICULUM

At least 60 quarter hours, 30 of which must be at the 5000 level or above, are required for the Master of Fine Arts degree in Theatre. The number of hours each student will carry per quarter will vary with the student's concentration. The distribution of courses within the department may necessitate some students' accumulating more than 60 hours in order to earn the degree, but no student should require more than two years to finish the program. Ten to twelve hours of theatre history during the first year of residence are mandatory for all students unless appropriate undergraduate course work is evidenced. Theatre 5011-12-13 is required of all except acting students. Students will be admitted to the directing concentration only by petition after the first year of the acting/directing program is completed.

REQUIREMENTS FOR SECOND MASTER'S DEGREE

Students admitted to the MFA program who have already earned a Master's or a doctoral degree may apply up to 15 credit hours from the previous graduate program to the MFA degree, with approval of the student's committee, the Dean of the College of Liberal Arts, the Dean for Graduate Studies and/or the Vice Chancellor for Graduate Studies and Research. 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 (5 years) established for completion of the MFA degree.

**Speech**

4222 Advanced Argumentation and Debate (4)
Prereq: 2331 or consent of instructor. Sp

4461 Quantitative Research Methods in Speech Communication (4) Designing experiments; planning field studies; using statistical analysis.

4541 Rhetorical Theory and Criticism (4) Survey of Western rhetorical theory; contemporary approaches to criticism of public address. Recommended: 1211.

4560 Rhetoric of the Women's Rights Movement (4) Historical and critical study of public addresses in campaigns for women's rights from the 1830s to the 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 in 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 intrapersonal, interpersonal, and mass communication systems. F

5210 Topics in Group and Interpersonal Communication (3) May be repeated. Maximum 9 hrs. Sp

5220 Quantitative Projects in Speech Communication (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) Philosophy and methods of directing cocurricular and extracurricular forensic activities in high schools and colleges: competitive and noncompetitive approaches to directing debate, oral interpretation and public speaking events. (Same as Curriculum and Instruction 5911) Sp

**Speech and Theatre**

4170-80-90 Film History and Theory (3, 3, 3)
Analysis of cinematic forms and styles. 4170—Narration. 4180—Exposition and persuasion. 4190—Experimental forms; films and other media.
5000 Thesis (1-15) E
4640 Group Performances of Literature (4) Oral
4840 D, Ph.D.; R. Inman, Ph.D.; J. L. Bunting, Ph.D.; J. C. Carlson (Emeritus), Ph.D.; Pennsylvania; A. C. Cole, Jr. (Emeritus), Ph.D.; Ohio; J. C. Daniel, Jr.; Ph. D. Colorado; D. A. Elmer, Ph. D. Minnesota; R. C. Fraser, Ph.D. Minnesota; B. Hochman, Ph.D. California (Bemidji); J. C. Howell (Emeritus), Ph.D. Connecticut; K. W. Jeon, Ph.D.; A. W. Jones (Emeritus), Ph.D.; Iowa; J. N. Liles, Ph.D.; R. Kennedy, Ph.D. Iowa; J. N. Liles, Ph.D.; Ohio State; L. E. Roth, Ph.D. Chicago; C. A. Shivers, Ph.D. Michigan State; J. T. Tanner (Emeritus), Ph.D. Cornell, S. R. Tipton (Emeritus), Ph.D. Duke; H. G. Welch, Ph.D. Florida; G. L. Whitson, Ph.D. Iowa

5110 Introduction to Graduate Research in Speech and Theatre (3) F
4133 Special Problems in Acting (3, 3) Ad-
4134 special problems in basic technical theatre practice. Prereq: 2211-21, or consent of instructor. Must be taken in sequence. Graduate credit available to Theatre MFA students only.

5221-22 Introduction to Scene Design (4, 4) 5221—Problems in stage design with reference to space and form, movement, scale, and style; rudiments of rendering and groundplan preparation. 5222—Play interpretation through scenic means; setting as environment for dramatic action; rudiments of model-making. Must be taken in sequence. Graduate credit available to Theatre MFA students only.

5228-53 History of the Theatre (4, 4, 4) Drama in performance with particular emphasis on theatre architecture, scene design, and acting styles. 5229—Antiquity to the Renaissance. 5235—The European Theatre, 1650-1850. 3254—Modern Theatre. Graduate credit available to Theatre MFA students only.

5262-63 History of American Theatre (3, 3) Development of theatre as social institution in American life. 3262—from its beginnings to 1900. 3263—from 1900 to present. Graduate credit available to Theatre MFA students only.

5321-22 Introduction to Lighting Design (4, 4) Problems of lighting design, elementary theory and problems in basic lighting practice. Prereq: 2211-21 and consent of instructor. Must be taken in sequence. Graduate credit available to Theatre MFA students only.

5351-52 Dramatic Theory and Criticism (3, 3) W, Sp
5951-52 Playwriting (4, 4) Prereq: Consent of In-
structor. F; W
5011-12-13 Projects in Lieu of Thesis (3, 3, 3) Available to Theatre M.F.A. students only.

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
5620 Projects in Lighting Design (3) May be repeated. Maximum 9 hrs. E
5630 Projects in Play Directing (3) May be repeated. Maximum 9 hrs. E
5640 Projects in Scene Design (3) May be repeated. Maximum 9 hrs. E
5650 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
5660 Projects in Technical Theatre (3) Problems of set design, interpretation, and execution. E
5670-71-72-73-74-75 Master Class in Acting (5, 5, 5, 5, 5, 5) Available to Theatre M.F.A. students only.
5680-81-82 Design and Technical Theatre Seminar (1-6, 1-6, 1-6) Available to Theatre M.F.A. students only. May be repeated. Maximum 6 hrs.
5890 Studies in Theatrical Production (3) May be repeated. Maximum 9 hrs. Sp
5912 Play Production in Secondary Schools (4) Principles and methods for directing high school theatrical programs. (Same as Curriculum and Instruction 5912.) Su
5950-60-70 Studies in Dramatic Theory and Criti-
icism (3, 3, 3) F; W, Sp

Speech Pathology

See Audiology and Speech Pathology

University Studies

(Non-Departmental)

University Studies deal with important contemporary topics which are sufficiently comprehensive to require the study and attention of students and faculty from more than one college. They are open to all qualified members of the university community.

4100 Energy Needs and Our Environment (3) Problems of present and projected energy resources and demands; economic, behavioral, legal, technical and environmental opportunities and constraints; regional impacts of energy production and consumption. Topical focus will change from quarter to quar-
ter. May be repeated with consent of instructor. May not be taken for graduate credit by Ecology majors.

College of Liberal Arts

4441-42 Advanced Play Directing (4, 4) Problems of play interpretation; directing period plays; prepa-
ratrix, Ph.D. Illinois; D. L. Bunting, Ph.D.; J. C. Carlson (Emeritus), Ph.D.; Pennsylvania; A. C. Cole, Jr. (Emeritus), Ph.D.; Ohio; J. C. Daniel, Jr.; Ph. D. Colorado; D. A. Elmer, Ph. D. Minnesota; R. C. Fraser, Ph.D. Minnesota; B. Hochman, Ph.D. California (Bemidji); J. C. Howell (Emeritus), Ph.D. Connecticut; K. W. Jeon, Ph.D.; A. W. Jones (Emeritus), Ph.D.; Iowa; J. N. Liles, Ph.D.; R. Kennedy, Ph.D. Iowa; J. N. Liles, Ph.D.; Ohio State; L. E. Roth, Ph.D. Chicago; C. A. Shivers, Ph.D. Michigan State; J. T. Tanner (Emeritus), Ph.D. Cornell, S. R. Tipton (Emeritus), Ph.D. Duke; H. G. Welch, Ph.D. Florida; G. L. Whitson, Ph.D. Iowa

5228-53 History of the Theatre (4, 4, 4) Drama in performance with particular emphasis on theatre architecture, scene design, and acting styles. 5229—Antiquity to the Renaissance. 3253—The European Theatre, 1650-1850. 3254—Modern Theatre. Graduate credit available to Theatre MFA students only.

5262-63 History of American Theatre (3, 3) Development of theatre as social institution in American life. 3262—from its beginnings to 1900. 3263—from 1900 to present. Graduate credit available to Theatre MFA students only.

5321-22 Introduction to Lighting Design (4, 4) Problems of lighting design, elementary theory and problems in basic lighting practice. Prereq: 2211-21 and consent of instructor. Must be taken in sequence. Graduate credit available to Theatre MFA students only.

5351-52 Dramatic Theory and Criticism (3, 3) W, Sp
5951-52 Playwriting (4, 4) Prereq: Consent of In-
structor. F; W
5011-12-13 Projects in Lieu of Thesis (3, 3, 3) Available to Theatre M.F.A. students only.

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
5620 Projects in Lighting Design (3) May be repeated. Maximum 9 hrs. E
5630 Projects in Play Directing (3) May be repeated. Maximum 9 hrs. E
5640 Projects in Scene Design (3) May be repeated. Maximum 9 hrs. E
5650 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
5660 Projects in Technical Theatre (3) Problems of set design, interpretation, and execution. E
5670-71-72-73-74-75 Master Class in Acting (5, 5, 5, 5, 5, 5) Available to Theatre M.F.A. students only.
5680-81-82 Design and Technical Theatre Seminar (1-6, 1-6, 1-6) Available to Theatre M.F.A. students only. May be repeated. Maximum 6 hrs.
5890 Studies in Theatrical Production (3) May be repeated. Maximum 9 hrs. Sp
5912 Play Production in Secondary Schools (4) Principles and methods for directing high school theatrical programs. (Same as Curriculum and Instruction 5912.) Su
5950-60-70 Studies in Dramatic Theory and Criti-
icism (3, 3, 3) F; W, Sp

Speech Pathology

See Audiology and Speech Pathology

University Studies

(Non-Departmental)

University Studies deal with important contemporary topics which are sufficiently comprehensive to require the study and attention of students and faculty from more than one college. They are open to all qualified members of the university community.

4100 Energy Needs and Our Environment (3) Problems of present and projected energy resources and demands; economic, behavioral, legal, technical and environmental opportunities and constraints; regional impacts of energy production and consumption. Topical focus will change from quarter to quar-
ter. May be repeated with consent of instructor. May not be taken for graduate credit by Ecology majors.

Zoology

MAJOR

Zoology

DEGREES

M.S., Ph.D.
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 the major field of study. The student has the option of demonstrating a reading knowledge of this foreign language by (a) passing the official reading examination given by the language department or (b) earning at least a B in 3030 language courses. This requirement for the first language must be fulfilled before the student can take the 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 foreign language examination in the second language.

