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

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

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

Publication Authorization Number: E01-0425-006-89
Graduate Admissions & Records
218 Student Services Building

REIGLIOUS CENTERS

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### University Calendar for 1989-90

#### Summer Term 1989
- **June 1 (Thursday)**: Classes Begin
- **July 4 (Tuesday)**: Independence Day
- **July 5 (Wednesday)**: First Session Ends
- **July 6 (Thursday)**: Second Session Begins
- **August 9 (Wednesday)**: Second Session Ends
- **August 11 (Friday)**: Commencement

#### Fall Semester 1989
- **August 23 (Wednesday)**: Classes Begin
- **September 4 (Monday)**: Labor Day
- **November 23-24 (Thursday-Friday)**: Thanksgiving
- **December 5 (Tuesday)**: Classes End
- **December 6-7 (Wednesday-Thursday)**: Study Period
- **December 8-13 (Friday-Wednesday)**: Final Exams
- **December 15 (Friday)**: Commencement

#### Summer Term 1990
- **June 19-23 (Monday-Friday)**: Spring Break
- **April 13 (Friday)**: Good Friday
- **May 1-2 (Monday-Tuesday)**: Study Period
- **May 3-8 (Thursday-Wednesday)**: Final Exams
- **May 11 (Friday)**: Commencement

#### Spring Semester 1990
- **January 10 (Wednesday)**: Classes Begin
- **January 15 (Monday)**: Martin Luther King Day
- **March 19-23 (Monday-Friday)**: Spring Break
- **April 13 (Friday)**: Good Friday
- **April 30 (Monday)**: Classes End
- **May 1-2 (Monday-Tuesday)**: Study Period
- **May 3-8 (Thursday-Wednesday)**: Final Exams
- **May 11 (Friday)**: Commencement

#### Summer Term 1990
- **May 31 (Thursday)**: Classes Begin
- **July 3 (Tuesday)**: First Session Ends
- **July 4 (Wednesday)**: Independence Day
- **July 5 (Thursday)**: Second Session Begins
- **August 8 (Wednesday)**: Second Session Ends
- **August 10 (Friday)**: Commencement

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**NOTE:** Deadlines for degree requirements on pp. 23-24.
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<tr>
<td>The Governor of Tennessee</td>
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<tr>
<td>The Commissioner of Education</td>
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<td>The President of the University</td>
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<tr>
<td>The Executive Director, Tennessee Higher Education Commission</td>
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<td>R.B. Hailey, Sevierville</td>
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<td>William Sansom, Knoxville</td>
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<td>William M. Johnson, Sparta</td>
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<td>Marcia A. Echols, Nashville</td>
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<td>Amon Carter Evans, Columbia</td>
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<td>Ben S. Kimbrough, Clarksville</td>
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<tr>
<td>Jack U. Dalton, Parsons</td>
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<tr>
<td>Tom Elam, Union City</td>
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<td>Ronald Terry, Memphis</td>
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#### From Anderson, Bedford, Coffee, Franklin, Lincoln, Moore, and Warren Counties

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<th>J. Steven Ennis June 1, 1994</th>
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<td>From Davidson County</td>
<td>Michael Graves June 1, 1993</td>
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<tr>
<td>From Hamilton County</td>
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<td>James A. Haslam, III June 1, 1989</td>
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<td>From Shelby County</td>
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<td>Jack Craddock June 1, 1990</td>
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#### Officers of the Board

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<td>Student Member</td>
<td>Bentley T. Beard July 1, 1989</td>
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<tr>
<td>Officers of the Board</td>
<td>Governor Ned McWherter, Chairman</td>
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<tr>
<td></td>
<td>William M. Johnson, Vice Chairman</td>
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<tr>
<td></td>
<td>Lamar Alexander, President</td>
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<tr>
<td></td>
<td>A. David Martin, Treasurer</td>
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<tr>
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<td>Beauchamp Brogan, Secretary</td>
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<td></td>
<td>Linda Logan, Assistant Secretary</td>
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</table>

#### University Administration

| Lamar Alexander, B.A., J.D., President of the University |
| Joseph E. Johnson, A.B., A.M., Ed.D., Executive Vice President and Vice President for Development |
| Homer S. Fisher, B.S., M.B.A., Senior Vice President |
| Michael T. Nettles, B.A., M.S., M.A., Ph.D., Vice President for Assessment |
| D.M. (Peter) Gosssett, B.S., M.S., Ph.D., Vice President for Agriculture |
| Emerson H. Fry, B.S., C.P.A., Vice President for Business and Finance |
| James C. Hunt, A.B., M.S., M.D., Vice President for Health Affairs |
| Sammie Lynn Puett, B.S., M.S., A.P.R., Vice President for Public Service and Continuing Education |
| Beauchamp E. Brogan, B.S., LL.B., J.D., General Counsel |
| David Martin, B.S., M.B.A., C.P.A., Treasurer |

#### UT, Knoxville Administration

| John J. Quinn, B.S., Ph.D., Chancellor |
| George W. Wheeler, B.S., M.S., Ph.D., Provost |
| Philip A. Scheurer, B.A., M.S., Vice Chancellor for Student Affairs |
| Jack E. Williams, B.S., Vice Chancellor for Development and Alumni Affairs |
| C.W. Minkel, B.A., M.A., Ph.D., Vice Provost and Dean of the Graduate School |
| Thomas C. Collins, B.S., M.S., Ph.D., Vice Provost for Research |
| O. Glen Hall, B.S., M.S., Ph.D., Dean of the College of Agriculture |
| J. William Rued, B.A., M.A., Dean of the School of Architecture |
| C. Warren Neil, B.S., M.B.A., D.B.A., Dean of the College of Business Administration |
| B. Kelly Letter, B.S., M.S., Ph.D., Dean of the College of Communications |
| Richard Wirsinskiewski, B.S., M.E., Ed.D., Dean of the College of Education |
| William T. Snyder, B.S., M.S., M.P., Ph.D., Dean of the College of Engineering |
| Jacquelyn O. DeJonge, B.S., M.A., Ph.D., Dean of the College of Human Ecology |
| Maia V. Varbourgh, B.A., J.D., Dean of the College of Law |
| Lorman A. Rainer, A.B., M.A., Ph.D., Dean of the College of Liberal Arts |
| Sylvia E. Hart, B.S.N., M.S.N., Ph.D., Dean of the College of Nursing |
| Eunice O. Shatz, B.A., M.S., Ph.D., Dean of the College of Social Work |
| Hyram Kitchen, M.S., D.V.M., Ph.D., Dean of the College of Veterinary Medicine |
| Joseph P. Goddard, B.S., M.S., Ph.D., Dean of the Division of Continuing Education |
| Gerald D. Bowker, B.A., M.A., Dean of Admissions (Undergraduate and Records) |
| Richard M. Roberts, A.B., M.A, Ph.D., Acting Dean of the UT Space Institute |
| Raymond Popp, B.S., M.A., Ph.D., Acting Director of the UT-Oak Ridge Graduate School of Biomedical Sciences |
| Gary R. Purcell, A.B., M.L.S., M.A. Ph.D., Director of the Graduate School of Library and Information Science |
| James A. Spencer, B.A., M.C.P., Director of the Graduate School of Planning |
The Graduate School Administration

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

The Graduate Council

Membership September 1, 1988

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

College or Unit | Elected Members | Expiration | Proxy
---|---|---|---
Agriculture | Dr. Luther Keller | Aug. 31, 1989 | Dr. Fred Allen
Business Administration | Dr. Gary N. Dicer | Aug. 31, 1990 | Dr. John M. Wachowicz
| Dr. C. Douglass Izard | Aug. 31, 1991 | Dr. Alan M. Schlottmann
Communications | Dr. Michael Singletary | Aug. 31, 1990 | Dr. Barbara Moore
Education | Dr. Estill Alexander | Aug. 31, 1989 | Dr. Craig Wrisberg
| Dr. Jerry Bellon | Aug. 31, 1989 | Dr. Peter Husen
| Dr. Charles Hargis | Aug. 31, 1990 | Dr. Andy Kozar
| Dr. Charles Thompson | Aug. 31, 1990 | Dr. George Harris
| Dr. Patricia Beitel | Aug. 31, 1991 | Dr. Charles Faires
Engineering | Dr. Thomas G. Carley | Aug. 31, 1989 | Dr. Marshall O. Pace
| Dr. W. Wayne Claycombe | Aug. 31, 1989 | Dr. Paul N. Stevens
| Dr. Paul J. Phillips | Aug. 31, 1990 | Dr. Robert Counce
| Dr. Joseph J. Perona | Aug. 31, 1991 | Dr. H.W. Hsu
Graduate Student Assoc. | Mr. Tom McDonald | Aug. 31, 1989 | Ms. Cherry Jones
| Ms. Sherrie Humphrey | Aug. 31, 1989 | Ms. Connie Lester
| Mr. Tom Shields | Aug. 31, 1989 | Ms. Kristi Havens
Human Ecology | Dr. Carl Dyer | Aug. 31, 1990 | Dr. Randy Bressee
Liberal Arts | Dr. Paul Barrette | Aug. 31, 1989 | Dr. Daniel Carroll
| Dr. William Lyons | Aug. 31, 1989 | Dr. Bruce Wheeler
| Dr. Michael Logan | Aug. 31, 1990 | Dr. Donald Ploch
| Dr. Charles Maland | Aug. 31, 1991 | Dr. William Heflin
| Dr. Susan Riechert | Aug. 31, 1991 | Dr. Dewey Bunting
| Dr. Kenneth Walker | Aug. 31, 1991 | Dr. Harry McSween
Nursing | Dr. Mary Lue Jolly | Aug. 31, 1989 | Dr. Patricia Droppleman
School Lib. & Inf. Sci. | Dr. Glenn Estes | Aug. 31, 1991 | Dr. Gary Purcell
School of Planning | Dr. Pat Fisher | Aug. 31, 1989 | Dr. David Johnson
Social Work | Dr. Tom Cruthirds | Aug. 31, 1989 | Dr. Cathy Faver
| Dr. Roger Nooe | Aug. 31, 1989 | Dr. Reginald Avery
UT Space Institute | Dr. Walter Frost | Aug. 31, 1991 | Dr. Atul Sheth
Veterinary Medicine | Dr. Terry Shultz | Aug. 31, 1991 | Dr. Michael H. Sims
## Majors and Degree Programs

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*Non-degree and provisional students must obtain permission from the department/program head to register for courses in these fields.*
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a International applicants only.
b American applicants only.
c G.S. Rating Form submitted to Department.
d Forms obtained from & returned to Department.
GRADUATE STUDY
Rules, policies, fees, and courses described in this catalog are subject to change without notice.
The Graduate School

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

The University of Tennessee is the official land-grant institution for the State of Tennessee with its main campus in Knoxville. UTK is a comprehensive, research-oriented institution offering a wide range of graduate programs leading to the Master’s and doctoral degrees. The University offers Master’s programs in 88 fields and doctoral work in 52. Approximately 5,700 graduate students are enrolled on and off campus. Administrators of graduate study is conducted by department heads or faculty advisors and committees responsible for particular programs. In addition to departmental units, numerous interdisciplinary programs, institutes and centers have been developed on campus and in locations throughout the state.

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

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

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

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

Admission and Registration

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

When a student is admitted to The Graduate School prior to having received the baccalaureate degree, that degree must be awarded before the date of first registration in The Graduate School. If a student does not enroll within one year after the requested admission, the application process must be repeated.

Types of Admissions

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

ADMISSION TO A GRADUATE DEGREE PROGRAM

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

The graduate application, a $15 fee, and one (1) official transcript from each institution previously attended are required for consideration as a potential degree candidate.

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 studies, achievement on admission tests for graduate studies, letters of recommendation from professors familiar with the applicant's capabilities, and other evidence of scholarly achievement. Refer to pages 8-9 and to descriptions of programs for specific requirements for admission.

NON-DEGREE ADMISSION

Applicants may apply for non-degree status who, for example:
1. do not desire to pursue a degree program; or
2. need additional time to fulfill application requirements for a degree program.

There is no specific limit on the number of courses that a student may take in non-degree status. However, before accumulating 15 hours of graduate coursework in this status, the student must either:
1. have been admitted to a specific degree program (see Change of Program, p. 20, for instructions); or
2. file a Plan of Study form with the Office of Graduate Admissions and Records for approval to continue taking courses in non-degree status. The plan of study must include a stated educational objective and a list of courses proposed to achieve that objective. A maximum of 15 graduate hours taken before acceptance into a degree program may be applied toward a graduate degree, if approved by the student's committee. Courses applied toward any graduate degree must fall within the time limit specified for the degree.

The graduate application, a $15 application fee, and one (1) official transcript from each institution previously attended are required for consideration as a non-degree student. The minimum requirements are a Bachelor's degree with a 2.5 grade-point average on a 4.0 scale (or a 3.0 the senior year) from a college or university accredited by the appropriate regional accrediting agency. A major area need not be declared, but some departments do not permit non-degree students to register for graduate courses (see pages 8-9 for information on restricted programs). Every graduate student must meet with an academic advisor at least once each semester to discuss his/her program. For students with a declared major, the advisor must be from the appropriate academic unit. If no advisor has been assigned, the department head or designee is the advisor. For a provisional student who has no declared major, the Associate Dean of The Graduate School or designee is the advisor.

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

The Office of Graduate Admissions and Records will process the change to non-degree status if all requirements are met. To apply for a specific degree program, the student must submit the Request for Change of Graduate Program form to the Office of Graduate Admissions and Records. Provisional admission does not assure admission to a non-degree or degree program. A student who wishes to enter a degree program will be directed to the appropriate department. The student who fails to complete provisional admission within seven weeks after registration will NOT be permitted to register again until all deficiencies have been corrected and a copy of the transcript showing the coursework taken, until all admission requirements are met. An international student on a non-immigrant visa may not enroll in the provisional status.

INTERNATIONAL STUDENT ADMISSION

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

- a. 3.0 and 3.5 on 4.0 scale;
- b. 14 and 15 on 20 point scale;
- c. 80.0 from Chinese institutions;
- d. 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 transcripts. An international student may apply for admission any semester, but normally enters the summer or fall semester. Deadlines for submission of application materials:
- Fall: 1 March
- Spring: 15 July
- Summer: 15 November

Resources of Graduate Admissions and Records must be notified of any change in entering date after admission has been granted. Individual departments and colleges may have further restrictions on admission dates. For this information, students should contact the department whose program they wish to enter.