3050 Comparative Vertebrate Embryology (5) Developmental morphology of selected vertebrates. 2 hrs and 3 labs. F, Sp

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

3080 Principles of Animal Physiology (5) Physiology of organ systems of animals including man. Prereq: Biology 3130. 3 hrs and 2 labs. F

3110 General Entomology (5) Introduction to insects; basic structure, development, behavior; classification of insect orders 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

3320 Histology (4) Study of animal tissues. Prereq: Biology 3120. 2 hrs and 2 labs. F, Sp

3410 Bioethics (3) Relationship between biological discoveries and human values. Open discussion of sensitive questions arising from new knowledge about medicine, behavior, resources, and technology. Sp

4007, 4019-4017 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 from invertebrates and vertebrates. Prereq: 3050. 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. Approval in advance by instructor and department. Prereq: 5 hrs per semester. Prereq: Biology 3110, 3120, 3130 and senior standing. F, W

4190 Mammalogy (4) Classification, evolution, distribution, reproduction, populations, and behavior. 2 hrs and 2 labs or field periods. F

4200 Ichthyology (5) Classification, collection and identification, distribution, life histories, and economic importance of fishes. Prereq: Biology 2110 or consent of instructor. 2 hrs and 2 labs or field periods. F

4210 Cell Physiology (5) Development of modern concepts in cell physiology from point of view of information and communication among subcellular components, integration of cellular activities. Prereq: Cell biology, or any physiology, and organic chemistry. Recommended prereq: Biology 3130. 3 hrs and 1 lab. Sp

4240 Animal Ecology (4) Environmental factors determining distribution and numbers of animals; intraspecific relations; problems and methods. Prereq: Biology 3130. 2 hrs and 2 labs. F

4250 Comparative Animal Physiology I (3) Environmental physiology. Survey of physiological mechanisms and their relation to animals to survive in diverse environmental conditions. Prereq: Biology 3120-30 and 2 yrs chemistry. W

4259 Comparative Animal Physiology Laboratory I (1) Coreq: 4250. W

4260 Comparative Animal Physiology II (3) Sensory, effector and integrative physiology. Prereq: 3080. Sp

4269 Comparative Animal Physiology Laboratory II (1) Prereq: 3080 and consent of instructor. Coreq: 4260. Sp

4270 Immunology (3) Same as Microbiology 4270.

4280 Comparative Endocrinology (5) Comparative analysis of the physiology and morphology of endocrine glands in vertebrates and invertebrates. Their role and importance in maintenance of the organism and species. Prereq: 3080 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. F

4320 Microtechnique (4) Prereq: 3320 recommended. 2 hrs and 2 labs.

4330 General Cytology (4) Study of cellular organization at the light and electron microscope levels and the functioning of these organelles. Prereq: Biology 3120. Sp

4369 General Genetic Laboratory (2) Mainly Drosofila experiments designed to illustrate basic principles of inheritance. Prereq: Biology 3130. 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. Prereq: Biology 2110.

4410 General Parasitology (4) Morphology, taxonomy and ecology of parasitic worms and protozoa, with emphasis on host-parasite relationships. 3 hrs and 1 lab. Prereq: Biology 3130 or consent of instructor. F

4430 Medical Entomology (4) Distinctive morphological features of parasites, life histories, and control of arthropods that parasitize human or serve as vectors of human pathogens. Recommended prereq: Entomology and Plant Pathology 3120 or Biology 3130.

4450 Protozoology (4) Morphology, taxonomy, and physiology of protozoa in relation to fundamental biological concepts. 2 hrs and 2 labs. Recommended prereq: Biology 3120.

4660 Introduction to Aquatic Ecology (4) Physicochemical nature of inland waters. Biotic communities are described, interrelationships explored. Prereq: Chemistry 1120-20-30, Biology 3130. 2 hrs and 2 labs. F

4750 Arachnology (4) Biology of spiders, mites, scorpions, and relatives. Prereq: 3110, or 3150. 2 hrs and 2 labs.

4720 Comparative Animal Behavior (4) Methods and principles. (Same as Psychology 4720.) F

4729 Comparative Animal Behavior Laboratory (4) Laboratory and research studies. Coreq: 4720. (Same as Psychology 4729.) F

4810-20-30 Insect Morphology and Taxonomy, (4, 4) 4810—Internal morphology of both generalized and specialized forms. 4820—Taxonomy of major orders, 4830—Taxonomy of minor orders and infraspecific forms. Prereq for 4820: 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: 2290-30 or 3080. 3 hrs and 1 lab. F, Sp

5000 Thesis (1-15) E

5017 Colloquium in Ethology (1) (Same as Psychology 5017.)

5075 Zooplankton Ecology (4) Secondary productivity in aquatic systems. Prereq: 4680 or equivalent.

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 staff 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, bibliographic and abstracts, and of preparing bibliographies and scientific papers.

5180 Fresh Water Invertebrate Zoology (4) Ecology and taxonomy of fresh water invertebrates exclusive of insects. Laboratory and field study. Prereq: 3150.

5210 Plant Parasitic Nematodes (4) (Same as Entomology and Plant Pathology 5210.)


5270 Advanced Neuromuscular Physiology (5) Cellular and molecular aspects of phenomena associated with conduction of excitation and muscular contraction. Prereq: 4520. 3 hrs and 2 labs.

5280 Insect Physiology (4) Functions and interrelationships of systems relative to metabolism, growth, coordination, movement, and reproduction. Prereq: 4520-1, or general chemistry or consent of instructor. 2 hrs and 2 labs. W, A

5290 Quaternary Problems (4) (Same as Geology 5290 and Botany 5290.)

5310-20 Seminar in the Teaching of College Zoology (2, 2) Current concepts and principles in teaching of zoology; modern techniques and instrumentation; supervised application of teaching principles and methods. Must be taken in sequence. Prereq: Consent of instructor. S/NC only.

5350 Biometry (3) Statistical methods used in analysis of quantitative biological data. Prereq: 1 qr statistics or consent of instructor. F

5360 Isotopic Methods and Techniques: Lecture (2) Theory of isotopic decay, measurement of radioactive decay by liquid scintillation counting, single and double isotope counting, applications using Cerenkov radiation, radioimmunoassay, synthesis of metabolic intermediates, experimental design and data analysis. Coreq: 5389. Prereq: Upper division laboratory course in either physiology, biochemistry, microbiology, or consent of instructor. F

5389 Isotopic Methods and Techniques: Laboratory (4) Use of liquid scintillation counter, optimization...
5410 Advanced Parasitology (4) Life cycles, technical procedures of collection, preservation, and identification of parasitic worms and protozoa. Prereq: Consent of instructor.

5430 Advanced Medical Entomology (3) Prereq: 4430.

5510-20 Advanced Animal Physiology (5, 5) Primarily mammalian physiology: 5510—membrane, neuron, central nervous system, muscle, 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

5550 Advanced Ornithology (4) Classification, distribution, and anatomy of birds. Prereq: 4300.

5570 Animal Populations (3) Characteristics and methods of study of animal populations.

5610-20 Foundations of Radiation Biology (4, 4) Physical, chemical, and biological mechanisms involved in actions of different kinds of radiations on living cell and its components. Recommended prereq: 1 yr biological science, general physics, biochemistry; calculus. (Same as Radiation Biology 5610-20.) 3 hrs and 1 lab.

5630 Methods of Experimentation with Laboratory Mammals (3) Designed to give competence in handling research mammals. Techniques of anesthesia, drug administration, radiography and surgery. Prereq: 4050, or 4410, or consent of instructor.

5660 Physiology of Development (3) Chemical aspects of growth, morphogenesis, and cytodifferentiation. Recommended prereq: Biochemistry 4110-20. F

5670 Cellular Immunology (4) Laboratory course with emphasis on immunological phenomena at cellular level. Preparation and use of immunofluorescent reagents, macrophage migration inhibition, skin allograft reactions, diffusion chamber cultures, and antibody formation at cellular level. 4 hrs and 2 labs.

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-hr lab. Su

5760 General Vertebrate Neuroanatomy (3) (Same as Psychology 5760.)

5780 Radiation Physiology (4) Effects of different kinds of radiations on functions of cells, tissues, and organ systems of animals. Recommended prereq: 5610. (Same as Radiation Biology 5780.)

5790 Transport of Ions Across Epithelia (4) Operational principles and methods needed to study electrical and kinetic properties of epithelia and electrically excitable tissues. Quantitative methods of measuring ion fluxes and flux ratios. Prereq: Two upper-division physiology courses, graduate standing, or consent of instructor. Recommended prereq: Chemistry 3810.

5820 Methods of Taxonomy (4) Classification of animals; rules of nomenclature; problems in priority; preparation of keys, descriptions, and figures. Prereq: Consent of instructor. W

5840 Aquatic Insects (4) Taxonomy and biology of aquatic insects, emphasis on immature forms. 2 hrs and 2 labs. Sp

5860 Geographic Distribution of Animals (4) Distribution patterns of vertebrate and invertebrate animals in all major habitats. Prereq: Consent of instructor.

5870 Insect Synecology (4) Ecology of insect communities.

6000 Doctoral Research and Dissertation (3-15) E

6110 Seminar in Cellular Biology (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. Sp

6140 Seminar in Immunobiology (2) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

6210 Seminar in Physiology (2) Prereq: Two physiology courses or consent of instructor. May be repeated. Maximum 6 hrs.

6310 Seminar in Cytology (2) Prereq: 4310. May be repeated. Maximum 6 hrs. W

6350 Seminar in Developmental Biology (2) Internal regulation in differentiating cell. Prereq: 3050, 4050; Biochemistry 4110-20. W

6410 Seminar in Parasitology (2) Prereq: 5410. May be repeated. Maximum 6 hrs.

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, 4660-70, 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 (3) Prereq: 5610. Coreq: 5620. May be repeated. Maximum 6 hrs. (Same as Radiation Biology 6910.)
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 Department of Medical Biology faculty listed here, the Knoxville Unit 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 (Chairperson and Director), M.D. Washington; C. C. Congdon (Vice Chairperson and Associate Director), M.D. Michigan; W. R. Farkas, Ph.D. Duke; S. Krauss, M.D. Pennsylvania; B. B. Lozzio, M.D. Buenos Aires (Argentina); T. P. McDonald, Ph.D. Tennessee; A. Solomon, M.D. Duke; P. W. Wigler, Ph.D. California (Berkeley).

Associate Professors:

Assistant Professors:
- E. W. Fuson, Ph.D. Tennesssee; W. T. Hanna, M.D. Ain-Shams (Egypt); A. T. Ichiki, Ph.D. California (Los Angeles); X. D. Lin, M.D. National Taiwan (Taiwan); F. J. Miller, A.B. Alabama.

The Department of Medical Biology of The University of Tennessee College of Medicine-Knoxville Unit 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 the major topics of oncology. Prereq: Biology 3110-20 or consent of instructor.

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.

4430 Clinical Genetics (3) Human genetic disorders, case presentations. Prereq: General biology and general genetics background or consent of instructor.

5000 Thesis (1-15) 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.

5220 Special Topics in Cancer (1-3) Special topics in oncology. Prereq: 4210 and consent of instructor. May be repeated. Maximum 9 hrs.

5320 Special Topics in Hematology (1-3) Special topics in clinical hematology. Prereq: 4310 and consent of instructor. May be repeated. Maximum 9 hrs.

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.
The College of Nursing offers a five-quarter program of study leading to the Master of Science in Nursing degree. The general purpose of the program is to prepare the graduate level nurses who are qualified to function as practitioners, clinicians, educators, and administrators in all segments of the health care delivery system.

Upon successful completion of the program, graduates will be able to:
1. Provide advanced high quality, comprehensive nursing care to individuals and groups in a variety of settings;
2. Collaborate with other health professionals in systematic implementation and evaluation of health care delivery to large groups in agency and community settings;
3. Utilize appropriate advanced teaching, administrative and clinical practice skills in the discharge of one's professional responsibilities;
4. Utilize appropriate research findings in the implementation and evaluation of nursing care;
5. Participate in clinical research activities by means of data collection, tabulation, and analysis, and by generating research topics for referral to nurse researchers.

GENERAL REQUIREMENTS FOR ADMISSION
1. Meet requirements for admission to The Graduate School.
2. Hold a Bachelor's degree in Nursing. If the Bachelor's degree is not in Nursing, the applicant must demonstrate successful completion of the equivalent of an upper division major in Nursing.
3. If the number of qualified applicants exceeds the number that can be accommodated, preference will be given to applicants:
   a. whose undergraduate GPA is 3.0 or higher;
   b. who have had at least two years of full-time clinical practice experience following completion of a baccalaureate nursing program;
   c. who are Tennessee residents;
   d. who are currently employed in underserved health service areas and who can demonstrate their commitment to return to those areas following completion of the program; or
   e. who are currently employed as nurse educators in programs preparing registered nurses; or
   f. who are currently employed as directors of nursing service.
4. Ordinarily one year of full-time clinical practice experience should be completed prior to applying for admission to the program.

DEGREE REQUIREMENTS
1. Students must complete 60 quarter hours of graduate level course work with a cumulative GPA of 3.0 or better.
2. The 60 credit hours must include the following components:
   a. Core requirement
      - Clinical and Business Affairs: 5450, 5460, 5550
      - Students completing the health nursing option must complete 5410, 5430, and 5310. Students selecting the community mental health nursing as their clinical option must complete 5560 and 5540 if their clinical option is primary care, 5520 and 5540 if their clinical option is secondary care or 5520 and 5540 if their clinical option is community mental health. Students selecting the advanced clinical practice functional option must complete 5560 and 5660 if their clinical option is primary care, 5520 and 5540 if their clinical option is secondary care or 5520 and 5540 if their clinical option is community mental health. Except for electives, all courses taken in other colleges must be approved in advance by the student's faculty advisor.
   b. Research: 5010, 5020, 5030, 5070, 5210, 5680 and a graduate level statistics course that must be approved in advance by the student's faculty advisor.
   c. who are Tennessee residents;
   d. who are currently employed in health nursing option must complete 5410, 5430, and 5310. Students selecting the community mental health nursing as their clinical option must complete 5560 and 5540 if their clinical option is primary care, 5520 and 5540 if their clinical option is secondary care or 5520 and 5540 if their clinical option is community mental health. Students selecting the advanced clinical practice functional option must complete 5560 and 5660 if their clinical option is primary care, 5520 and 5540 if their clinical option is secondary care or 5520 and 5540 if their clinical option is community mental health. Except for electives, all courses taken in other colleges must be approved in advance by the student's faculty advisor.
   e. who are Tennessee residents;
   f. who are currently employed in health nursing option must complete 5410, 5430, and 5310. Students selecting the community mental health nursing as their clinical option must complete 5560 and 5540 if their clinical option is primary care, 5520 and 5540 if their clinical option is secondary care or 5520 and 5540 if their clinical option is community mental health. Students selecting the advanced clinical practice functional option must complete 5560 and 5660 if their clinical option is primary care, 5520 and 5540 if their clinical option is secondary care or 5520 and 5540 if their clinical option is community mental health. Except for electives, all courses taken in other colleges must be approved in advance by the student's faculty 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.

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.

Reduction of hour requirements, when appropriate, will not be used to reduce the residency requirements of the second Master's degree.

2. The 45 to 60 hours must include the following components:

   a. whose undergraduate GPA is 3.0 or higher;
   b. who have had at least two years of full-time clinical practice experience following completion of a baccalaureate nursing program;
   c. who are Tennessee residents;
   d. who are currently employed in underserved health service areas and who can demonstrate their commitment to return to those areas following completion of the program; or
   e. who are currently employed as nurse educators in programs preparing registered nurses; or
   f. who are currently employed as directors of nursing service.
   4. Ordinarily one year of full-time clinical practice experience should be completed prior to applying for admission to the program.
   5. Students may choose either primary care, secondary/tertiary care nursing or community mental health nursing as their clinical option. Students selecting the management option must complete 5560 and 5660 if their clinical option is primary care, 5520 and 5540 if their clinical option is secondary care or 5520 and 5540 if their clinical option is community mental health.
   6. The core requirement that must be completed by all students regardless of clinical option includes the following courses: 5010, 5020, 5030, 5070, 5210, 5680 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, management or advanced clinical practice. Students selecting the teaching option must complete 6 hours of graduate level courses in education and 5630. Students selecting the management option must complete 6 hours of graduate level courses in administration and 5730. Students selecting the advanced clinical practice functional option must complete 5560 and 5660 if their clinical option is primary care, 5540 if their clinical option is secondary care or 5520 and 5540 if their clinical option is community mental health. Except for electives, all courses taken in other colleges must be approved in advance by the student's faculty advisor.
Core requirements
Clinical concentration option 17 hrs
Functional concentration option 20-30 hrs
Electives 6-11 hrs
Total 45-60 hrs

Faculty
Professor: S. E. Hart, (Dean), Ph.D., New York.
Associate Professors: D. H. Goodfellow, M.D., Pedhernose, M. Donnelien, M.S.N., New York; J. N. Mozingo, Ph.D., Waldem, B. M. Reid, M.S.N. Case Western.
Assistant Professors: K. P. Conlon, M.S.N. New York (Buffalo); P. G. Dropperform, Ph.D., Tennessee; M. Donellen, M.S., New York; J. F. Fesuse, M.N. Florida; J. Greene, Ph.D., Vanderbilt; M. F. Kollar, M.N. Vanderbit; M. M. Moline, M.S.N. Case Western.

Courses
4240 Nursing in Acute Care Settings (5) Theory and clinical practice related to care of hospitalized children and adults experiencing acute illness episodes. Prereq: 5510; credit toward graduate major in nursing; with consent of instructor. Prereq: All required 2000 and 3000 level nursing courses. 3 hrs and 2 labs. Su

4250 Community Mental Health Nursing (5) Theoretical and clinical practice related to care of clients whose primary actual or potential health problem is psychosocial or developmental; stress and coping; and how mental health maintenance and promotion. Open only to MSN candidates lacking undergraduate major in nursing; others with consent of instructor. Prereq: All required 2000 and 3000 level nursing courses 3 hrs and 2 labs. Su

4280 Nursing the Child Bearing Family (5) Theory and clinical practice related to care of clients and their families in varying stages of child bearing and child rearing, normal and abnormal states. Open only to MSN candidates lacking undergraduate major in nursing; others with consent of instructor. Prereq: All required 2000 and 3000 level nursing courses. 2.5 hrs and 2.5 labs. Sp

4330 Nursing in the Specialties (2-4) Application of principles from behavioral, physical, social and nursing sciences to solution of nursing problems. Exploration of nursing intervention needed to maintain or restore homeostasis in clients experiencing selected physiological and/or behavioral deviations. Specific topics to be determined by faculty and students. Prereq: Consent of instructor. May be repeated with consent of instructor. Maximum 12 hrs.

4350 Oncology Nursing (3) In-depth exploration of the cancer problem, medical and nursing intervention. Relates cellular kinetics to theories of carcinogenesis and metastasis, and examines treatment modalities and nursing intervention employed in all phases of the disease. Interdisciplinary approach analyzed. Prereq: 4230, R.N. status, or consent of instructor.

4820 Clinical Nursing Practicum and Seminar (8) Intensive clinical laboratory with opportunity to apply nursing and nursing related theories in a variety of health care settings. Weekly seminars with clinical practice. Open to candidates lacking undergraduate major in nursing; others with consent of instructor. Prereq: 4240-60-80. Coreq: 4180. Sp

5000 Thesis (1-5) 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. Prereq: 4240-60-80. Coreq: 4180. Sp

5010 Applied and Pathophysiology (5) Advanced physiological theories and principles related to normal and abnormal body function with particular emphasis on those processes which, when altered, are most commonly encountered in acute and chronic disease states. Prereq: 3210-20 or 4010 or consent of instructor. Su, Fr, Sp

5020 Current Health Issues (2) Weekly seminar dealing with current and pending legislative, political, and community issues, concerns, and actions that have direct or indirect implications for nursing and health care. Prereq: 5010. Repeated with consent of instructor. Maximum 12 hrs. Fr

5030 Behavioral Dynamics (3) Interviewing and communication theories utilized in nurse-client interactions and therapeutic intervention; assessment and treatment of patient and family perceiving and coping with disease and crisis states. Prereq: 16 hrs in undergraduate or graduate behavioral sciences. E

5070 Theories of Nursing (3) History of nursing theory; examination of selected nursing concepts, theories, conceptual frameworks and philosophies and their relationship to nursing education and nursing practices. F

5103 Independent Study in Nursing (1-4) In-depth exploration of a nursing topic of special interest to the student. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

5120 Secondary/Tertiary Nursing of Adults I (6) Role of clinical nurse specialist in assisting adults and their families to maximize potential. Techniques for application of advanced nursing, physiological, developmental and psychosocial theories to delivery of health and nursing care to adults and their families who are experiencing acute illness episodes and related crises. Prereq: 5010, 5030, 5070. 3 hrs and 3 labs. W

5130 Secondary/Tertiary Nursing of Adults II (6) Continuation of 5120 with further exploration of role of clinical nurse specialists; application of theories and concepts to nursing care of hospitalized adults with emphasis on analysis and utilization of nursing and health related research findings in delivery of health and nursing care. Prereq: 5020, 5120. Prereq and coreq: 5210. 3 hrs and 3 labs. Sp

5140 Secondary/Tertiary Nursing of Children I (6) Exploration of role of pediatric clinical nurse specialist in assisting children and their families to optimal health; application of advanced nursing, physiological, developmental and psychosocial theories and techniques useful in assisting children and their families who are experiencing acute illness episodes and related crises. Prereq: 5010, 5030, 5070. 3 hrs and 3 labs.

5150 Secondary/Tertiary Nursing of Children II (6) Continuation of 5140 with emphasis on role of pediatric clinical nurse specialist to families experiencing acute illness episodes and related crises. Prereq: 5010, 5030, 5070.