The following items must be received before admission will be considered:
1. A completed application accompanied with a $15 non-refundable processing fee.
2. Official or attested university records, with certified translations if the records are not in English (Notarized copies are not acceptable).
3. Certification of English proficiency. Every student whose native language is not English must either submit a score of 525 or above on the Test of English as a Foreign Language (TOEFL), taken within the past two years, or have received a degree from an accredited U.S. institution.
4. Documented evidence of financial resources sufficient to support the student as stated on the financial statement form supplied to the applicant.
5. Results of the Graduate Record Examination (GRE) or Graduate Management Admission Test (GMAT), if required. (See pages 8-9.)
6. Letters of recommendation or rating forms, if required. (See pages 8-9.)

Admission must be granted and financial documentation and financial certification must be received prior to issuance of an I-20 or IAP-66 form needed to obtain a visa. The I-20 must be received prior to issuance of an I-20 or IAP-56 form needed to obtain a visa. The Graduate School will not issue these forms after the following dates:
- Fall: 15 June
- Spring: 1 November
- Summer: 15 March

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 not enroll as a provisional or non-degree student. All students whose native language is not English must take an English proficiency examination after arrival at UTK. Refer to section on English Proficiency, page 19.

TRANSIENT GRADUATE STUDENT ADMISSION

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

ELIGIBILITY OF SENIORS

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

ENROLLMENT OF VETERINARY MEDICINE STUDENTS IN GRADUATE COURSES

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

1. The student's advisor must approve in advance the student's enrollment in each course.
2. The student may take a maximum of 10 semester hours of graduate courses during the D.V.M. program.
3. Approval must be obtained each semester at registration through the Office of Graduate Admissions and Records. The student's progress is subject to review and approval each semester by the Associate Dean, College of Veterinary Medicine.

ADMISSION OF FACULTY MEMBERS

Faculty members of UTK or the Institute of Agriculture at the rank of assistant professor or above, and employees of the administrative staff at UTK, the UT Central Administration, and the Institute of Agriculture will not normally be admitted to candidacy for a doctoral degree at UTK. Exceptions to this policy may be granted only upon petition to The Graduate School.

Requests should be directed to the Vice Provost and Dean of The Graduate School.

Possible conflict of interest, the ability to exert influence in the program area, and potential inbreeding of the faculty will be the major considerations when requests for exceptions are reviewed. Requests for exceptions must be made in writing. They should include a justification, a plan of study, and a schedule for meeting residence requirements. Requests must have the approval of the Head of the Department in which the faculty member will be housed, the Dean of the College, and the Vice Provost and Dean of The Graduate School.

Admission Procedures

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

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

1. The completed Graduate Application for Admission (inside front cover of Graduate Catalog).
2. A $15 non-refundable application fee.
3. One official transcript from all colleges and universities attended.
4. Reference letters or rating forms (pages 8-9). Forms obtained from the college or department should be returned to the same source.
5. Scores from examinations which may be required for admission. Graduate programs which require scores from the Graduate Record Examination or the Graduate Management Admission Test are shown on pages 8-9. The TOEFL is required of all students whose native language is not English, unless they have graduated from a regionally accredited U.S. institution.

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

Educational Testing Service
Princeton, NJ 08450

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

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

All of the above documents become the property of the University and will not be returned. For international graduate student admission procedures, see International Student Admission (page 14).

Readmission

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

Registration Procedures

Registration is required of all graduate students when using University facilities and/or faculty time. The minimum number of hours for registration is 3. Registration allows use of such services as library check-out, laboratories, and recreation facilities not open to the public.

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

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

To register, students should:

1. Report to the Office of Graduate Admissions and Records to obtain registration materials (scan form and Timetable of Classes).
2. Confer with an advisor assigned by the department to obtain approval of a schedule of courses, if not done previously.
3. Sign the scan form certifying approval of the advisor and return it to the Office of Graduate Admissions and Records or alternate location designated in the Timetable.
4. Consult Timetable to complete registration.

Non-degree or provisional students in unrestricted programs (see pages 8-9) may obtain permission to register from the Office of Graduate Admissions and Records. Students in these categories who do not have a declared major must obtain permission from the department/program head to register for courses in restricted fields.

Family Educational Rights and Privacy Act

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

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

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

### Fees, Residency Classification, and Financial Aid

#### University Fees

University fees and other charges are determined by the Board of Trustees and are subject to change without notice. All student fees are due in advance.

- All charges and refunds will be made to the nearest even dollar. All charges are subject to subsequent audit and verification. The University reserves the right to correct any error by appropriate additional charges or refunds.

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

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

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

- The general fees for graduate students in effect at the time of publication are as follows:
  - **APPLICATION FEE**: $15
  - **MAINTENANCE FEE** (in-state students) **$792**

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

- If a student applies but does not enter graduate school within twelve months after date of requested admission, the file will be destroyed and it will be necessary to resubmit the $15 application fee and a new application. This fee is not refundable.

#### MAINTENANCE AND TUITION (out-of-state students)

- **PER SEMESTER** $2,159

  **NOTE:** In lieu of the above charge for tuition and/or maintenance, part-time students may elect to pay fees computed by the semester hour credit (or audit) as follows:  
  - In-State $115 per semester hour or fraction thereof; minimum charge $230.  
  - Out-of-State $250 per semester hour or fraction thereof; minimum charge $500.

#### UNIVERSITY PROGRAMS AND SERVICES FEE

- **PER SEMESTER** $98

  All students enrolled in excess of eight semester hours per term are assessed an activity fee of $98. Part-time students taking fewer than nine semester hours will be assessed at the rate of $9 per semester hour or fraction thereof; minimum charge $12.

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

- Knoxville campus students taking a course load of 5-8 hours may elect to pay the full programs and services fee.

- Knoxville campus day students taking a course load of 3-8 hours may elect to pay the student health fee ($26), plus the appropriate part-time programs and services fee. The student health fee is included in the full $98 programs and services fee.

- The University programs and services fee is not refundable.

- The fee for the summer term is $52.

#### LATE PAYMENT FEE

- **Graduated Late Service Fee**
  - Upon receipt of a schedule (full, partial, or incomplete) a student is registered and is immediately responsible for payment of fees. Students who register early for a semester must pay their fees (or make satisfactory arrangements with the Bursar’s Office) before the graduating late service fee begins. Such students will be charged the graduated late service fee beginning with the third regular business day following the last registration day (minimum charge $3 day, $8 fourth day, $10 fifth day).

- **Students who register through late registration** will be granted two additional days for payment service charges. Effective the first day of classes, a graduated late service fee of $2 per day will be charged during the next ensuing five regular business days.

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

- **Additional Late Service Fees**
  - All students who have not completed registration and paid their appropriate charges (or made satisfactory arrangement with the Bursar’s Office) within five regular business days after classes begin will be charged an additional $10 late service fee (total $20).

- After 10 regular business days, students will be charged a second additional $10 late service fee (total $30).
- After 15 regular business days, students will be charged a third additional $10 late service fee (total $40).
- After 20 regular business days, students will be charged a fourth additional $10 late service fee (total $50), and may, at the discretion of the University, be withdrawn from school and assessed the appropriate fees as of the date dropped.

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

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

#### REINSTATEMENT FEE $45

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

#### LATE REGISTRATION FEE $15

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

#### RETURNED CHECK SERVICE FEE POLICY

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

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

- For other returned checks the service charge will be $10 if the check is made good within seven days from the date of notice and $20 if made good after seven days.

- Failure to clear returned checks will result in the forfeiture of all university services, including the receipt of grades, transcripts, and schedule of classes.

#### MUSIC FEE

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

- One-hour lesson per week per semester $90

- Payable at registration by students receiving individual instruction in music.

#### GRADUATION FEE

- Master’s degree candidates $30

- Doctoral degree candidates $75
Doctoral hood rental (optional) $5

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

PROFICIENCY FEES

Fees for proficiency examinations are $7 per credit hour for graduate students. See page 19 for other information on proficiency examinations.

TUITION PAYMENT PLANS

All student fees are due in advance and should be paid in full at registration each semester.

Prepayment Plan

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

Deferred Payment Plan

Although fees, rent, and other university expenses are due and payable at the beginning of each term, a full-time student in good financial standing with a definite anticipated source of funds may request the deferralment of up to 50% of the total charges at registration. The deferred payment may be divided into two equal payments payable on the 28th and 58th day of the term. All financial aid monies must be applied toward fees before a deferralment will be considered. A deferred payment service fee of $10 is assessed when any portion of tuition, fees, and other charges are deferred with the approval of the Bursar's Office. An additional $25 late payment charge will be assessed on each monthly installment which is not paid on or before the due date. For more details, contact the Bursar's Office.

Room and Board Payment Plan

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

DEFERRED PAYMENT SERVICE FEE $10

(See Tuition Payment Plans)

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

LATE PAYMENT SERVICE FEE $5

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

FEES FOR COURSES NOT TAKEN FOR CREDIT

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

REFUND OF FEES FOR WITHDRAWAL

After a schedule has been received by the student, withdrawal for the semester must be by official notification to the Withdrawal Office, 212 Student Services Building, whether or not fees have been paid, classes have been attended, or the schedule is incomplete. Failure to attend classes does not automatically withdraw or drop a student from college or class.

The effective date of withdrawal is the date the Withdrawal Office is notified by completion of the 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 semester. Failure to notify the Withdrawal Office promptly when withdrawing could result in a larger fee assessment. Withdrawal does not cancel fees and charges already incurred.

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

For a regular academic semester, 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 an 80 percent fee refund. Withdrawal between 15 and 21 calendar days following regular registration permits a 70 percent fee refund. Withdrawal between 22 and 28 calendar days following regular registration permits a 40 percent fee refund. The deferred payment policy does not apply to the off-campus Graduate Centers. Refunds, in accordance with the withdrawal refund policy, will be made after the drop deadline. If financial aid has been received for the term, the refund will be applied to financial aid repayment first before the student receives any refund.

REFUND OF FEES FOR DROPPED COURSES

Part-time students may pay fees computed at the appropriate semester-hour rate as indicated above. No charge is made for courses dropped during the first 7 calendar days following regular registration. A 20 percent charge is made for courses dropped between 8 and 14 calendar days following regular registration. A 40 percent charge is made for courses dropped between 15 and 21 calendar days. A 60 percent charge is made for courses dropped between 22 and 28 calendar days. A 100 percent charge is made for courses dropped after 28 days.

Students who drop courses are eligible for a refund only if the sum of the charges computed at the semester-hour rate for the hours continued plus the percentage assessed for the hours dropped results in an amount less than that paid. A course on a student's schedule is officially dropped, and the drop becomes effective, on the date that the change of registration form is processed on a drop/add terminal. Any refund due for dropped courses will be made after the final audit at the end of the semester.

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

SUMMER TERM FEES AND EXPENSES

Fees and expenses for the summer semester are the same as for other semesters except that a fee payment waiver is available except for a portion of the University programs and services fees as noted above.

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

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

WAIVER OF FEES

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

STUDENT HEALTH INSURANCE

The University makes available, by contract with an insurance company, group health insurance expressly for students. The program is designed to supplement the care provided by the University Student Health Service and provide basic benefits at low group premium rates. Primary emphasis is placed on hospitalization benefits since payment of co-payment is not provided on campus. Students not otherwise covered are urged to avail themselves of this or comparable insurance since paying for hospital care is the student's own responsibility.

Any information about the insurance is mailed by the company to the student's home and participation is solicited. Enrollment in the plan (or alternative coverage) is mandatory for international students. Students may obtain applications from the Student Health Service or the Center for International Education. Except for international students, enrollment for insurance is not a part of registration for classes. NOTE: The family health insurance policy should be carefully reviewed since most family policies do not cover the dependent child after a given age, some as early as nineteen.
IDENTIFICATION CARD

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

Residency Classification for Tuition Purposes

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

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

A student wishing to appeal a residency classification may contact the Residency Assistant, who will provide an application for reclassification and a copy of the State regulations. The application must be submitted on or before the last day of registration for a given semester. If the student is to be considered for reclassification that semester.

Academic Common Market

The Academic Common Market is an interstate agreement among Southern states for sharing unique programs. Participating states can make arrangements for their residents who are highly qualified to attend 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, Oklahoma, South Carolina, Tennessee, Texas, Virginia and West Virginia. Twenty-three doctoral, one Specialist in Tennessee, Texas, Virginia and West Virginia, and twenty-six Master's programs at UTK are approved by the Academic Common Market for residents of these states to enroll at in-state tuition rates. Residents of member states who seek further information should contact the Residency Assistant in the Office of Graduate Admissions and Records or the Southern Regional Educational Board, 502 Tenth Street, N.W., Atlanta, GA 30318-5790.

Financial Aid

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

ASSISTANTSHIPS AND FELLOWSHIPS

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

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

EMPLOYMENT

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

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

LOANS

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

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

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

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

VETERANS' BENEFITS

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

Student Services

Housing

UNIVERSITY APARTMENTS

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

OFF-CAMPUS HOUSING

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

RESIDENCE HALLS

The Department of Residence Halls provides housing on-campus for single graduate students. Graduate students are given the same priority for housing in residence halls as undergraduate students. All of the residence halls are conducive to academic achievement and personal development. However, many graduate students choose to live in Melrose or the Apartments Residence Halls since they remain open between the
Vehicle Operation and Parking

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

Each person who operates a motor vehicle in connection with attendance or employment at the University must register that vehicle with the 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 at the Security Building, 1115 UT Drive, at the Campus Information Center at Circle Park, and at the vehicle point of registration in the University Center.

Services to the Physically Disabled

Services for students with physical disabilities are coordinated by the Office of the Dean of Admissions and Records. 305 Student Services Building. In conjunction with the Physical Plant Office, the UT Bookstore, the Student Activities Office, and academic departments, the office seeks to assure that attendance at UT is as convenient as possible for such students.

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

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

The Office of Handicapped Student Services is eager to assist all students who need accommodations and/or support services due to a physical or sensory impairment. In order to adequately accommodate each student, it is helpful to know the individual need prior to coming to the UTK campus.

The following services and accommodations are available: interpreters, recorded texts, readers, facility accessibility, liaison with faculty/staff, equipment, transportation, acquisition for elevator keys, and special parking.

Students are encouraged to visit the Handicapped Student Services Office and to become involved with the Association of Disabled Students. Please contact the office at 900 Volunteer Blvd, Knoxville, TN 37996-4250, (615) 974-6087 Voice or TDD.

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 ensure their responsiveness to student needs.