5170 Readings in Applied Physiology (3) Carefully chosen functional concentration of advanced clinical nursing. Prereq: 5460. 2 hrs and 3 labs. F

5210 Applied Nursing Research (4) Utilization of research process to identify and investigate common nursing problems; critical assessment of nursing research and literature development and critique of nursing research proposals. Prereq: 4440 or equivalent, graduate level statistics course. W, Sp

5310 Secondary/Tertiary Care Nursing Field Work I (18) Clinical practice in acute care hospital settings with opportunities to apply newly acquired nursing knowledge to more complex clinical nursing situations. Prereq: 3120-30 or 5140-50. W, Sp

5320 Secondary/Tertiary Care Nursing Field Work II (9) Continuation of 5310 with emphasis on further acquisition and refinement of nursing skills needed to provide high quality nursing care to acutely ill patients. Prereq: 5310. F

5340 Secondary/Tertiary Nursing Seminar (2) Identification of issues and problems involved in delivery of secondary/tertiary nursing care; further analysis and exploration of theories and concepts included in 5680 as they affect the role of nurse as community mental health clinical specialist. Coreq: 5320. Prereq: 5680. F

5410 Principles of Community Mental Health (3) Exploration of theories, conceptual frameworks and philosophies that impact community mental health; discussion of nursing and other mental health care provider roles within current mental health care delivery systems. W

5540 Community Mental Health Nursing Seminar (2) Identification of issues and problems involved in delivery of community mental health care; further analysis and exploration of theories and concepts included in 5680 as they affect the role of nurse as community mental health clinical specialist. Coreq: 5520. Prereq: 5680. F

5460 Family Centered Primary Care Nursing II (6) Primary care nursing and health care management of individuals and families in middle and later stages of development; application of the nursing process to management of selected episodic and chronic health problems. Prereq: 5020, 5450. Prereq or coreq: 5210. 4 hrs and 2 labs. Sp

5480 Community Mental Health Nursing: Individual (3) Application of nursing process within systems framework; therapeutic intervention with individual; exploration of theoretical and research approaches to study of psychopharmacological issues; analysis of special clinical problems. Prereq: 5010, 5030, 5070. 2 hrs and 1 lab. W

5490 Community Mental Health Nursing: Family (3) Application of nursing process within systems framework to solution of nursing problems related to families; exploration of role of family member in community mental health care; communication and systems theories in therapeutic work with families experiencing mental health problems; current models of parent education. Prereq: 5020, 5480. Prereq or coreq: 5210. 2 hrs and 1 lab. Sp

5500 Community Mental Health Nursing: Group (3) Study of group leadership and group dynamic theories in utilization of leadership strategies in both structured and unstructured group processes. Prereq: 5480. 2 hrs and 1 lab. Sp

5510 Community Mental Health Nursing Field Work I (6) Clinical practicum in a community setting providing opportunities to apply mental health nursing knowledge in planned interactions with individuals and groups at primary, secondary and/or tertiary care levels. Community and mental health systems assessment. Prereq: 5440 and 5470. Su

5520 Community Mental Health Nursing Field Work II (6) Clinical practicum for graduate student choosing functional concentration of advanced clinical nursing. Prereq: 5440 and 5470. Su

5540 Community Mental Health Nursing Seminar (2) 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 clinical specialist. Coreq: 5520. Prereq: 5680. F

5550 Primary Care Nursing Field Work I (6) Placement in selected off-campus primary health care delivery site for purposes of applying newly acquired knowledge and developing clinical skills necessary to function as a nurse practitioner. Prereq: 5460. Coreq: 5680. Su

5560 Primary Care Nursing Field Work II (6) Continuation of 5550 with further emphasis on acquisition of critical thinking skills and the ability to function more autonomously. Prereq: 5550. F

5630 Teaching Strategies and Practicum (5) 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: 6 hrs approved education courses or consent of instructor. 2 hrs and 2 labs. Sp

5660 Primary Care Nursing Seminar (2) Issues and problems involved in delivery of primary nursing care; further analysis and exploration of theories and
concepts included in 5680 as they affect role of nurse as primary care provider. Coreq: 5560. Prereq: 5680. 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: 5310 or 5550 or 5510. Su

5730 Management Strategies and Practicum (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 other courses. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.
4031 Accelerated Historical Studies I (4) Introduction to evolution of architectural periods with selected illustrations from local examples. Advanced examination of relationship of historical and cultural developments to the built environment from antiquity through Byzantine period with applications to present-day design issues. Independent student projects on topics related to course material. Prereq: Admission to accelerated core program. F

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

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

4170 Introduction to Preservation and Restoration (4) History and theory of restoration and preservation. Sp

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

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


4732 Structural Design for Protection Against Extreme Hazards (4) Probability, risk, human values, insurance. Survey of possible hazards; floods, fire, hurricanes, and tornadoes, earthquakes, nuclear effects, internal and external explosions. Building code and engineered design of steel, masonry, concrete, and wood structures to resist extreme effects. Protective construction for human and system needs. Fire protection engineering, fire phenomena, life safety and analysis, high-rise building fires. Spring


4734 Aesthetics of Engineering Structures (4) Architecture in engineering; theory and utilization of space, design, and materials in large structures. Bridges, exhibition halls, power plants. Spring

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

4910 Architectural Photography (4) Photography as a design, research and presentation medium. Emphasis on architectural photography using black and white media. E

4920 Advanced Architectural Photography (4) Application of special photographic techniques with emphasis on color printing and processing. Prereq: Consent of instructor. F, W, Sp

4940 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.

4950 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 nature of coding behavior in animals and humans. 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.
Graduate School of Biomedical Sciences

W. E. Barnett, Director
R. J. Preston, Associate 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 biomedical sciences as a whole; and (2) perception 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 research areas available for Master's 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 should be eliminated prior to entrance.

Requests for application forms, information on admission, financial support, and housing should be sent to:

Director, University of Tennessee-Oak Ridge Graduate School of Biomedical Sciences, Biology Division, ORNL, Box Y, Oak Ridge, Tennessee 37830.

THE DOCTORAL PROGRAM

Requirements for the Ph.D. degree are:

1. Satisfactory (B grade or better) completion of the following core courses or their equivalent: Biochemistry (5110-20); Biophysics (5140); Genetics (5160); Molecular Genetics (5170); Cell Biology (5180-90); Mammalian Physiology (5200) and Statistics for Biologists (5740).

2. Three quarters of Biomedical Sciences Laboratory (5310-20-30-40).

3. Participation in 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 (5160); Molecular Genetics (5170); and Mammalian Physiology (5200). Additional credits may be obtained (6 to 15 credit hours) with electives. The student will need previous training in biology, calculus, physics, organic and physical chemistry.

2. Forty-five credit hours of approved graduate courses including a minimum of 9 quarter hours for thesis (maximum 18 quarter hours of course 6000). Other institutions may be accepted if qualified, however a limited number of students from within the Oak Ridge National Laboratories; 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.

3. For admission to candidacy:

   1. Completion of any required prerequisite courses and one quarter of graduate course work with a B average. Admission to candidacy forms must be filed at least one full quarter prior to receipt of degree.

4. A Master's Committee of three approved faculty members upon admission to candidacy.

5. A thesis reporting results of original and significant scientific research.

6. Pass a final oral (or oral and written) examination as determined by the student's committee.
Full-Time Faculty

Professors:  D. Billen, Ph.D., Tennessee;  D. E. 0/ins, Ph.D.  
Full-Time Faculty

and photosynthesis; biosynthesis of amino acids, enzymes; enzyme kinetics; intermediary metabolism of carbohydrates, lipids, proteins, nucleic acids, and coenzymes; nuclear RNA metabolism; nucleoli and other organelles as related to metabolism and regulation; transport phenomena; cell cycle. Prereg: 5110-20, 5160.  

1570 Molecular Genetics (3) Molecular biology of genetic processes. Gene regulation; coding; protein synthesis; suppression of missense and nonsense mutations; mutagen mechanisms; complementation; recombination. Prereg: 5110-20, 5160.  

5160 Biochemistry (3) Energy levels and excited states of molecules, electronic instruments, and adaptations to system perturbations; properties of macromolecules in solutions; molecular conformations; intermediate level treatment of physical principles of microscopy. Prereg: 5070-80.  

1550 General Genetics (3) Mendelian genetics, mitosis, and meiosis. Transmission genetics, mapping, and linkage.  


1570 Molecular Genetics (3) Molecular biology of genetic processes. Gene regulation; coding; protein synthesis; suppression of missense and nonsense mutations; mutagen mechanisms; complementation; recombination. Prereg: 5110-20, 5160.  

1580 Cell Biology I (3) Structure and composition of major nuclear and cytoplasmic organelles of eukaryotic cells. Pertinent instruments and techniques; mitosis and meiosis; cell cycle; chromosome structure; nuclear RNA metabolism; nucleoli and ribosome biogenesis; survey of specialized cells. Structure, function, and analysis of transcription and translation in bacteria. Coreq: 5110.  


2500 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. Prereg: 5180.  

2530 Biochemical Concepts In Medical Sciences (2) Biochemical mechanisms involved in physiological conditions and pathological processes of human body. Dynamic functions of organ systems; biochemical pharmacology; hormone actions; neurobiochemistry. Current biochemical advances in basic and clinical medicine. Prereg: 5200, 5110-20.  

3510-30-40 Biomedical Sciences Laboratory (3, 3, 3) To acquaint students with both approaches and technologies in various areas of contemporary research. Three or four laboratories conducting research in different areas of biomedical science. Required of all first-year students.  

3550-60 Biomedical Sciences Seminar (1, 1) Critical analyses of current journal publications in selected area of modern biology. Written evaluation of papers and weekly oral presentations by each student. Required of all first-year students.  

3570 Biomedical Sciences Seminar (1) Basic principles of scientific writing. Research articles, grant and thesis proposals, abstracts, review articles, progress reports. Required of all first-year students.  

5430-60-90 Graduate Research Participation (3, 6, 9) Special advanced research project covering area not related to dissertation research. Topics chosen with consent of instructor. May be repeated.  

5510-20-30-40 Special Topics in Biomedical Sciences (3, 3, 3) Tutorials or formal lectures. Pediatric topics include x-ray diffraction and crystallography; excited-state biophysics; physical chemistry of macromolecules; pathophysiology; pathology; cytochemistry and cytogenetics; mammalian genetics; human genetics; cancer research; plant physiology; radiation biology; biological aging. Additional courses and topics are developed on any subject of mutual interest to individual students and staff members. May be repeated.  


5740 Statistics for Biologists (3) Application and interpretation of statistical methods in data analysis. Random variational, Student's t, and Poisson distributions, statistical presentation of data, estimating means and variance; confidence intervals; tests of significance for comparing samples; analysis of variance; contingency tables; chi-square tests; correlation and association; linear regression. Prereg: introductory statistics or consent of instructor.  


5860 Cryobiology (3) Physical and chemical responses of cells and bacteria to low temperatures and ice formation. Relation of these responses to permeability, structure of semipermeable membranes, conformation of macromolecules, and nature and state of water in cells; and how they bear on other fields of biology and medicine—including electron microscopy, photobiology, cell physiology, exobiology, cryonics, and cryosurgery. Prereg: 5070-80 or equivalent, and 5190.  

5940 Classic Experiments In Genetics (3) Original papers presenting new and lasting concepts in genetics. Prereg: 5170.  

6000 Doctoral Research and Dissertation (3-15)  


6210 Protein Chemistry and Enzyme Mechanisms (3) Theoretical and practical aspects of protein chemistry and enzymes at molecular level using biochemical, physical and kinetic approaches and technologies in various areas of biomedical science. Prereg: 5180.  

6220 Enzyme Regulation and Kinetics (3) Kinetics of catalysis; Inhibition by product, substrate and deactivator inhibitors; stimulation and inhibition of enzyme activity; feedback regulation; role of substrates in enzyme regulation; multifunctional enzymes. Prereg: 5110-20.  

6240 Chemistry and Metabolism of Lipo (3) Nomenclature, chromatographic isolation, chemistry, physical properties, and enzymology of lipids. Hormonal action of prostaglandins and role of lipids in membranes, enzyme expression, and nucleic acid. Lipid biochemistry of mammalian cells, particularly lipids, and enzyme pathways. Prereg: 5110-20.  

6251 Molecular Biology in RNA (3) RNA synthesis and metabolism in prokaryotic and eukaryotic cells and their viruses. Prereg: 5110-20 or consent of instructor.  

6252 Molecular Biology of DNA (3) DNA replication, repair, and recombination. Recent advances in mechanisms of DNA replication and repair. Prereg: 5110-20 or consent of instructor.  

6270 Viral Carcinogenesis (3) History of viral oncology and retroviruses, viruses of tumor viruses. Biology of normal and transformed cells. DNA tumor viruses; replication cycle; transformation; genetics; natural history. Prereg: 5110-20 or consent of instructor.  

6280 Chemical and Physical Carcinogenesis (3) History and epidemiology of considerations of nature and metabolism of chemical carcinogens. Radiobiological and site-specific carcinogenesis.  

*Staff of Oak Ridge Associated Universities
6290 Cancer Biology and Biochemistry (3) Pathology and nomenclature of cancer. Tumor immunology and immunotherapy. Biochemistry of tumor cells; enzymology, metabolism; membranes; DNA repair; regulation; strategies in chemotherapy.

6300 Mutagenesis (3) Basic mechanisms in chemical and radiation mutagenesis and dosimetry in variety of systems including bacteria, fungi, Drosophila, and mice.

6400 Membrane Biology (3) Transport kinetics, membrane biogenesis and turnover, endocytosis and exocytosis, receptor regulation, hormone-membrane biogenesis interactions. Prereq: 5110-20 and 5180-90 or consent of instructor.

6410 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. Prereq: 5180-90 or consent of instructor.

6450 Immunology (3) Structured lectures in modern immunology and emphasis on concepts and mechanisms at the cellular level. Topics: T-B cell interaction, soluble mediators, tolerance, surveillance, transportation genetics, immunoglobulin structure. Selected laboratory exercises. Prereq: 5180-90 or consent of instructor.

6510-20-30-40 Advanced Topics in Biomedical Sciences (3, 3, 3, 3) Current and future research developments. Topics listed under Special Topics Courses, can be taken either as tutorials or as literature survey courses requiring substantial student participation. May be repeated.

6600 Mammalian Genetics (3) Orderly presentation of known genetics variants affecting each organ system of experimental mammals, especially laboratory mouse. Prereq: 5160.

6610 Mammalian Biochemical Genetics (3) Combined biochemical and genetic approaches to problems of immunology, globin synthesis, and control of enzyme synthesis. Prereq: 5110-20 and 5160 or consent of instructor.

6650 Microbial Genetics (3) Basic phenomena in microbial genetics: transduction, transformation, conjugation, and mutation. Genetics of bacteriophage. Prereq: 5160 or consent of instructor.

6750 Regulation of Intermediary Metabolism (3) Pathways involved in intermediary metabolism. Steady-state processes, "nonequilibrium" reactions, first enzymes, feedback inhibition, isozymes, multienzyme systems and compartmentation, covalent modification, positive and negative control, catabolite, repression, autoregulation, stringent control, attenuation, hormonal control, other selected topics. Prereq: 5110-20 or consent of instructor.
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:

1. Enable students to examine critically the role and function of libraries and information centers in our society, and to define and redefine that role as the needs of society demand;
2. Enable students to understand and use the concepts and procedures related to the selection, acquisition, organization, and dissemination of knowledge;
3. Enable students to understand and apply the principles of management to the library and information center;
4. Enable students to assume individual and collective responsibility for the well-being and development of their profession and of professional service.

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 school libraries, public libraries, academic 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. Upon admission to The Graduate School, all students are subject to an examination. Students who elect the thesis option, the examination will be a defense of the thesis. Students who elect the non-thesis option will be given a written comprehensive examination. Programs are designed for persons interested in school libraries, public libraries, academic libraries, special libraries and information centers as well as a variety of library and information related activities.

The SREB Academic Common Market applies to applicants from Arkansas, Georgia, West Virginia, and Virginia.

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.

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

Professors:

Associate Professors:

Assistant Professors:
J. M. Pemberton, Ph.D. Tennessee; M. S. Stephenson, M.L.S. North Texas State.

Courses

4140 Libraries and Librarianship (3) Librarianship as an occupation: its organization, responsibilities, problems and prospects.

4150 School Library Administration (3) Objectives, functions, and place of school library; relationship to local and state services; cooperative planning for quarters and materials; evaluation. (Same as Curriculum and Instruction 4150.)

4270 Organization of Library Collections I (6) Acquisitions, cataloging and maintenance of library collections.
4330 Introduction to Reference Materials (3) Basic information sources and services for all libraries.
4750 Utilization of Instructional Media (3) Same as Curriculum and Instruction 4750 and Vocational-Technical Education 4750.
5000 Thesis (1-15) E
5002 Non-Thesis Graduation Completion (1-15) 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/NC only. Degree credit may be applied for years after taking the course.
5110-20-30 Problems in Library Science (3, 3, 3) May be repeated with consent of school.
5140 Research Methods in Library Science (3) Research methods applicable to librarianship. Process and conduct of research; analysis of published research.
5200 Subject Reference and Bibliography (3) General patterns of bibliographic organization and basic information sources in subject fields including non-English materials; experiences in bibliographic methods and search techniques. Prereq: 4330.
5210 Sources and Services for the Social Sciences (3) English and non-English literature and bibliographic sources in education, economics, political science, history, geography, anthropology, psychology, and sociology; organization of collections for optimum use. Prereq: 5200.
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.
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.
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.
5250 Government Publications I (3) Acquisition, organization and utilization of U.S. federal government publications; legislative, executive and judicial branches. Prereq: 4330, 5200, or consent of instructor.
5260 Government Publications II (3) Acquisition, organization and utilization of publications of state and local governments in U.S.; publications of foreign governments and international and intergovernmental organizations: United Nations, UNESCO. Prereq: 4330, 5500, or consent of instructor.
5270 Legal Bibliography (3) Introduction to literature of Anglo-American jurisprudence. Use of reports, statutes, administrative regulations and decisions, treaties, periodicals, and indexes as bibliographic tools.
5300 Library Management (3) Management and organization concepts applicable to libraries and librarians.
5310 Multitype Networks (3) Organization, structure, governance, planning, evaluation, and services in state, regional, national, and international networking of information.
5330 Academic Libraries (3) Persistent and current problems. Topics vary depending upon needs and interests of group. Prereq: 4150 or consent of instructor.
5350 School Libraries (3) Persistent and current problems. Topics vary depending upon needs and interests of group. Prereq: 4150 or consent of instructor.
5360 Special Libraries and Information Centers (3) Development and present status, scope and objectives, administration and organizational problems, acquisition, organization, and use of information.
5370 The Library in the Community (3) Public library as social agency; role in education and communication systems of community.
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. Inter-relationship of staff, materials, and user space requirements.
5500 Principles of Materials Selection (3) Philosophy and practice in building library collections in light of library objectives.
5510 Nonbook Resources (3) Selection, processing, storage and utilization; films, video technology, sound recordings and microforms as information media. Prereq: 5500 or consent of instructor.
5515 Serials (3) Serials collections: selection, acquisition, bibliographic control, process, storage, maintenance, and public service. Prereq: 5500 or consent of instructor.
5520 History of the Book (3) History of writing and various methods of bookmaking from earliest times through 19th century. Prereq: Consent of instructor.
5530 Contemporary Publishing (3) Creation, production, marketing, and distribution of materials acquired by libraries, with special attention to various types of publishers.
5540 Archives and Manuscripts (3) Problems involved in acquisition, organization, description, storage, preservation and utilization. Prereq: Consent of instructor.
5550 Records Management for Information Professionals (3) Functional elements and objectives of records management within organizations, emphasis on control of creation, distribution, retention, storage, retrieval, protection, and disposition regardless of medium. Prereq: 4330, 4270, or consent of instructor.
5600 Reading Guidance for Children and Young People (3) Organization to meet needs, interest, abilities of different age and socioeconomic groups. Prereq: 5640 or consent of instructor.
5610 Mass Communications and the Library (3) Mass media of communication in terms of their relation to modern library service, considered as forces that influence what people read, see, and hear.
5620 Traditional Literature and Oral Narration (3) Fundamental principles of art storytelling; techniques of adaptation and presentation for various age groups; instruction and practice in oral techniques.
5630 Critical History of Children's Literature I (3) Development of literature for children noting influence of changing social and cultural factors; attention to emerging genres through primary sources. Fifteenth century to 1920.
5640 Critical History of Children's Literature II (3) Development of literature for children noting influence of changing social and cultural factors; attention to emerging genres through primary sources. 1920 to present.
5691 Advanced Production of Audiovisual Software (3) Same as Curriculum and Instruction 5691.
5700 Automation of Library Processes (3) Computer concepts and operations; applications to basic library operations: acquisitions, catalogs, circulation, and serials. Coreq: 4270, 5500, or consent of instructor.
5710 Introduction to Information Science (3) Content and method of information science; application of research findings to general library practice.
5720 Information Systems Analysis and Design (3) Examination and evaluation of tools and methodologies 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: 5710.
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.
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.
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.
5999 Practicum (6 or 9 or 12) Opportunity to translate library theory into practice under guidance of qualified librarians. Prereq: Completion of 21-hr core curriculum plus approval of director.
Graduate School of Planning

D. A. Johnson, Director

MAJOR
Planning

DEGREE
M.S.P.

The Graduate School of Planning offers a two-year graduate course leading to a degree of Master of Science in Planning with concentrations in land use, transportation, environmental, regional, administrative, health, and historic preservation planning.

The purpose of study is the education of professional planners, competent to handle positions of increasing technical and administrative responsibility. Graduates are candidates for professional service in regional, city, county, and metropolitan area planning agencies; in local, state, and federal agencies concerned with physical, economic and administrative planning; in private businesses and organizations dealing with urban problems; and in private consulting practices.

The curriculum is organized on a basis of six quarters, or 72 credit hours, and provides the student with core courses in planning theory, methods and techniques, and also takes advantage of offerings at The University of Tennessee in related fields such as government, economics, geography, civil engineering, and sociology.

The course of study ordinarily requires two years with an optional work internship during the summer between the two years. Planning courses as well as related courses will be offered during the summer period. This is to serve the needs of those planners now in the field who wish to acquire their professional degree but who can spare only the minimum amount of time from their jobs because of financial or family considerations.

Entering students follow a program of courses which provides education in the basic elements of planning. These include studies in theory, history, analytical methods, and legislation, as well as related courses in government, geography, sociology, and economics. Students are permitted to pursue particular interests through the choice of electives approved by the Graduate School of Planning.

Practice in research and analysis on a particular planning problem or topic is obtained through the preparation of a thesis or major study option.

Core planning courses are taught by the faculty of the Graduate School of Planning. Related courses are taught by other specialists drawn from the University faculty. In addition, the services of experienced professional planners in TVA and other public and private organizations are called upon to broaden the scope of the students' understanding. A variety of outside speakers and seminar leaders provide insight into particular problems of significance to planners.