General Regulations of The Graduate School

Advisor/Major Professor

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

Prerequisites

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

Course Listings

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

The official course title appears following the course number. Numbers in parentheses following the course title indicate the semester hours credit. If the credit is variable, to be determined in consultation with the instructor, the minimum and maximum are shown (e.g. 2-3). The credit hours are followed by a course description indicating the content to be covered.

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

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

"S/NC only" indicates that the course credit may be taken only for Satisfactory/No Credit grading. Refer to section on Grading System. A symbol indicating the semester or frequency that the course is normally offered is included at the end of many course descriptions:

F-Fall
Sp-Spring
Su-Summer
E-Every semester
A-Autumn semesters

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

Course Loads

The maximum load for a graduate student is 15 hours, and 9 to 12 hours are considered a full load. Students receiving financial aid should consult with the department/program head concerning appropriate course loads. Courses audited do not count toward minimum graduate hours required for financial assistance. Registration for more
than 15 hours during any semester is not permissible without prior approval of The Graduate School, which may allow registration of up to 18 hours if the student has achieved a cumulative grade-point average of 3.6 or better in at least nine hours of graduate work without incompletes. Students may enroll in only one course during a mini-term session.

Change of Registration

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

Students who fail to attend the first class meeting without prior arrangement with the department MAY BE DROPPED from the course to make space available to other students. Students have the responsibility to assure that they have been dropped. Otherwise they may receive a grade of F in the course.

The deadline for change of registration (e.g. from graduate to undergraduate, undergraduate to graduate, withdrawal) is approximately 35 calendar days after the first day of classes each semester. (See Graduate School News each term for exact date.) A student may change registration for a course at any time prior to and including this date by executing a change of registration form and submitting it to the Office of Graduate Admissions and Records. The student must sign the form certifying approval of the advisor. The instructor's signature is required if the course is closed and/or after the first two weeks of classes. If the student withdraws from a course or from the University after the first fifteen calendar days of classes and before the change of registration deadline, a grade of W will be entered on the permanent record.

Course registration may not be changed from credit to audit or audit to credit after the first fifteen calendar days after the beginning of classes. After the change of registration deadline, a student withdrawing from a course or from the University will receive a grade of F unless it can be demonstrated that the request for withdrawal is based on circumstances beyond the student's control. In the latter case, a grade of W will be entered on the permanent record.

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

Grading System

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

A (4 quality points per semester hour), superior performance.
B+ (3.5 quality points per semester hour), better than satisfactory performance.
B (3 quality points per semester hour), satisfactory performance.
C+ (2.5 quality points per semester hour), less than satisfactory performance.
C (2 quality points per semester hour), performance well below the standard expected of graduate students.
D (1 quality point per semester hour), clearly unsatisfactory performance and cannot be used to satisfy degree requirements.
F (no quality points), extremely unsatisfactory performance and cannot be used to satisfy degree requirements.
I (no quality points), a temporary grade indicating that the student has performed satisfactorily in the course but, due to unforeseen circumstances, has been unable to fulfill all requirements. An I is NOT given to enable a student to do additional work to raise a deficient grade. All incompletes must be removed within one semester, excluding the summer term. If a supplementary grade report has not been received in the Office of Graduate Admissions and Records at the end of the semester, the I will be changed to an F. The course will not be counted in the cumulative grade average until a final grade is assigned. No student may graduate with an I on the record.
S/NC (carries credit hours, but no quality points), S is equivalent to a grade of B (2 quality points per semester hour), or better, and NC means no credit earned. Courses where NC is received may be repeated for a grade of S. A grade of S/NC is allowed only where indicated in the course description in the Graduate Catalog. The number of S/NC courses in a student's program is limited to one-fourth of the total credit hours required.
P/NP (carries no credit hours, but no quality points), P indicates progress toward completion of a thesis or dissertation. NP indicates no progress or inadequate progress.
W (carries no credit hours or quality points), indicates that the student withdrew from the course.

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

Proficiency Examinations

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

English Proficiency

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

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

Minors

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

Two interdisciplinary minors are available, at the Master's and doctoral levels, in Statistics (Business Administration) and in Gerontology (Human Ecology). See Fields of instruction for specific requirements and approved provisions.

The minor area must be approved by the major and minor academic units, and a member from the minor unit must serve on the graduate committee.
Law Courses

A graduate student may take up to 6 semester hours of law courses and apply them toward a graduate degree upon approval of the College of Law and the student's major professor. The graduate student must register for law courses during the registration period at the College of Law and request an S/NC grade. If the student earns a 2.0 or better, an S will be recorded on the transcript. Below 2.0, an N/C will be recorded and the course cannot be used toward meeting degree requirements. Grades for law courses will not be reflected in the cumulative grade-point average as law courses do not carry graduate credit.

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

Auditors and Audited Courses

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 an auditor, and paying regular fees. Graduate students paying regular fees also are entitled to audit courses.

The names of all auditors properly registered will appear on the intermediate class rolls, but will be removed from the final grade report. No record of audited coursework will appear on the permanent record.

Short Courses and Workshops

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

1. The number of contact hours should never be fewer than the equivalent of one hour per week during the term for each hour of credit awarded, i.e., 15 hours per semester.
2. For every contact hour, there should be at least two hours of student preparation.
3. For each hour of graduate credit under the semester system, there should be a minimum elapsed time of one week.

The Curriculum Committee of the Graduate Council monitors the policy. Each new course or change in a current course must be approved in both content and format.

Correspondence Study

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

Transfer Credits

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

To be transferred into a graduate program at UTK, a course must:

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

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

MASTER'S DEGREE

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

ED.S. DEGREE

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

DOCTORAL DEGREE

Coursework taken prior to admission to a doctoral program may be used toward the degree as determined by the student's doctoral committee. Although the courses are used as part of the requirements toward the degree, they are not officially transfer courses and are not placed on the student's 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 Office of Graduate Admissions and Records. The form requires the signature of the head of the department in which admission was previously granted. No signature is needed if a student requests to change from a non-degree or provisional status to a degree program, 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 program requested, he/she remains in the former program. The results of each request for program change are communicated to the student by mail.

Residence Requirements

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

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

Ed.S. degree: on the semester hour basis, the requirement is that if the student has a Master's degree, two consecutive semesters of residence if the student lacks a Master's degree.

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

A statement from doctoral students as to how and during what period of time the residence requirement was satisfied must be presented with the Application for Admission to Candidacy along with signatures of approval from the Major professor and the Department Head/Program Director. More information about the rationale for the residence requirement may be obtained from the Graduate Council report available in The Graduate School.

Theses and Dissertations

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

The student and major professor together share responsibility for the accuracy and professionalism of the final product of the student's research. The student should confer with the Thesis/Dissertation Consultant regarding problems and questions in advance of preparing the final copy. The UTK Guide to the Preparation of Theses and Dissertations provides the correct format for theses or dissertations. Workshops are held periodically throughout the academic year. The date for each workshop is announced in the Graduate School News.

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

### Academic Standards

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

The academic records of all graduate students are reviewed at the end of each semester, including the summer term. Graduate students must maintain a cumulative grade-point average (GPA) of at least 3.0 on all graduate courses taken for a letter grade of A-F. Grades of S/NC, P/NP, and I, which have no numerical equivalent, are excluded from this computation. These policies do not apply to provisional students (see section on provisional admission).

### ACADEMIC PROBATION

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

### DISMISSAL

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

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

Departments and programs may have requirements for continuation or graduation in addition to the requirements set forth in this Catalog by The Graduate School. It is the student’s responsibility to be familiar with the special requirements of the department or program.

### 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 of the respective college, the Dean of The Graduate School, the Graduate Council, and the Chancellor. The By-Laws of the University (Article V, section 7) provide that any individual may ultimately appeal to the Board of Trustees, through the President. A copy of the Appeals Procedure is available in the Office of Graduate Admissions and Records.

### Requirements for Advanced Degrees

#### Master’s Degrees

Master’s degree programs are available with thesis and non-thesis options. These programs require 30 or more graduate hours of course work. In addition to the M.A. and M.S. degrees, a number of other degrees are offered, including the MBA, and the M.S.S.W. A complete list is found under “Majors and Degree Programs,” on pages 8–9. For specific degree requirements, consult individual departments listed by college and field of instruction in this Catalog. See also the chart, page 23, for a summary of procedures for the degrees.

### COURSE REQUIREMENTS

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

At least two-thirds of the minimally required hours in a Master’s degree program must be taken in courses numbered at or above the 500 level. Only 6 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 15). The responsibility of this committee is to assist the student in planning a course of study and carrying out research, and to assure fulfillment of the degree requirements. If the student has a minor, one member of the committee must be from the minor department.

### ADMISSION TO CANDIDACY

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

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

#### THESIS REGISTRATION

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

#### THESIS

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

#### FINAL EXAMINATION FOR THESIS AND PROBLEMS IN LIEU OF THESIS STUDENTS

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

REGISTRATION FOR USE OF FACILITIES

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

FINAL EXAMINATION FOR NON-THESIS STUDENTS

With the exception of students pursuing the MBA, each non-thesis student must pass a final written examination. A department may require a terminal oral examination. The examination is not merely a test over coursework, but a measure of the student's ability to integrate material in the major and related fields. It must be scheduled through the Office of Graduate Admissions and Records in accordance with the deadlines specified in the Graduate School News and will be conducted by the Master's committee. Final examinations not properly scheduled must be repeated. Students taking the final examination but not otherwise using University facilities may pay a fee of $148 instead of registering. In case of failure, the candidate may not apply for reexamination until the following semester. The result of the second examination is final.

TIME LIMIT

Candidates have six calendar years from the time of enrollment in The Graduate School to complete the degree. Students who change degree programs during this six-year period may be granted an extension after review and approval by The Graduate School. In any event, courses used toward a Master's degree must have at least one year of related work experience. Additional information on admission requirements can be obtained from the departments offering the degree. Also see the chart, page 23, for a summary of procedures for this degree. All deadlines are published each semester in the Graduate School News.

COURSE REQUIREMENTS

The student's program involves a minimum of four semesters of study totaling at least 60 semester hours of graduate credit beyond the baccalaureate degree. A minimum of 6 hours is required outside the major department or area.

A student admitted to the program with a Master's degree, or with acceptable work beyond the Master's degree, may have program requirements modified upon recommendation of the student's committee. However, no modifications will be permitted in examination and research requirements, nor in the minimum 6 graduate hours required outside the major. All prior coursework accepted toward the degree must be related to the student's program objectives. A maximum of 6 hours beyond the Master's degree may be transferred from another institution to an Ed.S. program. See Transfer Credit, page 24.

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

ED.S COMMITTEE

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

ADMISSION TO CANDIDACY

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

The Admission to Candidacy form, signed by the student's committee and listing all courses toward the degree, is submitted to the Office of Graduate Admissions and Records before the student has completed 15 hours of coursework in the Ed.S. program. A qualifying examination may be required for admission to candidacy if the student has a Master's degree earned six years or more prior to admission to the program. This examination may be written and/or oral.

RESEARCH REQUIREMENTS

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

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

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

FINAL EXAMINATION

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

TIME LIMIT

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

Doctoral Degrees

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

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

COURSE REQUIREMENTS

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

DOCTORAL COMMITTEE

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

The committee should be formed during the student's first year of doctoral study. Subject to Graduate Council policies and individual program requirements, the committee must approve all coursework applied toward the degree, certify the student's mastery of the major field and any cognate fields, direct the research, and recommend the dissertation for approval and acceptance by The Graduate School.

CONTINUOUS REGISTRATION

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

DOCTORAL EXAMINATIONS

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

Diagnostic Examination

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

Qualifying Examination

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

Comprehensive Examination

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

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

Defense of Dissertation Examination

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

LANGUAGE REQUIREMENTS

Candidates for the Ph.D. degree may be required to demonstrate a reading knowledge of at least one foreign language in which there exists a significant body of literature relevant to the major field of study. Please refer to the descriptions of individual programs. The doctoral committee will determine the specific language (or languages) required. 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 Office of Graduate Admissions and Records in accordance with the dates and times for the examinations printed in the Graduate School News.

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

ADMISSION TO CANDIDACY

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

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

DISSERTATION

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

A student should be registered for the number of dissertation hours representing the fraction of effort devoted to this phase of the candidate's program. Thus, a student working full time on the dissertation should register for 12 hours of 600 per semester. Two copies of the dissertation (prepared according to the regulations in the UTK Guide to the Preparation of Theses and Dissertations) must be submitted to and accepted by The Graduate School. Each copy must include an approval sheet, signed by all members of the doctoral committee, which certifies to The Graduate School that they have examined the final copy and found that its form and content demonstrate scholarly excellence. Doctoral forms and a thesis card 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>PROCEDURES</th>
<th>UNDER DIRECTION OF</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admission as a potential degree candidate</td>
<td>Office of Graduate Admissions and Records and Major Department</td>
<td>Prior to completing 15 hours of graduate courses</td>
</tr>
<tr>
<td>Formation of Master's/Ed. S. committee</td>
<td>Advisor/Major professor</td>
<td>Prior to application for admission to candidacy</td>
</tr>
<tr>
<td>Submission of application for admission to candidacy</td>
<td>Master's/Ed. S. committee</td>
<td>At least one semester prior to graduation*</td>
</tr>
<tr>
<td>Approval of admission to candidacy</td>
<td>The Graduate School</td>
<td>Prior to graduation</td>
</tr>
</tbody>
</table>

GRADUATION REQUIREMENTS FOR NON-THESIS OPTION

<table>
<thead>
<tr>
<th>PROCEDURE</th>
<th>RESPONSIBILITY</th>
<th>DEADLINE</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>Office of Graduate Admissions and Records</td>
<td>Deadline available at registration*</td>
</tr>
<tr>
<td>Payment of graduation fee</td>
<td>Bursar's Office</td>
<td>Deadline available at registration*</td>
</tr>
<tr>
<td>Scheduling of Final Examination</td>
<td>Student and Office of Graduate Admissions and Records</td>
<td>Not later than one week prior to Final Examination*</td>
</tr>
<tr>
<td>Final Examination</td>
<td>Master's/Ed S. committee</td>
<td>Not later than three weeks prior to Commencement*</td>
</tr>
<tr>
<td>Removal of Incomplete(s)</td>
<td>Instructor of course</td>
<td>Not later than one week prior to Commencement*</td>
</tr>
</tbody>
</table>

GRADUATION REQUIREMENTS FOR THESIS/PROBLEMS OPTIONS

<table>
<thead>
<tr>
<th>PROCEDURE</th>
<th>RESPONSIBILITY</th>
<th>DEADLINE</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>Office of Graduate Admissions and Records</td>
<td>Deadline available at registration*</td>
</tr>
<tr>
<td>Payment of graduation fee</td>
<td>Bursar's Office</td>
<td>Deadline available at registration*</td>
</tr>
<tr>
<td>Submission of thesis/problems to Master’s/Ed. S. committee</td>
<td>Student</td>
<td>At least two weeks prior to Final Examination</td>
</tr>
<tr>
<td>Scheduling of Final Examination</td>
<td>Student and Office of Graduate Admissions and Records</td>
<td>Not later than one week prior to Final Examination*</td>
</tr>
<tr>
<td>Final Examination</td>
<td>Master's/Ed S. committee</td>
<td>Not later than 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 each semester.
### Summary of Procedures for Doctoral Degrees

<table>
<thead>
<tr>
<th>PROCEDURES</th>
<th>UNDER DIRECTION OF</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admission as a potential degree candidate</td>
<td>Office of Graduate Admissions and Records and Major Department</td>
<td>Prior to completing 15 hours of graduate courses</td>
</tr>
<tr>
<td>*Appointment of doctoral committee</td>
<td>The Graduate School on recommendation of department head</td>
<td>Preferably during the first year of graduate study, but at the latest, prior to admission to candidacy</td>
</tr>
<tr>
<td>*Comprehensive Examination</td>
<td>Major department</td>
<td>Prior to admission to candidacy</td>
</tr>
<tr>
<td><em>Foreign language examination(s)</em>*</td>
<td>Office of Graduate Admissions and Records</td>
<td>Prior to admission to candidacy</td>
</tr>
<tr>
<td>Submission and approval of application for admission to candidacy</td>
<td>Doctoral committee and The Graduate School</td>
<td>At least one semester prior to graduation***</td>
</tr>
</tbody>
</table>

### GRADUATION REQUIREMENTS

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

* The order of these items varies with individual programs.
** Not required in some programs.
*** Deadlines are printed in the Graduate School News each semester.
COLLEGES
College of Agriculture

O. Glen Hall, Dean
Gary Schneider, Associate Dean

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

The College of Agriculture began in 1869 when the University was designated as Tennessee's Federal Land-Grant Institution. As such, the University was enabled for the first time to offer instruction in agriculture. Graduate instruction began as early as 1889. The College is not only an academic unit of The University of Tennessee, Knoxville campus, but is also (with the Agricultural Experiment Station, the Agricultural Extension Service and the College of Veterinary Medicine) one of the four administrative units of The University of Tennessee’s Institute of Agriculture.

There are many shared resources and positive interactions between various units of the Institute. For example, most of the faculty in the College of Agriculture hold joint appointments in the Agricultural Experiment Station and are actively involved in significant basic and applied research in agriculture and the associated natural resources. On campus and field research laboratories are utilized in the instructional programs of the College; extension and research activities provide many students excellent part-time job opportunities. Very significant is the fact that the Agricultural Experiment Station provides more than 100 graduate research assistantships to support graduate students.

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

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

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

MASTER OF SCIENCE PROGRAMS

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

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

DOCTORAL PROGRAMS

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

College of Business Administration

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

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

Facilities for Research and Service
- Center for Business and Economic Research
- Management Development Center
- MBA Center of Excellence in New Venture Analysis and Entrepreneurship

The College of Business Administration was originally the School of Commerce, dating back to 1919. Commerce was changed to Business in 1937 and gained college status in 1947. The college-wide MBA program was approved in 1966 and the doctoral program in 1971.
Graduate programs of the College of Business Administration are designed to prepare men and women to assume positions in the increasingly complex world of business and industry, teaching and research, and government.

Viewing the business firm as operating in dynamic social, political, and economic environments that demand leaders capable of dealing with innovation and rapid change, the College places central importance on development of students' thought processes. Emphasis is focused on flexibility of mind, receptivity to new ideas, and capacity to adapt one's reasoning powers. Our objective is to encourage the student to develop the ability to reason analytically and logically. Above all else, we strive to instill the irresistible desire to continue to learn and grow in knowledge throughout the student's life.

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 in business as a member of the Graduate Management Admission Council.

CENTER OF EXCELLENCE

The Tennessee Higher Education Commission (THEC) has designated a Center of Excellence for New Venture Analysis and Entrepreneurship within UT’s College of Business Administration. The primary goals and benefits of the center are threefold: to coordinate the resources needed to provide an MBA concentration in new venture analysis and entrepreneurship, to provide a centralized entity in the college for quality research in the field of new ventures, and to provide support and development programs for existing new ventures. Information on the first of these goals, the MBA concentration, is located under Business Administration. Information on the two latter goals may be obtained by contacting the Center for New Venture Analysis at 608 Stokely Management Center, Knoxville, TN 37996-0563 or by calling (615) 974-1739.

GRADUATE PROGRAMS

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

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

FINANCIAL ASSISTANCE

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

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

College of Communications

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

Departments and Schools
Advertising
Broadcasting
Journalism

Facility for Research and Service
Communications Research Center (CRC)

The College of Communications grew out of the School of Journalism, which was originally located in the College of Business Administration. The Master's program began in 1968 under Journalism and was changed to Communications after the School gained College status in 1970. The doctoral program was initiated in 1975.

Communications media are a vital force in today's complex society. Specialization, gaps among segments of society, and the nature of world conflict point to the need for more understanding of communication media. Educating men and women in the perceptive understanding of the communications media is a necessity. The graduate programs in the College acquaint students with the nature of communications and prepare them for professional work in many fields.

The College of Communications offers the Master of Science and the Doctor of Philosophy degrees with a major in Communications.

In addition, Communications is available as a minor for students majoring in other departments. Required coursework will be selected after discussion with the major advisor and an advisor from the College of Communications.

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

For application forms and other information about the M.S. and Ph.D. programs in Communications, write to:

Assistant Dean for Graduate Studies
College of Communications
98 Communications Building
The University of Tennessee
Knoxville, TN 37996-0313

College of Education

Richard Wisniewski, Dean
C. Glennon Rowell, Associate Dean for Graduate Studies

Departments
Art and Music Education
Curriculum and Instruction
Educational and Counseling Psychology
Educational Leadership
Health, Leisure, and Safety
Physical Education and Dance
Special Services Education
Technological and Adult Education

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

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

The faculty of the College of Education is committed to performing three major functions: (1) to provide professional preparation for teachers, administrators, school service personnel, and others interested in the evaluation and improvement of educational opportunities, programs, and services; and (3) to provide and conduct research and development in education and other areas of responsibility. The College of Education holds membership in the American Association of Colleges for Teacher Education and in the Holmes Group. All certification and degree programs through the doctoral level are fully accredited by the National Council for Accreditation of Teacher Education, the Southern Association of Colleges and Schools, and the Tennessee State Department of Education.

MASTER OF SCIENCE PROGRAMS

On the Master's level, professional study may be planned (1) in one of the areas listed on page 8-9, (2) in appropriate combinations...
of these areas, or (3) in combinations of one or more of these areas with appropriate subjects or areas in other colleges. Students in the College of Education's five-year preparatory program must meet all criteria for admission to The Graduate School to earn 12 hours credit toward their Master's degrees. Admission to Graduate School must be prior to or during the semester that the first graduate credit is to be earned. Internship cannot be used for graduate credit.

**SPECIALIST IN EDUCATION PROGRAMS**

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

**DOCTORAL PROGRAMS**

The College of Education offers programs of advanced study leading to the Doctor of Education in the major areas listed on page 8-9.

Ph.D. in Education requirements are available under Education, Fields of Instruction.

**TEACHER CERTIFICATION**

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

**College of Engineering**

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

**Departments**

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

**Facilities for Research and Service**

Center for Computer Integrated Engineering and Manufacturing
Center for Measurement and Control Engineering
Center of Excellence for Materials Processing

The College had its beginnings in the University when surveying was introduced into the curriculum in 1838. The first two professional degrees, Civil Engineer and Mining Engineer, were established in 1879 at the same time that the Board of Trustees authorized the establishment of a graduate school. Known as Mechanic Arts originally, Engineering became a college in 1904.

The purpose of the College of Engineering is to educate men and women to the high levels of research, technical competence, and understanding that will enable them to fulfill their responsibilities as professional engineers.

Graduate programs of the College of Engineering provide opportunities for advanced study leading to the Master of Science and the Doctor of Philosophy degrees. For a listing, consult majors and degrees available on page 8-9.

**GRADUATE PROGRAM AT THE UT SPACE INSTITUTE**

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

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

This is a unique program allowing American engineering students to develop some understanding, both scientific and cultural, of Japan. It allows an M.S. candidate to obtain a degree from UTK while carrying out research at a Japanese university. The program requires approximately two years; one year is spent in Japan and the remaining period is spent at 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.

**CENTER OF EXCELLENCE FOR MATERIALS PROCESSING**

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

**College of Human Ecology**

Jacquelyn O. DeJonge, Dean
Kermit Duckett, Associate Dean of Graduate Studies

**Departments**

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

The University of Tennessee was one of the first institutions of higher education in the South to offer home economics, with the first class being offered in 1897. Initially called a School of Home Economics, it combined with Agriculture in 1947 to become the College of Agriculture and Home Economics. In 1959, the two colleges became separate units, although they continue to share resources. In 1985 the name was changed to Human Ecology.

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

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

**College of Law**

Marilyn Yarbrough, Dean
Richard S. Wirtz, Associate Dean
Julia P. Hardin, Associate Dean
Mary Jo Hoover, Associate Dean
N. Douglas Wells, Assistant Dean

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

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

**THE PROFESSIONAL PROGRAM**

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

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

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

In combination, the direction and objectives of the college lead to the development not of a narrow technician, but of a student of the law with the perspective, breadth, and understanding necessary to accomplish the many tasks assigned by society to the legal profession.

GRADUATE PROGRAM

The College of Law and the College of Business Administration offer a coordinated dual program leading to conferred of both the Doctor of Jurisprudence and the Master of Business Administration. The dual program saves the student one semester of the time that would be required to earn both degrees independently.

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

College of Liberal Arts

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

Departments

Anthropology
Art
Audiology and Speech Pathology
Biochemistry
Botany
Chemistry
Classics
Computer Science
Cultural Studies
English
Geography
Geological Sciences
Germanic and Slavic Languages
History

Mathematics
Microbiology
Music
Philosophy
Physics and Astronomy
Political Science
Psychology
Religious Studies
Romance Languages
Sociology
Speech Communications
Theatre
Zoology

Facilities for Research and Service
Bureau of Public Administration
Center for Applied and Professional Ethics
Center for Environmental Biotechnology
Center for Psychoanalysis and the Humanities
Center for Quaternary Studies of the Southeastern U.S.
Center for the Study of War and Society
Child Behavior Institute
Forensic Anthropology Center
Hearing and Speech Center
Institute for Applied Microbiology
Institute for Resonance Ionization Spectroscopy
James R. Stokely Institute for Liberal Arts Education
Joint Institute for Heavy Ion Research
Latin American Studies Institute
Psychological Clinic
Science Alliance

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

The College of Liberal Arts consists of a wide array of academic disciplines and interdisciplinary programs. The central purposes of a liberal education include the encouragement of intellectual tolerance, a dedication to the quest for knowledge as a worthwhile goal in and of itself, and the cultivation of a responsible, creative individual mind. These qualities enable one to develop an ability to reason and to express oneself clearly, an incentive to absorb emerging knowledge, and a competence to confront the uncertainties of human experience. Faculty research and creative activity is the foundation on which education in this College is built. As a result of that endeavor, the lives of students are enriched and the world's body of knowledge grows.


GENERAL INFORMATION

Foreign Study Courses

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

Off-Campus Study

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

Independent Study

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

College of Medicine-Knoxville Unit

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

Department

Medical Biology

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

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

GRADUATE PROGRAMS

The faculty with the College of Veterinary Medicine participates in the graduate program leading to M.S. and Ph.D. degrees in
College of Nursing

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

The College of Nursing was established in July 1971. The Master's program was initiated in 1976 and approval for the doctoral program was granted in 1988. More specific information about the programs may be obtained under Nursing, Fields of Instruction, or by contacting:

Director of M.S.N. or Ph.D. Program
The University of Tennessee College of Nursing
1200 Volunteer Blvd.
Knoxville, TN 37996-4110
(615) 974-4151

MABEST OF SCIENCE IN NURSING

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

THE DOCTORAL PROGRAM

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

College of Social Work

Eunice Shatz, Dean
Lou M. Beasley, Associate Dean, Nashville

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

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

The University of Tennessee College of Social Work is the only graduate professional social work education program in Tennessee with degrees offered at the Baccalaureate, Master's and doctoral levels.

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

GRADUATE PROGRAMS

The two-year program (thesis or non-thesis option) leading to the Master of Science in Social Work is fully accredited by the Council on Social Work Education and is offered on all three campuses. The foundation curriculum of the Ph.D. program is available only in Knoxville. A dual degree program in Social Work and Divinity is offered by the college's Nashville Branch and the Divinity School of Vanderbilt University. A special bulletin describing facilities, admission, fees, and degree requirements is available from the College of Social Work, Henson Hall, Knoxville, TN 37996-3333.

College of Veterinary Medicine

Hyram Kitchen, Dean
Charles F. Reed, Jr., Associate Dean
William H. Grau, Jr., Associate Dean

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

The College of Veterinary Medicine, established in 1974, offers a professional curriculum leading to the Doctor of Veterinary Medicine (D.V.M.) degree. The college offers graduate studies leading to the Master of Science and the Doctor of Philosophy degrees. Residency training programs in the various clinical specialties are also offered. The primary objective of the college is to educate veterinarians for private practice. However, the professional curriculum provides an excellent basic medical education, in addition to training in diagnosis, disease prevention, medical treatment, and surgery. Graduates are qualified to pursue careers in many facets of veterinary medicine and related health professions.

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

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

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

**Accounting and Business Law**

*(College of Business Administration)*

**MAJORS DEGREES**

Accounting ........................................ M.Acc.

Business Administration ........ MBA, Ph.D.