ADMISSION PROCEDURES

All applicants should submit two letters of recommendation with their applications. Both letters should be from teachers familiar with the applicant's undergraduate or, where applicable, graduate academic record. In the event the applicant has had planning experience, a third letter is required from a supervisor or other person familiar with the planning work of the applicant. All applicants who wish to be considered for financial assistance from the University or the Graduate School of Planning should also submit recent Graduate Record Examination scores for the Aptitude (verbal, quantitative and analytical) portion of that test. All applicants are also requested to submit a statement of career goals.

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 37916.

DEGREE REQUIREMENTS

Each student will be required to complete a minimum of 72 hours credit.

The following courses are the required core curriculum for the M.S.P. degree: 5040, 5045, 5100, 5110, 5130, 5140, 5230, 5270, 5280, 5340, 5435, 5440, 5460, 5500, Sociology 5320 or Statistics 5211. Waivers can be made by the faculty where competence is demonstrated.

Each student will be required to demonstrate competence in individual research. This may take either of two forms.

Plan I—Complete a thesis for 9 hours credit.

Plan II—Complete a major study with acceptable documentation. In order to be eligible for the major study the student must have earned a grade of B+ or higher in Research Methods II, have a 3.5 cumulative grade point at the time of approval of the major study proposal, and have completed at least 24 hours of graduate study. The student meeting these criteria may present a proposal for a major study which will include at least 9 hours of elective course work in an area of concentration. The proposal shall justify the area of study, the approach to the study, and the method of final documentation. Approval of the documentation, which must include written documentation, is a prerequisite for graduation.

Students in the Graduate School of Planning are given a comprehensive written examination after approximately four quarters of course work. In addition to testing the knowledge of the student, the information thus obtained is taken into account in advising students concerning the study program they should undertake during the balance of their academic program to remove any indicated deficiencies.

Each student will be encouraged, but not required, to complete a work internship equivalent to at least two and one-half months of full-time work in a planning agency at approximately the mid-point in course work.

Faculty

Professors:
D. A. Johnson, Ph.D. Cornell; K. B. Kenney, Ph.D.

Associate Professor:
G. E. Bowen, M.A. George Washington.

Assistant Professors:
P. Fisher, Ph.D. Florida State; A. Lose, Ph.D.
Missouri.
Graduate School of Social Work

Ben P. Granger, Dean
Betty J. Cleckley, Associate Dean
Lou M. Beasley,
Branch Director, Knoxville
M. Kate Mullins,
Branch Director, Memphis
Roger M. Nooe,
Branch Director, Nashville
Ronald K. Green,
Director, Office of Continuing Social Work Education

MAJOR
Social Work

DEGREE
M.S.S.W.

The University of Tennessee School of Social Work is a fully accredited two-year graduate professional school, with a program (thesis or non-thesis option) leading to the degree of Master of Science in Social Work. The full two-year curriculum is offered in all three branch locations.

GRADUATE PROFESSIONAL EDUCATION

The School of Social Work has as its primary objective the education and training of persons for leadership in the social welfare profession and the social work practice community. Leadership roles include positions in social welfare administration, social planning and policy development, and positions as treatment team leaders, supervisors, consultants, and expert practitioners.

Central to professional leadership are a commitment to the values and goals of the profession and a developed capacity for self-awareness and self-discipline. The experience of a graduate professional education builds commitment, and the School's program guides students into independent, analytical thought and prepares them to use their skills and knowledge to effective purpose.

The School of Social Work recognizes and enjoys the challenge of cultural pluralism in society and encourages applications for admission from minority group members. Through the planned inclusion of significant and pertinent racial and ethnic content in the curriculum, the School provides students with the educational background needed to take creative roles in the social work profession's efforts toward the elimination of racism and such other social ills as poverty, crime, neglect, and social injustice.

A special bulletin describing the facilities, admission, fees, and degree requirements is obtainable from The School of Social Work, 2014 Lake Avenue, Knoxville, Tennessee 37916.

AREAS OF PROFESSIONAL PRACTICE

Specializations within the School's curriculum prepare students for social work careers in such practice fields as criminal and juvenile justice systems; family and child welfare services in public and voluntary agencies; group services in neighborhood and community centers; health services; mental retardation; public welfare services; mental health services; rehabilitation services; school social work; and social gerontology.

THE PROFESSIONAL CURRICULUM

The School of Social Work's curriculum is designed to provide the student with the basic components of professional competence through a progression of course work and supervised practice experience. Students may elect a thesis or non-thesis option. The two-year, six-quarter program includes a core curriculum, a specialization in one of two areas—social work treatment or social welfare administration and planning—and concurrent field practice.

The Core Curriculum

The core curriculum is offered during the first two quarters of the first year and is required of all students. It is a 30-quarter-hour sequence of five basic courses. As the initial phase of the School's educational program, the core curriculum contributes to the process of socialization and professional identification, and presents students with a comprehensive and broad knowledge base from which to operate in the future as practitioners and administrators.

<table>
<thead>
<tr>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall Quarter, First Year</td>
</tr>
<tr>
<td>5070 Social Work Research I</td>
</tr>
<tr>
<td>5110 Social Welfare Policy and Services I</td>
</tr>
<tr>
<td>5210 Human Behavior and Social Environment I</td>
</tr>
<tr>
<td>5410 Social Work Practice I</td>
</tr>
<tr>
<td>5910 Field Practice</td>
</tr>
<tr>
<td>TOTAL QUARTER HOURS</td>
</tr>
<tr>
<td>Winter Quarter, First Year</td>
</tr>
<tr>
<td>5080 Social Work Research II</td>
</tr>
<tr>
<td>5120 Social Welfare Policy and Services II</td>
</tr>
<tr>
<td>5220 Human Behavior and Social Environment II</td>
</tr>
<tr>
<td>5420 Social Work Practice II</td>
</tr>
<tr>
<td>5920 Field Practice</td>
</tr>
<tr>
<td>TOTAL QUARTER HOURS</td>
</tr>
<tr>
<td>Spring Quarter, First Year</td>
</tr>
<tr>
<td>5110 Social Welfare Policy and Services I</td>
</tr>
<tr>
<td>5210 Human Behavior and Social Environment I</td>
</tr>
<tr>
<td>5410 Social Work Practice I</td>
</tr>
<tr>
<td>5910 Field Practice</td>
</tr>
<tr>
<td>TOTAL QUARTER HOURS</td>
</tr>
<tr>
<td>Fall Quarter, Second Year</td>
</tr>
<tr>
<td>5940 Field Practice</td>
</tr>
<tr>
<td>Specialization Courses or Electives</td>
</tr>
<tr>
<td>TOTAL QUARTER HOURS</td>
</tr>
<tr>
<td>Winter Quarter, Second Year</td>
</tr>
<tr>
<td>5940 Field Practice</td>
</tr>
<tr>
<td>5961 Integrative Seminar</td>
</tr>
<tr>
<td>One Elective</td>
</tr>
<tr>
<td>TOTAL QUARTER HOURS</td>
</tr>
</tbody>
</table>

AREAS OF SPECIALIZATION

Social Work Treatment

Social work treatment deals with those individual, family, and group methods utilized to enhance the social functioning of individuals and effectively ameliorate problems of social dysfunction. The 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.

Social Welfare Administration and Planning
Social welfare administration and planning deals with the design, implementation, and continued operation of effective programs for client service. Specifically, the method deals with assessment of client characteristics, development of environmental resources, design of effective organizational structures, management, staff development, program evaluation, social planning, neighborhood and community development, financing, and coordination of services.

Field Practice
Field practice is a critical component of the student's first- and second-year program. Because The UT School of Social Work cooperates with a wide range of social agencies and human service programs in the Province and in the Tennessee and areas immediately adjacent to the State, the School is able to provide field placements in a variety of social work practice areas. The faculty works closely with the placement agency and the field instructor to insure that the student has a quality field practice experience which meets the objectives of the core curriculum and the specialization.

The first-year curriculum is on a concurrent class and field plan, with students engaged in classroom study two or three days per week and in field practice the remainder of the week. First-year agency placements are selected to provide the student with practice experiences related to the core curriculum content and beginning specialization. Within the placement, each student's experiences are planned and designed according to the educational needs.

In the second year, students are engaged full time in classroom courses during the fall quarter. The winter and spring quarter plan consists of a block field placement of four days per week and an additional Thursday in December open to students engaged in field practice the remainder of the week. 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 committee in selecting 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 in social work and to the student's career objectives, and have the approval of the student's faculty advisor.

3. Achievement of a B average on all work presented for the Master's degree.
4. Completion of each required course at a satisfactory level (a grade of C or above). Graduate courses may not be repeated to raise a grade.
5. Students who elect a thesis must pass an oral examination conducted by a faculty committee.
6. Students who elect a non-thesis option must pass a written comprehensive examination.
7. Credits to be counted toward the degree must be earned within six years from the beginning date of the earliest course applied toward the degree, except in cases where permission to update courses has been granted.
8. The minimum number of credit hours required for a degree shall be 79 hours including a maximum of 36 S/N C hours.
9. Performance at a satisfactory level in field practice, which is designed to teach professional practice skills.

ADMISSION REQUIREMENTS
Admission to the professional curriculum is based on the following requirements:
1. A bachelor's degree from an accredited college or university with some preparation in the social sciences. At least three-fourths of the applicant's undergraduate work should be in social sciences, humanities, physical sciences, and other liberal arts subjects. Those with other academic backgrounds may request consultation regarding ways in which they might be admitted.
2. A grade point average of 2.5 on a 4.0 scale, with those falling below the average to be admitted on supplemental evidence of ability to perform at a satisfactory level.
3. Personal qualifications acceptable for entrance into the professional practice of social work.

Preference is given to applicants with a B average in undergraduate work and to required or elective courses offered here. Work, and if previous courses are equivalent to required or elective courses offered here. Work, and if previous courses are equivalent to required or elective courses offered here. Work, and if previous courses are equivalent to required or elective courses offered here.

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.

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 either in the Memphs Branch in March or in the Nashville Branch in June with an intensive ten-week term from which students proceed in the fall into the regular second-year curriculum. Application for admission to the accelerated program is through the regular admission process. Applications should be filed not later than December 31 for the Memphs program and not later than January 31 for the Nashville program.

PART-TIME STUDENTS
Courses in the regular curriculum of the School are open to persons who meet the admission requirements, and who are planning to complete the work for the degree within the next two or three years. Application should be made to the School in the regular way, but the applicant should inform the Director of Admissions of the wish to begin part-time study on a planned basis.

TRANSFER CREDITS
Courses completed in another accredited 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, and if previous courses are equivalent to required or elective courses offered here. The University of Tennessee School of Social Work allows a maximum of 15 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 toward the degree. 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 two years. Completion of the degree. In addition, S/N/C credit earned for the field practicum is also accepted.

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, E.D.; Columbia; G. McLaran (Emeritus), M.S.S.W.; Tennessee; M. K. Muller, Ph.D.; Chicago; R. M. Noe, D.S.W.

Tulane; B. Orchard (Emeritus), M.S.W.; New York School of Social Work.