Jan R. Williams, Head

**Accounting Professors:**

Dittrich, Norman E., CPA, Ph.D., Ohio State

Kiger, Jack E. (Distinguished Prof.), CPA, Ph.D., Missouri

Read, W. H. (Emeritus), CPA, MBA, Northwestern

Scheiner, James H., CPA, Ph.D., Ohio State

Stanga, Keith G. (Distinguished Prof.), CPA, Ph.D., Louisiana State

Williams, Jan R. (Ernst & Whinney Prof.), CPA, Ph.D., Arkansas

**Associate Professors:**

Borthick, A. Faye, CPA, DBA, Tennessee

Herring, Hartwell C., III, CPA, Ph.D., Alabama

Izard, C. Douglass, CPA, Ph.D., Mississippi

Posey, Imogene A., CPA, M.S., Tennessee

Reeve, James M., CPA, Ph.D., Oklahoma State

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

**Lecturers:**

Hendrick, Lee W., J.D., Houston

Hughes, Harry N., B.S., Tennessee

**THE MASTER OF ACCOUNTANCY PROGRAM**

The objective of the Master of Accountancy (M.Acc.) program is to provide persons having an undergraduate accounting background and a high level of ability and motivation with the depth and understanding of accounting which will enhance their probability of success in a career in professional accounting. Moreover, the student's educational experience should develop perspectives toward the discipline of accounting in a manner that will enable the student to spearhead innovation and change in response to needs in public accounting, business, industry, or government.

**Admission Requirements**

- Application deadlines for international students are: Fall, March 1; Spring, July 15; Summer, November 15. Application deadlines for U.S. citizens and permanent residents are: Fall, June 1; Spring, October 1; Summer, February 1. Although the program is designed for students who have completed an accredited baccalaureate degree program with a major in Accounting, those with outstanding undergraduate records in any area may earn the M.Acc. degree by completing prerequisites in accounting and by including courses in other business and related disciplines to supplement the applicant's undergraduate background. Students entering the program are expected to have completed coursework in calculus and computer science. For students with no previous exposure to calculus, Mathematics 305 is available.

In addition to the general admission requirements for The Graduate School, M.Acc. applicants are required to take the Graduate Management Admission Test (GMAT) and submit information on forms provided by the College of Business Administration. Applicants whose native language is not English must submit results of the Test of English as a Foreign Language (TOEFL).

**Course Requirements for the M.Acc. Program**

A student's program encompasses a minimum of 30 semester hours of graduate course work. Specifically, the student must complete courses in accounting and other areas as indicated below. Each course is 3 semester hours of graduate credit.

**Accounting Core (9 hours):**

- 511, 513, 521.

**Accounting Concentration (12 hours):**

1. Financial Auditing: 512, 531, 519, one accounting elective.


3. Taxation: 531, 532, 533, 539.

**Non-accounting Electives (9 hours):**

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

**Transfer Credits**

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

**Other Requirements**

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

BUSINESS ADMINISTRATION CONCENTRATIONS

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

MBA Concentration: Controllship.

The concentration in controllership provides added accounting skills appropriate for those seeking employment in the controllership or general management functions of a variety of organizations. Although the controllership concentration provides broad preparation for the Certified Management Accountants’ examination, it is not designed to meet the minimum educational requirements to take the Certified Public Accountants’ examination.

Minimum course requirements are three courses from the following: 504, 505, 522, 541.

Ph.D. Concentration: Accounting.

This degree provides a research-oriented terminal qualification for those seeking entry-level faculty time before degree is completed. May not be used toward degree requirements. May be repeated. Maximum 6 hrs.

Graduate Internship in Accounting (3) Directed project. Prereq: Consent of M.Acc program advisor. May be repeated. Maximum 6 hrs.

Graduate Seminar in Accounting (3) Topics vary. Prereq: Consent of instructor.

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


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

21-22 Accounting Colloquium (1,1) Research and discussion of contemporary issues in practice of accountancy. Prereq: Consent of Ph.D. program advisor. May be repeated. S/NC only.

Business Law

Professors:

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

Assistant Professor:

Massingale, Cheryl S., MBA, J.D	 Tennessee

GRADUATE COURSES


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

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


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

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

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

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

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

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

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

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

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


542 Systems Analysis and Design (3) Analysis and design of information systems for management and distribution of economic information about organizations. Prereq: 541.

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

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

594 Graduate Seminar in Accounting (3) Topics vary. Prereq: Consent of instructor.

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


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

21-22 Accounting Colloquium (1,1) Research and discussion of contemporary issues in practice of accountancy. Prereq: Consent of Ph.D. program advisor. May be repeated. S/NC only.

Advertising

(Major of Communications)

MAJOR

COMMUNICATIONS

M.S.

Ronald E. Taylor, Head

Associate Professors:

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

Assistant Professors:

Hovland, Roxanne, Ph.D	 Illinois
Hoy, Marica, Ph.D	 Oklahoma State

The Department of Advertising offers a concentration area for the Master’s with a major in Communications. See Communications for additional information.

GRADUATE COURSES

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

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

520 Advertising and Communications Theory (3) Application of contemporary communications theories of attitude change, information-processing, and persuasion as applied to creative strategy decisions. Prereq: Consent of instructor or admission to program. F

530 Advertising Research (3) Nature, scope, and applications of research function to advertising decisions. Market segmentation, copy appeals, media strategy. Prereq: Statistics 201 or equivalent. Sp

540 Advertising Planning (3) Analysis of decision-making in budgeting, creative strategy, media strategy, research, evaluation, and agency-client relationships. Advertising response functions. Prereq: Consent of instructor or admission to program. Sp

590 Seminar in Advertising Issues (3) Salient issues in advertising. Topics vary. Prereq: Consent of instructor or admissions to program. May be repeated. Maximum 6 hrs. Su

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

598 Internship (3) Professional work in advertising supervised by advertising manager with faculty approval. No retroactive credit for previous work experience. Prereq: Completion of core courses. Su

Aerospace Engineering
See Mechanical and Aerospace Engineering

Agricultural and Extension Education
(College of Agriculture)

MAJOR DEGREE
Agicultural and Extension Education...... M.S.

Roy R. Lassly, Head

Professors:
Carter, Cecil E., Jr., Ph.D.................Ohio State
Dickson, Lewis H., Ed.D..................Cornell
Todd, John D., Ed.D......................Illinois

Associate Professor:
Lassly, Roy R., Ed.D...............Okahoma State

The Department of Agricultural and Extension Education offers a program leading to the Master of Science degree with a major in Agricultural and Extension Education. The program is designed primarily for teachers of Vocational Agriculture and staff employed by the Agricultural Extension Service. However, due to the flexibility of the program, it would be of value to any student interested in agriculture or adult and continuing education. The program may be completed under a thesis or non-thesis option with a concentration in either agricultural education or agricultural extension education. Candidates for the Master's degree must meet the general requirements of The Graduate School and those stipulated by the department.

THE MASTER'S PROGRAM

Thesis Option
A candidate for the Master's degree who elects the thesis option must successfully complete:
1. A minimum of 36 hours of graduate credit in courses approved by the student's advisory committee. Only 6 hours of thesis may be counted toward this requirement.
2. A minimum of 24 hours of graduate credit in courses numbered at or above the 500 level.
3. A minimum of 12 hours of graduate credit in courses appropriate to the area of concentration taught in the department and a minimum of 6 hours taught from outside the department.
4. A minimum of 3 hours of graduate credit in coursework in either research methodology or statistics.
5. A final oral examination.

Non-Thesis Option
A candidate for the Master's degree who elects the non-thesis option must successfully complete:
1. A minimum of 36 hours of graduate credit in courses approved by the student's advisory committee.
2. A minimum of 24 hours of graduate credit in courses numbered at or above the 500 level.
3. A minimum of 12 hours of graduate credit in courses appropriate to the area of concentration taught in the department and a minimum of 6 hours taught from outside the department.
4. A minimum of 3 hours of graduate credit in coursework in either research methodology or statistics.
5. A creative component designed by the student and approved by the student's advisory committee for 3 hours of graduate credit.
6. A written and oral comprehensive examination.

GRADUATE COURSES

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

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

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

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

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

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

524 Research Methodology (3) Social research design, hypothesis testing, sampling, survey construction, scaling, interviewing, data coding, basic descriptive and relational statistics, and presentation of results. Prereq: 436, 523, or consent of instructor.

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

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

527 Adult Education and Strategies for Teaching (3) Psychological, philosophical and sociological theories for adult education in agriculture; methods and strategies for organizing classes and teaching adults. Prereq: 411 or 416 or consent of instructor.

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

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

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

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

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

593 Special Problems in Agricultural and Extension Education (1-3) Special research and/or special reports based on supervised independent study. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

Agricultural Economics and Rural Sociology
(College of Agriculture)

MAJOR DEGREES
Agricultural Economics.................M.S., Ph.D.

Handy Williamson, Head

Professors:
Badenhop, M. B. (Emeritus), Ph.D...........Purdue
Brooker, J. R., Ph.D......................Florida
Cieland, C. L., Ph.D......................Wisconsin
Eastwood, D. B., Ph.D...................Tufts
Keller, L. H., Ph.D......................Kentucky
Klindt, T. H., Ph.D......................Kentucky
Langford, F. O., Ph.D....................Wisconsin
McLemore, D. L., Ph.D....................Clemson
McManus, R. B., Ph.D....................Purdue
Martin, J. A. (Emeritus), Ph.D............Minnesota
Mundy, S. D., Ph.D.       Tennessee
Pentecost, B. H., J.D.   Tennessee
Ranney, W. P. (Emeritus), Ph.D.    Minnesota
Sapper, G. B., Ph.D.       Illinois
Whitley, T. J. (Emeritus), Ph.D.    Purdue
Williamson, H., Ph.D.       Missouri

Associate Professors:

English, B. C. Ph.D.       Iowa State
Orr, R. H., Ph.D.              Illinois
Park, W. M., Ph.D.            VPI
Roberts, R. K., Ph.D.        Iowa State
Todd, R. W., J.D.             Tennessee

Assistant Professors:

Haden, K. L., Ph.D.       Oklahoma State
Huffaker, R. G., Ph.D.       California (Davis)
Pomelli, G. K., Ph.D.        California (Davis)
VanTassel, L. W., Ph.D.       Texas A&M

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

THE MASTER'S PROGRAM

Thesis Option
A candidate for the Master's degree must complete a minimum of 30 hours of graduate credit in courses approved by the student's Master's committee. Only 6 hours of thesis may be counted toward this requirement. At least 24 hours of graduate credit must be earned in courses numbered at or above the 500 level. In the agricultural economics concentration, 12 hours of agricultural economics, 6 hours of economic theory and 6 hours of quantitative methods are required. In the rural sociology concentration, 12 hours in the department (9 hours rural sociology), 6 hours of sociological theory, 3 hours of research methods and 3 hours of statistics are required. Each student must successfully complete a final oral examination.

Non-Thesis Option
A minimum of 36 hours of graduate coursework is required. At least 27 hours must be in courses numbered at or above the 500 level. The program must include a minimum of 18 hours in agricultural economics, 6 hours of economic theory, and 6 hours of quantitative methods. Each student must successfully complete both written and oral comprehensive exams.

Minor
A minor will include 6 hours of coursework in the department, with at least 3 hours in 500- or 600-level courses. The student's committee must include a member of the faculty from the department who will be responsible for designating courses required for the minor.

THE DOCTORAL PROGRAM

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

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

Agricultural Economics

GRADUATE COURSES

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

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

440 Agricultural Production Economics (3) Application of microeconomic theory to problems of resource allocation, enterprise selection, scale of operation of agricultural firms; economic interpretation of technical agricultural production relationships. Prereq: 210 and Economics 311. F

442 Farm Business Management II (3) Advanced topics and methods in management of micro and mainframe computer: linear programming application in farm planning; spreadsheet analysis of whole farm problems; farm analysis and management control; risk analysis and management; income tax management; farm growth and intergenerational transfer. Prereq: 342. Sp

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

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

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

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

493 Independent Study in Agricultural Economics (1-3) Directed individual or team research and report writing. Off-campus intern experience and research allowed. Special courses in specific topics. Student must arrange with instructor before registering. Graduate credit for non-majors only. Prereq: junior standing. May be repeated. Maximum 6 hrs. E

500 Thesis (1-5) P/NP only. E

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

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

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

524 Econometric Methods in Agricultural Economics (3) Application of statistical methods to agricultural economic models; estimation of supply, demand and production functions; forecasting, economic forecasting models; interpretation of results. Prereq: Statistics 461 or consent of instructor. F

540 Advanced Agricultural Production Economics (3) Theoretical and empirical concepts in agricultural resource allocation; economic interpretation of agricultural policies; economic interpretation of policy as related to agricultural industry and rural areas. Prereq: 540 or equivalent. Sp

550 Advanced Agricultural Marketing (3) Analysis of structure, conduct and performance of agricultural marketing system; application of price theory concepts to existing circumstances in agricultural industries; existing concepts of price theory; marketing research and performance; analysis of transportation issues and location theory. Prereq: Economics 311 or consent of instructor. Sp

560 Advanced Rural Economic Development (3) Theoretical and historical perspectives on process of economic development; analyze role of agriculture, sectoral interdependence and trade in development; application of theory to specific development issues. Prereq: 460 or consent of instructor. Sp

570 Advanced Natural Resource Economics (3) Analysis of natural resource allocation issues; applied welfare economics, external effects and evaluation of public policy. Prereq: 470 and Economics 511 or consent of instructor. F

593 Special Topics in Agricultural Economics (1-3) Topics to be assigned. Prereq: Consent of instructor. May be repeated. Maximum 8 hrs. S/NP only. E

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

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

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

650 Operations Analysis in Marketing (2) Components and functions, acquisition of assets and equity funds; factors influencing environmental quality; alternative public policy tools for influencing natural resource use or improving environmental quality. Prereq: 210 or consent of instructor. Sp

670 Consumer Demand and Food Consumption (2) Simultaneity of consumer decision making; food demand, constraints on demand. Complete demand system
Agricultural Engineering

GRADUATE COURSES

460 Diffusion of Agricultural Technology (3) Analysis of diffusion and communication processes whereby new technology spreads from scientists to change agents and then to farmers. Innovation-decision process; communication behavior; mass media, role of professional change agents, opinion leadership and consequences of technological change. Prereq: 360 or consent of instructor. (Same as Sociology 450.) Sp.

580 Advanced Rural Sociology (3) Application of sociological concepts and theory to analyze changing structure and function of rural life in U.S. and developing countries. Demographic changes, rural social and community indicators, and rural development processes. Prereq: 360 or equivalent. (Same as Sociology 580.) Sp.

593 Special Topics in Rural Sociology (1-3) Current sociological issues involving application of sociological theory. Prereq: 380 or consent of instructor. May be repeated. Maximum 6 hrs. (Same as Sociology 593.) E.