Associate Professors:

G. W. Ayers, D.S.W.; Tulane; L. M. Beasley, Ph.D.; Denver; W. J. Bell, D.S.W.; Tulane; B. J. Cleckley, Ph.D.; Brandeis; D. S. W.; Tulane; J. C. Eades, Ph.D.; Southern Illinois (Carbondale);

R. W. Falcon, Ph.D.; City University of New York; M. Fine, Ph.D.; Brandeis; J. I. Harlan, M.S.; Tulane; C. S. McKeown, Ph.D.; University of California (Berkeley);

R. B. Rowen, Ph.D.; Arizona; H. Rubenstein, Ph.D.; Chicago; D. A. Santee, M.S.; Simmons; J. P. Tatge, Ph.D.; Tulane; B. J. Veazey, M.S.W.; Tennessee; A. R. Wachter, M.S.S.W.; Tennessee; C. S. Wilson, Ph.D.; St. Louis; P. G. Zarbock, M.S.S.W.; Wisconsin.

Assistant Professors:

J. R. Bates, Ph.D.; Michigan; C. Catingog, Ph.D.; D. Washington; J. Charing, M.S.S.W.; Tennessee;

J. C. Collier, M.S.W.; Tulane; H. P. Coyle, Ph.D.; Western Reserve; C. I. Faust, M.S.S.W.; Tennessee;

A. R. Ford, M.S.; G. M. Gates, M.S.; Georgia; M. S. W.; Tennessee; W. D. Harrison, Ph.D.; Minnesota;

K. Hirayama, D.S.W., Pennsylvania; J. F. Jankovic, Ph.D.; D. Rutgers; D. C. Johnson, M.S.W.; California (Berkeley); J. R. Michaeil, M.S.; Ohio State; D. Parker, D.S.W.; Loyola; P. R. Pogge, Ph.D.; Washington; M. P. Strong, M.S.S.W.; Tulane.

Courses

5000 Thesis (1-15 E)

5002 Non-Thesis Graduation Completion (3-15)

Required for the non-thesis student not otherwise registered during any quarter when such a student uses university facilities and/or faculty time before degree requirements. May be repeated. S/N/C only. E

5070-80 Social Work Research I, II, III, IV (2, 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 context of the research design, methodology, and research design and methodology appropropriate to evaluative research, and utilization of research findings. Prereq: Completion of core or consent of instructor.

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: 5070-80 and consent of faculty member conducting investigation. S/W

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 (2-9) Individual study or research on problems of special significance to the student, 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 of social work professionals can make to policy-making process through which macrosocial 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 skill development. F

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 indivisible and indivisible social welfare benefits through organized instrumental action of professional nature. W

5130 Social Policy Analysis (2-3) ‘Policy science’ techniques related to ordination of extraordinary in assessing social, political, and economic implications of social policy proposals. Prereq: Completion of core or consent of instructor. W

5161 Social Welfare Seminar (3-3) Problem area or field of practice seminar focusing on substantive knowledge about social problem or condition and interrelatedness of problem, solutions, and environment. Seminar, social policy, social welfare program, and social work practice. Fields such as health, mental health, child and family welfare, mental retardation, 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 (2, 3) Examination of theories pertaining to individual family, and small group within context of functions, structures, roles and processes. Behavior of these systems conceptualized along functional-disfunctional and normal-deviant continuum. Organizing themes, development and maturation, adaptive and defensive mechanisms. Open system approach used to understanding interrelationship of biological, psychological, and social variables with emphasis on implications of culture and ethnic. W, F

5260 Special Accelerated Program in Social Work (15) Ten-week program providing qualified students with intensive academic and field practice experience that qualifies them to enter second year of graduate study upon successful completion of this term. S/N/C only.

5310 Human Behavior and Social Environment (2-3) Deepens and extends student’s knowledge of range of available theories 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 pros, drama, and poetry, which illuminate and expand knowledge and appreciation of every person’s humanness. Adaptive and maladaptive responses to extraordinary life situations and events, portrayed by creative writers. Artistic representation of molding of human personality and the interaction of persons with one another and with society. Prereq: Completion of core or consent of instructor.

5312 Psychopathology and Social Deviance (2-3) Theories of and recent research in etiology of psycho-syndromal dysfunction and social variance. Categorical approach to psychopathology examined and differentiated from other approaches to human behavior. Prereq: Completion of core or consent of instructor.

5313 Deviant Behavior of Children and Youth (2-3) Deviant behavior and conduct disorders in child-
5560 Social Work Treatment with Groups (2-3) Development of knowledge and skill in use of group methods in social work practice; organization and formulation of group, structuring of group tasks and experiences, understanding and enhancing group functioning, enabling problem-solving effectiveness, facilitating group decision making, and evaluating individual change and group effectiveness. Prereq: Completion of core or consent of instructor.

5561 Interpersonal Skill Development (2-3) Training designed 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-based, leadership, techniques and procedures, and research. Prereq: Completion of core or consent of instructor.

5561 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.

5562 Community Organization (2-3) Using behavioral and social science knowledge about communities and groups to assist in development of resources to meet human needs. Prereq: Completion of core or consent of instructor.

5570 Social Planning (2-3) (Same as Planning 5570) Social agencies and institutions and their role in social planning. Prereq: Completion of core or consent of instructor.

5571 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.

5571 Administration in Social Work (2-3) Introduction to administrative practice as it relates to social work purpose and values and development of administrative principles that make possible effective professional welfare services. Prereq: Completion of core or consent of instructor.

5572 Organizational Design of Social Welfare Agencies (2-3) Critical problems of adapting organizational structure and operational patterns to tasks, objectives, and mandates. Planning and design techniques for new programs and for modification of existing programs and the 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 community organization student, or consent of instructor. F

5580 Management of Residential Settings (2-3) Issues and trends in management and programming in residential institutions for children, aged, mentally ill, and mentally disabled, juvenile delinquents, and other groups. Prereq: Completion of core or consent of instructor.

5581 Organizational Perspectives in Juvenile Justice (2-3) Aspects of juvenile justice system: overview of juvenile delinquency, introduction to theories of causation, role of police in detecting delinquency and apprehension of delinquent offenders, police procedures, role of juvenile courts, alternatives to institutions, correctional institutions, aftercare programs, and preventive strategies. Prereq: Second-year standing.

5582 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.

5585 Social Work Treatment for Marital Adjustment (2-3) Theories regarding social and cultural values and personality processes which gain expression in marriages, concepts regarding contemporary marriage styles, problem areas in marriages, and appropriate treatment approaches. Prereq: Completion of core or consent of instructor.

5586 Social Gerontology (2-3) Physical, psychological, and social aspects of aging; economic and health status of aging; older person and family; community programs for aging; retirement—phenomenon of modern society. Prereq: Completion of core or consent of instructor.

5587 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.

5580 Social Gerontology (2-3) Physical, psychological, and social aspects of aging; economic and health status of aging; older person and family; community programs for aging; retirement—phenomenon of modern society. Prereq: Completion of core or consent of instructor.

5588 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.

5590-10 Field Practice (3, 4) Instruction and supervised practice in methods of social work with individuals, groups and communities. Prereq: Admission to the School; 5140 concurrently or prior to 5920. May be taken in sequence. Required course. S/NC only.

5590-40-50-60 Field Practice (4, 4-8, 4-8) Specialized instruction and supervised practice methods of social work treatment, administration, and planning in community health and welfare programs and agencies. Prereq: Admission to the School. Must be taken in sequence. S/NC only. Sp; W; Sp.

5591 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, discussions, simulations, and gaming situations prepares graduating student to assume positions of responsibility and leadership within profession. Graduating student helps to plan toward continuing his/her education and professional development. S/NC only.

5592 Policy Options (2-3) Application of substantive knowledge to comprehensive problem-solving within existing service and community systems. Critical appraisal of functional relationships between problem, policy, planning, practice, and outcomes. Examination of problems from practice to determine key elements of optimal services and implications for policy decisions. S/NC only.

5593 Policy Analysis in Governmental Social Welfare Policy Making (2-3) Practical introduction to processes of legislative and/or administrative policy making at state or local governmental level, through assignment of students to offices of elected or appointed policy makers. Limited social welfare policy research activities. Seminar to present normative and descriptive theory about policy-making process, and models of policy analysis. Prereq: 5110 and consent of instructor. May be repeated.
Index