Agricultural Engineering

(College of Agriculture)

MAJORS

DEGREES

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

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

Professors:

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

Assistant Professors:

Baxter, D. O., M.S....................Missouri
Freeland, Robert S., Ph.D............Tennessee

Graduate programs leading to the Master of Science and Doctor of Philosophy with a major in Agricultural Engineering are available to graduates of a recognized curriculum in engineering, mathematics, or one of the physical sciences. A graduate program leading to the Master of Science in Agricultural Engineering Technology is available to graduates in a recognized curriculum in agriculture or other related fields. Each applicant will be advised about any prerequisite courses before entering a program. The student's program of study must be approved by his/her advisory committee and must comply with the requirements of The Graduate School.

A completed departmental data sheet and three completed Graduate School Rating Forms are required in addition to The Graduate School application.

THE MASTER'S PROGRAMS

Agricultural Engineering Requirements

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

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

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

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

Agricultural Engineering Technology Requirements

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

2. Active participation in graduate seminars conducted by the department. Resident students must register for a minimum of 2 hours in Agricultural Engineering Technology 530 (included in the 24 hours credit of #1) and must attend the graduate seminar each semester whether registered or not.

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

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

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

THE DOCTORAL PROGRAM

Concentrations for the doctoral program in Agricultural Engineering include agricultural power and machinery, agricultural structures and environment, agricultural electrical and electronic systems, food and process engineering, and soil and water conservation engineering. Students applying for entrance into the doctoral program must submit evidence of ability to perform and report independent research to the satisfaction of the department. The Master's thesis may be offered as such evidence. Scores on the GRE aptitude and engineering tests also are required.

Departmental Requirements

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

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

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

4. A minimum of 24 hours from coursework numbered greater than 600. Maximum 9 hours in courses numbered greater than 600.

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

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

Agricultural Engineering

GRADUATE COURSES


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

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


450 Electrical Distribution and Utility Design (2) Design of on-farm electrical systems, control, motors, stray voltage, special electrical loads, and safety. Prereq: Electrical Engineering 301. 1 hr and 1 lab. Sp.


460 Design of Agricultural Structures (2) Design fundamentals for wood, steel and concrete components, compression and tension members; beam and column design; pole structure design; fasteners and joint design. Prereq: 320. 1 hr and 1 lab. Sp.
Agriculture

GRADUATE COURSES

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

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

506 Physical Phenomena (3) Properties of materials, fundamentals of hydraulics, principles of electricity and electronics, thermal phenomena, applications in agricultural systems. Prereq: Consent of instructor. F

512 Agricultural Machinery Systems Analysis (3) Analysis of current fluid machinery, adaptation planning for sequential operations, machinery for unique and alternate production and harvesting systems, operational management. Prereq: 432 and 506. 2 hrs and 1 lab. F,A

522 Processing and Environmental Systems (3) Environmental systems in plant and animal production; application of electric power; mechanical equipment, structures, crop processing and materials handling. Prereq: 506. 2 hrs and 1 lab. F,A

530 On-Site Domestic Water Supply and Wastewater Renovation (3) Basic ground water hydrology, selection and design of pumps and delivery systems, point-of-use water treatment processes; soil-based wastewater renovation principles, and design and operating criteria for on-site wastewater renovation systems. Prereq: 506. 2 hrs and 1 lab. Sp,A

542 Simulation of Agricultural Systems (3) Synthesis and analysis of agricultural systems using computer simulation, philosophy of system simulation, critical path, discrete and continuous systems. Prereq: 506 and scientific computer programming. 2 hrs and 1 lab. Sp,A

546 Automation Devices and Applications (3) Electrical and fluid control systems. Basic electronics as applied to simple automation systems, programmable controllers, digital logic and transducers. Prereq: 506 and computer programming course. 2 hrs and 1 lab. Sp,A

552 Seminar (1) Current and recent literature related to agricultural production technology. May be repeated. Maximum 3 hrs. E

562 Selected Topics in Agricultural Engineering Technology (1-3) Current trends and problems in agricultural production technology. May be repeated. Maximum 6 hrs. E

Agriculture

(College of Agriculture)

GRADUATE COURSES

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

Animal Science

(College of Agriculture and College of Veterinary Medicine)

MAJOR

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

DEGREES

J. B. McLaren, Acting Head

Professors:

Barth, K. M., Ph.D. ......... Rutgers
Bell, M. C. (Emeritus), Ph.D. ..... Oklahoma State
Bliert, J. K. (Emeritus), Ph.D. ..... Ohio State
Chaplain, C. C. (Emeritus), Ph.D. ..... Iowa State

Ph.D. .................. Iowa State

Erickson, B. H., Ph.D. ............. Kansas State
Hall, O. G., Ph.D. ............. Iowa State

Hansard, S. L. (Emeritus), Ph.D. .......... Florida
Lidwall, E. R. (Emeritus), M.S. .......... Tennessee
McDonald, T. P., Ph.D. ............ Tennessee
McLaren, J. B., Ph.D. ............ Auburn
Meriman, G. M. (Emeritus), D.V.M., Michigan State
Miller, J. K., Ph.D. ............. Georgia
Montgomery, M. J., Ph.D. ........ Wisconsin
Murphee, R. L. (Emeritus), Ph.D. .......... Wisconsin
Richardson, D. O., Ph.D. ........ Ohio State
Shirley, H. V. (Emeritus), Ph.D. ........ Illinois
Shrode, R. R., Ph.D. ............ Iowa State
Tugwell, R. L. (Emeritus), Ph.D. .......... Kansas State

Associate Professors:

Backus, W. R., Ph.D. ............ Tennessee
Eiliser, H., D.V.M., Ph.D. ........ Illinois
Heitmann, R. N., Ph.D. ........ Maini
Henry, R. W., D.V.M., Ph.D. ........ Ohio
Hitchcock, J. P., Ph.D. .......... Michigan State
Kattess, H. G., Ph.D. .............. YPI
Masincupp, F. B., Ph.D. ........ Kansas State
Oliver, S. P., Ph.D. ............ Ohio State
Robbins, K. R., Ph.D. ............ Illinois
Schultz, T. W., Ph.D. ............ Tennessee
Simms, M. H., Ph.D. ............ Auburn
Wallace, J. C., Ph.D. ............ Nebraska

Assistant Professors:

Baumbach, G. A., Ph.D. .......... Florida
Bell, B. R., Ph.D. ............. NC State
Chesnut, A. B., Ph.D. ............ Illinois
Cullen, W. C., Ph.D. ............. Minnesota
Godkin, J. D., Ph.D. ............. Massachusetts
Oroz, S. E., D.V.M., Ph.D. .......... Ohio State
Quigley, J. D., Ph.D. ............ Virginia Tech
Smalling, J. D., Ph.D. ............ Texas A&M
Smith, M. O., Ph.D. ............. Oklahoma State

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

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

THE MASTER'S PROGRAM

For admission to the M.S. program, a student must have obtained a 3.0 grade-point average on a 4.0 scale (or a 3.0 each term during the junior and senior years) in a completed undergraduate degree program in one of the animal sciences or in a related area. The student must submit evidence (letters of recommendation, personal interview, etc.) that indicates ability to complete requirements for the M.S. Prerequisite courses may be required if the student has insufficient undergraduate background. If the
student has an unsatisfactory grade-point average while enrolled on a probationary (non-degree) basis and a minimum of 12 hours of graduate coursework must be completed the first term with a minimum grade-point average of 3.0 for admission to the M.S. program. The program requires the writing of a thesis based on original research; the completion of a minimum of 24 hours of graduate coursework, of which at least 14 hours must be taken in courses numbered at or above the 500 level; and a minimum of 6 hours of thesis. Included in the course requirement are 1 hour of Agriculture 512 and a minimum of 3 hours in statistics. These statistics courses must be chosen from the 400, 500, or 600 level of courses approved for use in the Intercollegiate Graduate Statistical Program (ICGSP). The remainder of the coursework will be selected jointly by the student and the major professor depending on the student's area of concentration and professional objectives. The advisory committee will consist of the major professor, a faculty member of Animal Science, who will act as chairperson of the committee, and a minimum of two other faculty members, one of whom may be outside of the Animal Science Department. The advisory committee approves the student's coursework and research problem and conducts the final oral examination which consists of a comprehensive oral examination and a defense of the thesis.

THE DOCTORAL PROGRAM

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

1. A minimum of 16 hours in related fields outside of animal science. 2. At least 24 hours credit at the 500 and 600 level, exclusive of doctoral research and dissertation, in which a minimum of 6 hours must be at the 600 level. Students in the nutrition, breeding, physiology, or anatomy concentration must complete at least 12 hours at the 500 and 600 level in the respective discipline and a closely related area. Students in the management concentration must complete Animal Science 581 and 9 hours at the 500 or 600 level in two non-management concentrations for a total of 12 hours (including 581). 3. A minimum of 1 hour of Agriculture 512 in addition to that required at the M.S. level. 4. A minimum of 6 hours in 400-, 500-, or 600-level statistics courses approved for the ICGSP. A minimum of five faculty members will constitute the student's advisory committee, of which at least one must be outside Animal Science. The major professor will be the chairperson. The student and the major professor select a program of study depending on the student's area of concentration and professional goal. The advisory committee approves the coursework and the dissertation research proposal and determines if there is to be a foreign language requirement. The advisory committee conducts the comprehensive written and oral examination and the final dissertation defense examination.

GRADUATE COURSES

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

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

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

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

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

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

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

511 Special Problems in Animal Science (1-4) Prereq: Consent of instructor and department head. May be repeated. Maximum 3 hrs. E

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

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

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

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

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

533 Nonruminant Animal Nutrition (3) Physiological development and digestive potential of nonruminal animals during the life cycle. Concepts and methodology concerning nutrient requirements, interaction, availability and deficiencies of nutrients. Nonruminant additives and environmental effects on nutrient utilization; nutritional effects on products. Prereq: 322 or consent of instructor. F

534 Ruminant Animal Nutrition (3) Digestive physiology of ruminant stomach, rumen fermentation, determination of nutrient requirement and feed intake regulations of ruminant animals. Prereq: 332. Sp

541 The Genetics of Populations (2) Application and extension of principles and concepts learned in basic courses in genetics. breeding and statistics to convey useful comprehension of the genetics of populations. Prereq: Basic courses in genetics, breeding and statistics. 1 hr and 1 lab. F

542 Applied Animal Breeding (3) Procedures for estimating population parameters, determination of response to various selection methods and breeding system, estimation of genetic and phenotypic interrelationships among metnic traits, estimation of breeding values, optimal methods of simultaneously altering several genetic characters, industrial application of animal breeding methodology. Prereq: 541 or equivalent. Sp/A

571 Design and Analysis of Biological Research (3) Experimental design and testing of experimental units; analysis and interpretation of data; statistical models and contrasts, analyses of variance, covariances, treatment arrangements, mean separation and regression. Prereq: Plant and Soil Science 471 or equivalent; knowledge of software package on micro- or mainframe computer. (Same as Plant and Soil Science 571.) Sp

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

573 Intermediate Statistical Computing (2) Application of statistical procedures to analysis and handling of data using computers; capabilities of existing software and hardware; statistical analysis methods with high speed digital computers. Prereq: 571 or equivalent; knowledge of MAT mainframe and software package. 2 hrs and 1 lab. F

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

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

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

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

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

621 Advanced Topics in Animal Physiology (1-4) Recent advances and concepts, research techniques, current problems. May be repeated. Maximum 5 hrs. E
631 Advanced Topics in Animal Nutrition (1-4) Recent advances and concepts, research techniques, current problems. May be repeated. Maximum 6 hrs. E

632 Advanced Energy-Protein Nutrition (4) Chemical forms, digestion, absorption, intermediary metabolism, deficiencies, excesses and interaction of energy and protein. Prereq: 533 or 534, and Biochemistry 410 or Nutrition 511 or consent of instructor. Sp.A

633 Advanced Mineral-Vitamin Nutrition (4) Chemical forms, digestion, absorption, intermediary metabolism, deficiencies, excesses and interaction of minerals and vitamins. Prereq: 533 or 534, and Biochemistry 410 or Nutrition 511 or consent of instructor. Sp.A

641 Advanced Topics in Animal Breeding (1-4) Advances and concepts, research techniques, current problems. Prereq: 542 or equivalent. May be repeated. Maximum 6 hrs. E

642 Quantitative Breeding Research Methods and Interpretation (2) Estimation of genetic parameters: phenotypic, genetic, and environmental correlations; repeatability; heritability; and selection indexes from simulated and actual data. Prereq: 542. 1 hr and 1 lab. Sp.A

671 Advanced Research Planning (3) (Same as Plant and Soil Science 671).

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

Animal Science-Veterinary Medicine

See Veterinary Medicine for program description.

GRADUATE COURSES

591 Special Topics in Anatomy and Physiology of Domestic and Laboratory Animals (1-4) May be repeated. Maximum 6 hrs. E

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

521 Animal Physiology (4) Introduction to major body systems and interrelationships: nervous, muscle, blood, cardiovascular, kidney, respiratory, gastrointestinal, and endocrine. Concepts of metabolism, temperature regulation, and acid-base balance. Prereq: General undergraduate anatomy and physiology, and biochemistry, or consent of instructor. 3 hrs and 1 lab. F

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

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

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

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

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

Anthropology

(College of Liberal Arts)

MAJOR

DEGREES

Anthropology: M.A., Ph.D.

William M. Bass, Head

Professors:


Associate Professors:

Harrison, Ira E., Ph.D. Syracuse Howell, Benita J., Ph.D. Kentucky Krippel, Walter E., Ph.D. Missouri Logan, Michael H., Ph.D. Penn State Schroedi, Gerard F., Ph.D. Washington State

Assistant Professors:

Bass, Mary Ann, Ph.D. Kansas State Gallaway, Alison, Ph.D. Arizona Samek, Jan F., Ph.D. SUNY Binghamton Willey, P. S., Ph.D. Tennessee

Research Associate Professor:

Chapman, Jefferson, Ph.D. North Carolina

Research Assistant Professors:

Smith, Maria Q., Ph.D. Tennessee Tardif, Suzette D., Ph.D. Michigan State

The Department of Anthropology offers both the M.A. and Ph.D. degrees with concentrations in biological anthropology, archaeology, cultural anthropology, and zooarchaeology. Additional information on the Anthropology graduate program may be obtained from the departmental brochure or by contacting the Anthropology Department.

THE MASTER'S PROGRAM

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

M.A. Requirements

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

The requirements must be met prior to taking the Graduate Examination.

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

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

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

THE DOCTORAL PROGRAM

An incoming student should possess an M.A. in Anthropology. Students with an M.A. in another discipline may be admitted after completing specific requirements outlined in the departmental brochure. In addition to the requirements prescribed by The Graduate School for the Ph.D., the Anthropology Department requires the following:

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

2. No minimum credit hour requirement. Specific courses to be taken are determined by students and their advisory committees. Students should plan to devote a minimum of 4 years beyond the B.A. to attain the Ph.D.

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

4. Demonstration of knowledge of one foreign language. This language should normally be French, German, Russian or Spanish, but another language may be substituted at the committee's discretion. This requirement may be met by:
   a. Successful performance on a language examination administered by the appropriate language department. Students electing this alternative should consult with their advisor.
   b. Completion of the intermediate (200 level) sequence of a language with a grade of B or better in the second semester.

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


ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UTK on an in-state tuition basis. The M.A. program in Anthropology is available to residents of the states of Kentucky,
410 Principles of Cultural Anthropology (3) Exploration and illustration of major concepts, theories, and methods in cultural anthropology, with application to analysis of specific ethnographies. Prereq: 130.

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

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

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

440 Cultural Ecology (3) Concepts and methods in studying dynamic interaction between prehistoric and present day cultures and their environments: ecological theory, methods of analysis, and review of selected case studies. Prereq: 120, 130, 410, or consent of instructor.

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

460 Selected Topics in Archaeology (3) Regional or theoretical issues in archaeology for undergraduate students. Practical experience in laboratory study of archaeological materials. Prereq: 120 or consent of instructor. May be repeated. Maximum 6 hrs.

461 African Prehistory (3) African cultural history from earliest evidence of human activity to time of European contact. Stone age of African south of Sahara. Prereq: 120 or consent of instructor. (Same as Afro-American Studies 461.)

462 Early European Prehistory (3) Origins and evolution of human culture in Europe through beginnings of recorded life. Paleolithic and Mesolithic chronology and lifeways. Prereq: 120 or consent of instructor.

463 Rise of Complex Civilizations (3) Development of complex societies in Old World from origins of agricultural economics to rise of States. Mesolithic, Neolithic and Metal Age lifeways in Africa, Europe, and Asia. Prereq: 120 or consent of instructor.

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

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

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

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

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

485 Primate Behavior (3) Social organization and behavioral characteristics of selected primates: group composition, size, and structure; patterns of mating; other social interactions; communication; and cultural behavior. Application of primates study to human ethology. Prereq: 110 or consent of instructor.

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

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

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

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

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

512 Urban Studies in Anthropology (3) Process of urbanization, the city. Theory and method in researching urban communities; urban problems and applied anthropology.

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

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

515 Medical Anthropology (3) Cultural impact on disease patterning, theories of disease causation, and models of therapy. Theoretical and applied aspects of the anthropological study of health and disease. Prereq: Consent of instructor.

516 Nutritional Anthropology (3) Anthropological contributions to study of food-related cultural and biological variability. Prereq: Consent of instructor. Prereq: 110, 120, 130, or consent of instructor. Recommended prerequisite: Basic nutrition course.

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

521 Laboratory Studies in Zooarchaeology (4) Examination and comparison of skeletons of major vertebrate groups, shells of terrestrial and aquatic mollusks, in relation to animal remains from archaeological contexts. Basic osteology and shell characters of species encountered in aboriginal sites; use of comparative collections. May be repeated. Maximum 8 hrs.

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

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

531 Quantitative Methods in Archaeology (3) Application of quantitative techniques to archaeological data critically examined through literature and problem solving, statistical evaluation and statistical analyses and other mathematical methods. Prereq: Consent of instructor.

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

558 Theory in Archaeology (3) Detailed consideration of theory in contemporary archaeology: models of scientific explanation, research design, archaeological formation processes, and methods of analysis and interpretation.

561 Archaeological Resource Management (3) Federal legislation and regulations affecting identification, protection, and management of archaeological resources. Professional ethics and responsibilities and relationship of federal, public interest groups, and professional archaeologists. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

562 Prehistory of Old World Archaeology (3) (Same as Classics 562).

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

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

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


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

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

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

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

587 Laboratory in Forensic Anthropology (3) Discussion and lab experience with forensic anthropological techniques: radiographic analysis, dental examination, hair analysis, bone microstructure. Prereq: Human Origins, 480, 581 or consent of instructor. 2 hrs and 1 lab.

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

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

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

600 Doctoral Research and Dissertation (1-15) P/NP only. E

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

610 Seminar in Cultural Anthropology (3) Selected topics, primarily for doctoral students in cultural anthropology. May be repeated. Maximum 6 hrs.

611 Theory in Cultural Anthropology (3) Critical evaluation of current issues in theory and data interpretation, primarily for doctoral students in cultural anthropology.
Architecture

(Office of the Provost)

J. William Rudd, Dean
William J. Lauer, Associate Dean
Jon Coddington, Assistant to the Dean

Professors:
Anderson, G. I., M.Arch.................Illinois
Conley, G., B.Arch......................Harvard
Grieger, F. A., M.Arch.................Pennsylvania
Kelso, R. M., M.S.........................
Kersavage, J. A., D.Sc..................Southern Cal
Lauer, W. J., M.S.Arch, Engr..........Iowa State
Lester, A. J., M.Arch....................Virginia
Lizin, P., Ph.D.........................Pennsylvania
Robinson, M. A., M.Arch..............Pennsylvania
Shell, W. S., M.S.Arch................Columbia
Watson, J.S., M.Arch...................Pennsylvania
Wodhouse, L. M., Ph.D................St. Andrews

Associate Professors:
Herz, M. D., B.Arch......................Columbia
Kinzy, S. A., M.Arch....................Illinois
Martella, W. E., B.Arch...............California
Moffett, M. S., Ph.D....................MIT
Narancic, V., B.Arch....................Belgrade
Rabun, J. S., M.A.......................Texas

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

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

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

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

Applicants must provide a transcript of previous academic work and must have attained at least a 2.5 overall grade-point average. Applicants must also demonstrate the ability to study, and these abilities must be shown by the applicant as well.

Second-year students are required to submit a portfolio which demonstrates a proficiency in freehand and orthographic drawing skills prior to taking Basic Architecture I. If an otherwise qualified student does not have these skills, he/she can come to the School of Architecture the summer before entering the second degree program and take an intensive drawing course which will fulfill the prerequisite.

Please consult The University of Tennessee Undergraduate Catalog for the minimum requirements of the Second Degree Program.

GRADUATE COURSES

403 Introduction to Preservation (3) History, theory, and legal aspects of architectural preservation and restoration.

404 Preservation Technology (3) Techniques of preservation: methods of analysis, history of materials and technology used in old buildings.

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

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

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

412 Non-Western & Indigenous Architecture (3) Building responsive to climate, material availability, and economic level, as designed by anonymous builders. Prehistoric times to present throughout world. Fer- tile Crescent; Indus Valley; Hindu, Buddhist, and Mughal architecture of India, China, and Japan.

413 Tennessee Architecture (3) History of settlement patterns and building in Tennessee. Reading assignments, lecture notes, projects, and oral presentations.

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

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


420 American Architecture II (3) Style patterns from Gothic Revival through twentieth century.

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

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

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

433 Earthquake-Resistant Structures (3) Analysis and design of structures to resist earthquake effects. Earth-quake phenomena, Vibration of single degree structural systems, Resonance, earth tremors, Introduction to dynamic analysis of structures. Instrumentation and structural response. Frame and shear wall behavior. Foundation structure interaction. Prereq: Consent of instruc-


443 Building Energy Analysis (3) Balancing heat flow through external skin of residential and small and large commercial buildings. Local climate evaluation. Site planning, building size and orientation, window area, wall treatment, infiltration control, and other design elements. Energy use quantity methods and economic analysis of energy efficient design features. Architectural program analysis of external and internal load dominated buildings. Prereq: 341.

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

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

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

Art

(College of Liberal Arts)

MAJOR DEGREE

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

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

Professors:
Blain, Sandra J., M.F.A..................Wisconsin
Braake, P. M., M.F.A...............Yale
Clark, R.A., M.S......................Wisconsin
Claveau, Dale G. (Emeritus), Ph.D.......Chicago
Falsetti, Joseph S., M.S................Ohio State
Kennedy, William C., M.F.A...........Wisconsin
Kurka, Don, Ph.D.................New York
Lealand, W. E., M.F.A..............Tennessee
Livingston, P. R., M.F.A.............Wisconsin
Martinson, Fred, Ph.D...............Chicago
Nichols, P. G., M.F.A..............Michigan
Peacock, D., M.F.A..................Iowa
Stewart, F.C., M.F.A.................Claremont

Associate Professors:
Daehnert, R. H., M.F.A...............Wisconsin
Darrow, J. F., Eg.D...............Illinois State
Goldstein, M. B., M.F.A...........Nebraska
Habel, Dorothy, Ph.D.............Michigan
Lee, B., M.F.A.................Yale
LeFevre, Richard, M.F.A............Rochester IT
Moffatt, F., Ph.D. ........................................ Chicago
Neff, A., Ph.D. ......................................... Pennsylvania
Riesing, T., J., M.F.A. ................................... Nebraska
Saupe, T., M.F.A. ......................................... Wisconsin
Yates, S., M.F.A. ......................................... North Carolina
(Greensboro)

Assistant Professors:
Longobardi, Pam, M.F.A. ........................ Montana State
Lyons, B., M.F.A. ........................................ Arizona State
Wilson, D., M.F.A. ...................................... California (San Diego)

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

THE MASTER'S PROGRAM

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

1. A detailed letter of intent.
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.

M.F.A. Requirements

A minimum of 60 hours is required:
1. Successful completion of 20 hours of studio in a concentration area. An inter-area program must be approved by the graduate faculty only after the second semester in residence. Ten hours of concentration must be in second year courses (512, 514, etc.).
2. A minimum of 9 hours of art history for graduate credit.
3. Eleven hours of electives which may consist of any combination of courses offered by the University for graduate credit.
4. Art 599, Project in Lieu of Thesis (20 hours). A third year of semi-independent study. Student must have completed all other coursework prior to registration.
5. A student with the permission of the area faculty may petition to take 3 hours of outside academic courses as a substitute for 3 hours of art history or 3 hours of concentration area. The petition is to be presented to the graduate committee for final approval and should directly address the need and relevance of this substitution to the student's concentration.

Four semesters beyond the Bachelor's degree are required in residence. Residence is defined by the Department of Art as (1) a minimum enrollment of 6 hours per semester and (2) use of Department of Art facilities so that students are available for discussion and criticism.

The candidate's committee will consist of a minimum of 3 members and a maximum of 6 members and will be appointed prior to registration for Art 599. Three members of the committee shall be as follows: one from the candidate's concentration area who shall be the major professor, one from art history, and one from studio discipline outside the concentration area.

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

Academic Standards

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

ACADEMIC 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. The M.F.A. program in Art is available to residents of the state of Alabama. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.

GRADUATE MINOR IN THE HISTORY OF ART

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

GRADUATE COURSES

401 Fiber: Advanced Projects (3-6) Prereq: 302 or consent of instructor. May be repeated. Maximum 12 hrs.
402 Fabric: Advanced Projects (3-6) Prereq: 301 or consent of instructor. May be repeated. Maximum 12 hrs.
404 or consent of instructor. May be repeated. May be repeated. Maximum 12 hrs.
405 Advanced Computer Enhanced Design (3) Prereq: 404 or consent of instructor. May be repeated. Maximum 8 hrs.
406 Goldsmithing (3-6) Metalsmithing techniques: granulation, electroforming, electroplating, electrolyphilic, anodization, and photo processes with individual studio problems to develop personal style of expression. Prereq: 6 hrs of metalsmithing or consent of instructor. May be repeated. Maximum 12 hrs.
409 Special Topics in Fiber/Fabric (3) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 12 hrs.
411 Drawing IV (6) Individualized pursuit of personal drawing techniques and concepts, supplemented by individual and group critiques; weekly life drawing sessions. Prereq: 311. May be repeated. Maximum 12 hrs.
413 Painting IV (6) Individual concepts and personal expression with varied media. Prereq: 313. May be repeated. Maximum 12 hrs.
419 Special Topics in Drawing and Painting (3) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 12 hrs.
424 Ceramics: Clay and Glasses (3) Clay chemistry, clay bodies, glaze theory, glaze calculation, intensive formulating, mixing and testing of clay bodies and glaze formulas. Prereq: 321 and 322.
425 History of Ceramics Seminar (3) Ceramics from ancient through contemporary. Ceramics sculpture, and ceramic aesthetics: lectures and individual investigations. May not be used toward art history requirement. Prereq: 321 and 322.
426 Kilns: Design, Construction and Operation (3) Kiln design, traditional and modern refractories, construction methods, and operation of wood, gas, and electric kilns. Prereq: 321 and 322.
429 Special Topics in Ceramics (3) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 12 hrs.
439 Special Topics in Photography (3) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 12 hrs.
441 Advanced Sculpture (3-6) Individual development of sculptural problems and techniques. Prereq: 6 hrs of 300 level sculpture. May be repeated. Maximum 12 hrs.
449 Special Topics in Sculpture (3) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 12 hrs.
453 Advertising Illustration (3) Advertising illustration media and techniques as applied to product illustration. Prereq: 354.
454 Editorial Illustration (3) Editorial illustration media and techniques as applied to book, magazine, and newspaper illustration. Prereq: 453.
456 Graphic Design/Illustration Practicum (1-12) Practical experience in design and illustration field. Only by rearrangement with department. Prereq: Senior standing and consent of instructor. May be repeated. Maximum 12 hrs.
458 Special Topics in Graphic Design/Illustration (3) Student- or instructor-initiated course offered at convenience of department. Prereq: Determined by department. May be repeated. Maximum 12 hrs.
462 Intaglio III (3-6) Individual projects through advanced color printing methods and combinations with other print media. Prereq: 362. May be repeated. Maximum 12 hrs.
499 Special Topics (3-6) Individual projects through advanced color ediclining methods from stones and aluminum plates. Prereq: 363. May be repeated. Maximum 12 hrs.


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

471 History of North American Art (3) Landmarks in painting, architecture, sculpture, and design from prehistory to 1900.

472 History of 20th-Century American Art (3) Developments in architecture, painting, and design from 1900.

473 19th-Century American Painting (3) From West and Copley to emergence of 'The Eight.'