Academic Calendar, 2
Academic Common Market, 13, 33, 45, 87
Academic Termination, 16
Accounting, 37
Activity Fee (University Programs and Services Fee), 12
Adding Courses, 14
Administration, Graduate School, 6
Administration, University, 7
Admission Examinations, 8, 9, 11
Admission Procedures, 11
Admission Requirements, 8, 9, 10, 11
Admission to Candidacy, 18, 19, 20
Admission, Type of:
  Faculty Members, 11
  Graduate Degree Program, 10
  International Students, 11
Non-Degree, 10
Probation, 11
Seniors, 11
Transient, 11
Veterinary Medicine Students, 11
Adult Education, 51
Advertising, 46
Advisor, 14
Aerospace Engineering, 82, 84
Agricultural Economics and Rural Sociology, 24, 25
Agricultural Education, 61
Agricultural Engineering, 24, 26
Agricultural Experiment Station, 23
Agricultural Extension Education, 26
Agricultural Extension Service, 23
Agricultural Mechanization, 26
Agriculture Campus (map), 4
Agriculture, College of: 23
  Agricultural Economics and Rural Sociology, 24, 25
  Agricultural Engineering, 24, 26
  Agricultural Extension Education, 26
  Agricultural Extension Service, 23
  Agricultural Mechanization, 26
  Agriculture Campus (map), 4
Agriculture, Institute of: 23
  Agricultural Economics and Rural Sociology, 24, 25
  Agricultural Engineering, 24, 26
  Agricultural Extension Education, 26
  Agricultural Extension Service, 23
  Agricultural Mechanization, 26
Animal Science, 24, 26, 32
Entomology and Plant Pathology, 28
Food Technology and Science, 24, 25
Forestry, Wildlife and Fisheries, 24, 29
Ornamental Horticulture and Landscape Design, 30
Ornamental Horticulture, 30
Plant and Soil Science, 24, 31
Agriculture, Institute of: 23
  Agricultural Experiment Station, 23
  Agriculture Extension Service, 23
  College of Agriculture, 23
  College of Veterinary Medicine, 31
Animal Science, 24, 26, 32
Anthropology, 97
Appeals Procedure, 16
Application, 11, 12
Application Fee, 11, 12
Archaeology, 99
Architecture, School of, 147
Art, 99
Art Education, 50
Asian Studies, 112
Assistantships, 3, 13
Astronomy, 129
Audiology, 3
Auditors, 13, 15
Automobile Registration, 16
Average, Required, 14
Aviation Systems, 93
Biochemistry, 104
Biology, Radiation, 135
Biomedical Sciences, 18, 148
Black Studies, 112
Board of Trustees, 7
Botany, 105
Broadcasting, 47
Bureau of Educational Research and Service, 50
Business Administration, College of: 33
  Accounting and Business Law, 37
  Business Administration, 38
  Business Education, 38
  Economics, 38
  Finance, 40
  Management, 41
  Management Science, 41, 96
  Marketing and Transportation, 42
  Office Administration, 43
Statistics, 44
Business and Economic Research, Center for, 37
Business Education, 38, 61
Business Law, 38
Calendar for 1982–83, 2
Campus Map, 4, 5
Candidacy, Admission to, 18, 19, 20
Change (Revision) of Program, 15
Change of Registration, 14
Chemical Engineering, 68
Chemistry, 107
Child and Family Studies, 88
Civil Engineering, 71, 72
Classics, 110
College Student Personnel, 51
Colleges:
  Agriculture, 23
  Business Administration, 33
  Communications, 45
  Education, 48
  Engineering, 67
  Home Economics, 87
  Liberal Arts, 97
  Medicine-Knoxville Unit, 143
  Nursing, 144
  Veterinary Medicine, 31
Committees:
  Doctoral, 19
  Master's, 50
  Specialist in Education, 19
Communications, 46
Communications, College of: 45
Communication, 46
  Advertising, 49
  Broadcasting, 47
Journalism, School of, 47
Communications Research Center, 48
Comparative and Experimental Medicine, 32, 94
Comparative Literature, 112
Comprehensive Examinations, 20
Computer Science, 110
Computing Center, 17
Confidentiality of Information, 12
Consumer Studies and Housing:
  Public Policy, 87, 88
Contents, 3
Continuing and Higher Education, 51
  Continuous Registration, 20
Correspondence Study, 15
Correspondence Directory, 3
Council, Graduate, 6
Counseling, Vocational Rehabilitation, 58
Course, Drop, Add, 14
Course Listing, Explanation, 14
Course Load, 14
Cultural Studies, 112
Curriculum, 82
Curriculum and Instruction, 52, 55
Dates of Registration, 2
Deferred Payment Service Fee, 12
Degree Program Admission, 10
Degree Requirements, 18–22
Degrees Available, 8–9
Diagnostic Examinations, 20
Dissertation, 16, 20
Dissertation Registration, 20
Distributive Education, 61
Doctoral Committees, 19
Doctoral Degrees, 8–9, 19–22
Doctor of Business Administration, 36
Doctor of Education, 49, 52, 56, 60, 62, 64
Doctor of Philosophy, 24, 36, 39, 42, 45, 49, 52, 60, 62, 68, 72, 75, 79, 82, 85, 87, 94, 95, 97, 102, 104, 105, 107, 112, 114, 115, 117, 118, 121, 127, 129, 131, 135, 137, 141, 148
Doctoral Examinations, 20
Doctoral Languages, 20
Dropping Courses, 14
Dual J.D.-MBA Program, 35
Ecology, 94
Economics, 38, 112
Education, 49, 55
Education, College of: 49
Art and Music Education, 50
Continuing and Higher Education, 51
  Curriculum and Instruction, 52
  Education, 49, 55
  Educational Administration and Supervision, 55
  Educational and Counseling Psychology, 56
  School of Health, Physical Education, and Recreation, 62
  Division of Health and Safety, 62
  Division of Physical Education, 63
  Division of Public Health, 65
  Division of Recreation, 65
  Special Education and Rehabilitation, 58
  Vocational-Technical Education, 60
  Educational Administration and Supervision, 55
  Educational and Counseling Psychology, 56
  Educational Psychology and Guidance, 56
  Educational Research and Service, Bureau of, 17
  Educational Testing Service, 12
  Electrical Engineering, 75
  Elementary Education, 52
  Employment, 13
  Energy, Environment, and Resources Center, 17
  Engineering Administration, 67
  Engineering, College of: 67
  Administration, 67
  Chemical, Metallurgical and Polymer, 68
  Civil, 71
  Electrical, 75
  Engineering Science and Mechanics, 78
  Industrial, 80
  Mechanical and Aerospace, 82
  Nuclear, 85
  Engineering Experiment Station, 67
  Engineering Science, 78
  English, 112
  English Education, 52
  English for Foreign Students, 11, 15
  English Proficiency, 15
  Entomology and Plant Pathology, 28
  Entrance Requirements, 10
  Environmental Engineering, 73
  Environmental Practice, 32
Examinations:
- Admission, 8, 9, 11
- Comprehensive, 20
- Diagnostic, 20
- English Proficiency, 11, 15
- Final, 19–21
- Oral, 19–21
- Proficiency, 15
- Qualifying, 20
- Written, 19, 20

Expenses, 12, 13

Experiment Stations:
- Agricultural, 23
- Engineering, 67

Explanation of Course Listings, 14
- Extension Service, Agricultural, 23
- Facilities and Services, 16
- Faculty Members, Admission of, 11
- Failures, 14
- Fee Classification, 13
- Federal Educational Rights and Privacy Act, 12
- Fees, 12–13
- Fellowships, 3, 13
- Final Examinations, 19–21
- Finance, 40
- Financial Aid, 3, 13
- Food Science, 90
- Food Systems Administration, 91
- Food Technology and Science, 24, 28
- Foreign Language Education, 52
- Foreign (International) Students, Admission of, 11
- Foreign (International) Students, Office of, 17
- Forestry, 24, 29
- French, 136
- General Regulations, 14
- Geography, 114
- Geological Sciences, 115
- Geology, 115
- German, 117
- German Language and Literature, 117
- Germanic and Slavic Languages, 117
- Grades, 14, 15
- Grading System, 14, 15
- Graduating Assistantships, 13
- Graduate Council, 6
- Graduate Course Numbers, 14
- Graduate Credit, 14
- Graduate Management Admission Test, 8–9, 12, 35
- Graduate Record Examination, 8–9, 12
- Graduate Research Centers and Institutes, 17
- Graduate School Administration, 6
- Graduate School News, 10
- Graduate School Regulations, 14
- Graduate Student Responsibility, 10
- Graduate Studies and Research, 10
- Graduation Fee, 12
- Graduation Requirements, 21–22
- Greek, 110
- Guidance, 56
- Handicapped Student Services, 3, 16
- Health Education, 62
- Health, Physical Education, and Recreation, School of, 62
- History, 118
- Home Economics, 89
- Home Economics, College of, 87
- Child and Family Studies, 88
- Home Economics, 89
- Home Economics Education, 61, 89
- Nutrition and Food Sciences, 90
- Textiles, Merchandising and Design, 91
- Home Economics Education, 61, 89
- Horticulture, 30
- Housing, 3, 16
- Incompletes, 15
- Industrial Education, 62
- Industrial Engineering, 80
- Industrial and Organizational Psychology, 95
- In-state Fee Classification, 13
- Institute of Agriculture, 23
- Instructional Media and Technology, 52
- Aero/collegiate Programs: 93
- Aviation Systems, 93
- Comparative and Experimental Medicine, 94
- Ecology, 94
- Industrial and Organizational Psychology, 95
- Life Sciences, 96
- Management Science, 96
- Interior Design and Housing, 91
- International Students, 11, 17
- International Student Affairs Office, 3, 17
- International Students Admission, 11
- Italian, 136
- J.D.-M.B.A. Program, 35
- Journalism, 47
- Kingsport University Center, 18
- Language Requirements, 20
- Late Registration Fee, 12
- Latin, 110
- Law Courses, 15
- Liberal Arts, College of: 97
- Anthropology, 97
- Archaeology—Greek and Roman, 99
- Art, 99
- Audiology and Speech Pathology, 101
- Biochemistry, 104
- Botany, 105
- Chemistry, 107
- Classics, 110
- Computer Science, 110
- Cultural Studies, 112
- Economics, 112
- English, 112
- French, 114, 136
- Geography, 114
- Geological Sciences, 115
- Germanic and Slavic Languages, 117
- Greek, 110, 118
- History, 118
- Latin, 110, 120
- Mathematics, 120
- Microbiology, 32, 124
- Music, 125
- Music Education, 50
- Music Fee, 12
- Nashville Graduate Engineering Program, 18
- Non-Degree Admission, 10
- Non-Thesis Programs, 19
- Non-Thesis Registration, 19
- Nuclear Engineering, 85
- Nursing, College of, 144
- Nutrition, 90
- Oak Ridge Programs, 18
- Oak Ridge School of Biomedical Sciences, 18, 148
- Off-Campus Centers, 18
- Off-Campus Housing, 16
- Office Administration, 43
- Office Hours, 3
- Ombudsman, 17
- Oral Examinations, 19–21
- Ornamental Horticulture and Landscape Design, 30
- Out-of-State Fee Classification, 13
- Parking Rules, 16
- Passing Grades, 14
- Pathobiology, 32
- Philosophy, 127
- Physical Education, 64
- Physically Disabled, 16
- Physics, 129
- Planning, School of, 153
- Plant and Soil Science, 24, 31
- Plant Pathology, 26
- Political Science, 131
- Polymer Engineering, 71
- Portuguese, 137
- Prerequisites, 14
- Privacy Act, 12
- Procedures: Admission, 11
Index 161

Specialist in Education, 8-9, 19, 21, 49, 52, 55, 58, 60, 63
Specialist in Education Committee, 19
Speech and Hearing Science, 101, 139
Speech and Theatre, 139
Speech Pathology, 101
Statistics, 44
Student Employment, 13
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, 140
Theses and Dissertation, 16, 19-20
Thesis, 18-19
Thesis Registration, 18
Time Limit, 19-20
Timetable of Classes, 3
Traffic Rules, 16
Transcripts, 3, 10, 11
Transfer Credits, 15
Transient Admission, 11
Transportation and Logistics, 43
Transportation Center, 17
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, 16
University Programs and Services Fee, 12
University Studies, 140
Urban Practice, 32
Vehicle Operation, 16
Veterans' Benefits, 3, 14
Veterinary Medicine, 11, 31
Veterinary Medicine, College of, 31
Environmental Practice, 32
Pathobiology, 32
Rural Practice, 32
Urban Practice, 32
Veterinary Medicine Students, 11
Vocational Rehabilitation Counseling, 58
Vocational-Technical Education, 60
Waiver of Fees, 13
Water Resources Research Center, 18
Where to Write, 3
Wildlife and Fisheries Science, 30
Withdrawal, 13, 14
Work-Study, 3, 13
Written Examination, 19-20
Zoology, 140

Appeal, 16
Doctoral Degree, 22
Master's Degree, 21
Registration, 12
Specialist in Education Degree, 21
Proficiency Examinations, 15
Provisional Admission, 11
Psychological Clinic, 133
Psychology, 132
Psychology, Industrial and Organizational, 95
Public Administration, 131
Public Health, 63
Qualifying Examination, 20
Radiation Biology, 135
Reading Education, 52
Readmission, 12
Recreation, 65
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, 58
Religious Studies, 135
Requirements:
Admission, 8-9, 10
Course, 18-20
Doctoral Degree, 19
Grades, 14
Graduate School, 14
Graduation, 20-21
Language, 20
Master's Degree, 18
Residence, 15
Research, 19
Specialist in Education Degree, 19
Research Centers and institutes, 18
Research Requirements, 19
Residence Halls, 16
Residence Requirements, 15
Residency Classification, Fees, 13
Responsibility, Graduate Students, 10
Restricted Programs, 6-9, 11
Revision of Program, 15
Romance Languages, 135
Rural Practice, 32
Rural Sociology, 24, 25
Russian, 117, 137
Safety Education and Service, 63
Scholarships, 3, 13
School Health Education, 64
Schools:
Architecture, 147
Biomedical Sciences, 148
Library and Information Science, 151
Planning, 153
Social Work, 155
Science Education, 52
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, 52
Social Security Number, 12
Social Work, School of, 18, 155
Sociology, 137
Space Institute, 17
Spanish, 137, 139
Special Education, 58