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

475 History of the 19th-Century Painting in Europe and America (3) French: Neoclassicism, Romanticism, Realism, Romanticism, Realism, Impressionism, Van Gogh, Gauguin, Picasso, and Cubism. Italy: Early or High Renaissance or Mannerist periods.

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

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

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

482 Museology II: Exhibition Planning and Installation (3) Exhibition concept development and implementation. Exhibition design and installation techniques. Publicity, production, matting and framing, lighting and display. Prereq: 481 or consent of instructor. (Same as Anthropology 482.)

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

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

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

489 Studies in Art History (3) Concentration in individually selected area. Prereq: 12 hrs of art history and consent of instructor. May be repeated. Maximum 6 hrs.

494 Individual Problems (3) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

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

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

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

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

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

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

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

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

514 Graduate Painting II (2-6) May be repeated. Maximum 10 hrs.

515 Graduate Watercolor I (2-6) May be repeated. Maximum 10 hrs.

516 Graduate Watercolor II (2-6) May be repeated. Maximum 10 hrs.

521 Graduate Ceramics I (2-6) May be repeated. Maximum 10 hrs.

525 Graduate Ceramics II (2-6) May be repeated. Maximum 10 hrs.

541 Graduate Sculpture I (2-6) May be repeated. Maximum 10 hrs.

542 Graduate Sculpture II (2-6) May be repeated. Maximum 10 hrs.

551 Graduate Graphic Design/Illustration I (2-6) May be repeated. Maximum 10 hrs.

552 Graduate Graphic Design/Illustration II (2-6) May be repeated. Maximum 10 hrs.

561 Graduate Printmaking-Intaglio I (2-6) May be repeated. Maximum 10 hrs.

562 Graduate Printmaking-Intaglio II (2-6) May be repeated. Maximum 10 hrs.

563 Graduate Printmaking-Lithography I (2-6) May be repeated. Maximum 10 hrs.

564 Graduate Printmaking-Lithography II (2-6) May be repeated. Maximum 10 hrs.

565 Graduate Printmaking-Screen Printing I (2-6) May be repeated. Maximum 10 hrs.

566 Graduate Printmaking-Screen Printing II (2-6) May be repeated. Maximum 10 hrs.

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

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

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

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

590 Seminar in Art Criticism (3) Theory and practice. Prereq: M.F.A. candidate or consent of instructor.

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

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

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

595 Projects in Lieu of Thesis (10) Prereq: All graduate course work and successful second year evaluation by graduate faculty. May be repeated. Maximum 20 hrs. S/N only. E.

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

400 Special Topics (2-4) Student- or instructor-initiated course offered at convenience of department. May be repeated. 210 Drawing (2-4) Intermediate to advanced. May be repeated.

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

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

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

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

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

489 Wood (2-4) Intermediate to advanced. May be repeated.

Art and Music Education

(College of Education)

MAJORS

DEGREES

Art Education............................M.S.

Music Education........................M.S.

Charles H. Ball, Head

Professors:


Associate Professors:

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

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

GRADUATE COURSES

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

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

510 Foundations of Music Education (3) Historical, philosophical and aesthetic bases. Prereq: Consent of instructor.

520 Research in Music Education (3) Definition of research problems, data collection and analysis, and research report writing. Application of knowledge of research techniques to analysis of existing research literature in music education. Prereq: Consent of instructor.

530 Advanced Band Literature and Conducting (3) Reading, conducting, and interpreting band scores suitable for school, college, and community bands; contemporary and standard band literature. Prereq: Consent of instructor.

540 Advanced Choral Literature and Conducting (3) Reading, conducting, and interpreting vocal scores suitable for school, college, and community groups. Prereq: Consent of instructor.

550 Curriculum Development and Evaluation in Music Education (3) Principles of curriculum development applied to music education programs. Formulating objectives; construction of evaluation instruments; survey of appropriate literature. Prereq: Consent of instructor.

555 Administration and Supervision of School Music (3) Problems of supervision, research, and in-service education, teacher preparation, guidance. Prereq: Consent of instructor.

560 Psychology of Music Teaching (3) Research on musical perception and cognition and its application to teaching of music. Definition and measurement of musical ability. Prereq: Course in general psychology and 1 yr of music theory or consent of instructor.

570 Studies in Elementary and Middle School Music (3) Current trends and research in teaching of music in elementary and middle school. Prereq: Consent of instructor.

580 Seminar in Music Education (1-3) Class investigation and individual reporting of pertinent topics and issues in music education. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

590 Special Topics in Music Education (1-3) E

593 Independent Study in Art Education (1-3) E

Music Education

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

Astronomy

See Physics and Astronomy

Audiology and Speech Pathology

The American Speech-Language-Hearing Association, including the required number of clock hours of clinical practicum (minimum 150 hours as a graduate student, 300 total). An exception to this rule must be approved by the appropriate departmental committee. Enrollment in clinical practicum courses is required for all clinical practice experiences. If the undergraduate preparation does not include sufficient coursework in speech pathology, audiology, psychology, and related fields, the student may be required to make up such deficiencies.

Students may elect either the thesis or the non-thesis option. Students in both programs are required to take 511. The Master’s program with the thesis will include a minimum of 30 semester hours of approved graduate credit, including 6 hours of 500 credit in the preparation of an acceptable thesis representing original independent work, and a final oral examination. At least two-thirds of these total courses must be at the 500 or 600 level; no more than 6 hours of thesis courses and no more than 6 hours of practicum. Students in the non-thesis
option program must present a total of 36 semester hours of approved graduate credit and pass a final written examination. A minimum of 24 hours must be at the 500 or 600 level, no more than 6 of which may be practical. The decision as to choice of the thesis or non-thesis program is normally made following completion of 511 and a conference with the student's advisor.

THE DOCTORAL PROGRAM

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

1. Basic speech, hearing, and language processes;
2. Speech, hearing, and language disorders;
3. Related disciplines providing insight into human communication 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 academic years, plus one summer semester. The first year will be devoted primarily to formal study beyond the Master's degree with the remaining two years of graduate study focusing on additional courses, research, and thesis. The decision as to choice of the thesis or non-thesis program is normally made following completion of 511 and a conference with the student's advisor.

GRADUATE COURSES

431 Stuttering (3) Nature, appraisal and treatment. Prereq: 304 or consent of instructor.
432 Clinical Practice in Speech-Language Pathology I (1-4) Prereq: 320, 331 or consent of instructor. Enrollment for fewer than 2 hrs must have prior departmental approval. (Same as Special Education 453.)
433 Clinical Practice in Speech-Language Pathology II (1-4) Prereq: 432 and consent of instructor. Enrollment for fewer than 2 hrs must have prior departmental approval. (Same as Special Education 453.)
440 Voice Disorders (3) Etiology, diagnosis, and treatment of organic and functional vowel disorders. Prereq: 304, 306, or consent of instructor. (Same as Special Education 440.)
455 Problems in Speech Pathology (1-3) Prereq: Consent of instructor.
463 Practical Applications of Language Habilitation Techniques (3) Various methods and procedures in treating delayed/disabled preschoolers. Alternative/augmentative systems. Prereq: 461 or consent of instructor.
465 Speech and Language of the Culturally Different Child (3) Speech and language differences of children of various racial/ethnic minorities and class membership and from different geographic regions.
473 Audiology II (3) Basic principles of clinical audiology; pure tone, speech, masking and overview of special auditory tests. Prereq. 371. (Same as Special Education 473.)
494 Introduction to Aural Rehabilitation (3) Rehabilitation of acoustically impaired having communication difficulties, residual hearing and other sensory modalities. Prereq. 473.
500 Thesis (1-15) P/NP only. E
502 Registration for Use of Facilities (3-15) Required of students not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N only. E
506 Neural Bases of Speech and Language (3) Structure and function of central and peripheral nervous systems, role in speech and language. Prereq: 336.
511 Introduction to Research in Speech and Hearing (3) Analysis of research techniques, application of statistics, and completion of pilot research project. Prereq: Psychology 355 or equivalent or consent of instructor.
512 Clinical Practice in Audiology (1-4) Prereq: 473 and 494. May be repeated. Maximum 9 hrs.
513 Clinical Practice in Audiology: Off-Campus Sites. (1-4) Prereq: Consent of instructor.
514 Practicum in Verbo-Tonal Habilitation (1-4) Prereq: 473, 494, 595, or consent of instructor. May be repeated. Maximum 6 hrs.
515 Practicum in Aural Rehabilitation (1-4) Prereq: 473 and 494. May be repeated. Maximum 6 hrs.
517 Instrumentation in Audiology and Speech Pathology (3) Principles of instrumentation in audiology and speech pathology; laboratory assignments for familiarization of student with instruments for measuring speech and hearing processes.
520 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: 506 (or equivalent) or consent of instructor.
522 Seminar: Articulation and Voice Disorders (3) Current research in diagnosis and management of articulation and voice disorders. Prereq: Undergraduate courses in articulation and voice disorders or consent of instructor.
531 Seminar on Stuttering (3) Current significant research in stuttering. Prereq: 431 or consent of instructor.
533-34 Advanced Clinical Practice in Speech-Language Pathology (1-4, 1-4, 1-4) Prereq: 454 or equivalent and consent of instructor. May be repeated. Maximum 6 hrs. Enrollment for less than 2 hrs must have prior departmental approval.
536-37 Advanced Clinical Practice in Speech-Language Pathology: Off-Campus Sites (1-4, 1-4, 1-4) Prereq: 100 hrs clinical experience, consent of instructor. May be repeated. Maximum 6 hrs each. Enrollment for less than 2 semester hrs must have prior departmental approval.
539 Advanced Clinical Practice in Speech-Language Pathology: Public Schools (1-4) May be repeated. Maximum 6 hrs. Enrollment for less than 2 hrs must have prior departmental approval.
545 Sound Measurement Techniques and Hearing Conservation (3) Techniques of measurement and analysis of sound; hearing conservation in schools and industry. Prereq: Consent of instructor.
546 Advanced Audiology (3) Theory and practice of advanced pure tone and speech audiometry; instrumentation and interpretation of audiometric findings with differential diagnosis. Prereq: 473.
547 Special Problems in Audiology (1-3) Prereq: 473 or equivalent and consent of instructor. May be repeated. Maximum 6 hrs.
548 Special Study in Audiology (1-3) Special reading, consultation, and research activities in field of audiology. May be repeated. Maximum 6 hrs.
550 Seminar in Audiology (1-3) Significant research in various areas of audiology. Prereq: Consent of instructor. May be repeated. Maximum 10 hrs.
551 Advanced Auditory Assessment (3) Theoretical and applied considerations of procedures used to identify lesions in auditory mechanism: behavioral assessment, acoustic immittance and electrophysiological techniques. Prereq: 473, 507 and 546.
552 Seminar in Speech Pathology (2-3) Current significant research in speech pathology. Topics vary. Prereq: 5 hrs in speech pathology. May be repeated with consent of department. Maximum 9 hrs.
559 Special Problems in Speech-Language Pathology (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.
567 Management and Supervision for Speech-Language Hearing Professionals (3) Management systems, accountability, performance appraisal and clinical super-
vision for audiologists and speech language pathologists interested in private practice, supervisory or administrative positions.

561 Tutorial in Child Language Pathology (2) Interactions with various staff members of Pediatric Language Program; selected topics. May be repeated. Maximum 6 hrs.

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

579 Psycholinguistic Concepts in Speech Pathology (3) Theoretical and practical concepts and information theory in studying the normal acquisition of language and certain disorders of language. Prereq: Consent of instructor.

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

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

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

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

595 The Verbo-Tonal System (3) Theory, procedures, and instrumentation of Verbo-Tonal System in habilitation of hearing impaired; diagnosis, speech management, and foreign languages. Prereq: 371. Recommended prereq: 305,473, and 494.

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

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


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


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

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

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

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

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

650 Advanced Seminar in Audiology (2) Topics vary. Prereq: Consent of instructor. May be repeated. Maximum 8 hrs.

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

655 Practicum in College Teaching (2) Supervised experience in college teaching. Prereq: Consent of instructor. May be repeated. Maximum 4 hrs. S/NC only.

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

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

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

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

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

Aviation Systems

(UT Space Institute)

MAJOR

DEGREE

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

R. D. Kimberlin, Program Chair

Professors:


Associate Professors:

Kimberlin, R. D., M.S............ Tennessee Watts, C. F., M.S............ Arizona

Assistant Professor:

Sollies, U. P., Ph.D.............. Tennessee

The University of Tennessee Space Institute offers a program leading to the Master of Science degree with a major in Aviation Systems. The Aviation Systems program is designed for those who possess a Bachelor's degree in engineering or science and wish to study under a "system philosophy" toward careers in research and development or administration in areas pertinent to aviation.

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

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

THESIS OPTION

The thesis program involves satisfactory completion of the following requirements:

Research and Development Specialization

1. Twelve hours of 500-level courses in the major field of aviation systems.
2. Six hours in industrial engineering (engineering management).
3. Six hours of electives from the major field, mathematics or engineering.
4. Six hours of Aviation Systems 500 demonstrating the ability to conduct and report on an independent investigation.

Administration Specialization

1. Twelve hours of 500-level courses in the major field of aviation systems.
2. Three hours in industrial engineering (engineering management).
3. Three hours in economics or finance.
4. Six hours of electives selected from the major field, mathematics or engineering.
5. Six hours of Aviation Systems 500 demonstrating the ability to conduct and report on an independent investigation.

NON-THESIS OPTION

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

Research and Development Specialization

1. Twelve hours of 500-level courses in the major field of aviation systems.
2. Six hours in industrial engineering (engineering management).
3. Twelve hours of electives in the major field, mathematics or engineering.
4. Three hours of an assigned project under Aviation Systems 510.
5. A comprehensive final written examination on all coursework submitted for the degree and defense of the project course paper.

Administration Specialization

1. Twelve hours of 500-level courses in the major field of aviation systems.
2. Three hours in industrial engineering (engineering management).
3. Three hours in economics or finance.
4. Twelve hours of electives in the major field, mathematics or engineering.
5. Three hours of an assigned project under Aviation Systems 510.
6. A comprehensive final written examination on all coursework submitted for the degree and defense of the project course paper.

ACADEMIC COMMON MARKET

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

GRADUATE COURSES

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

501 Aviation Systems: An Overview (3) Aviation systems, present and future. Socioeconomic base, aerospace and propulsion technology, meteorology, air traffic control, and community interaction with technological trends and developments pertinent to present status and future development of air transportation. Prereq: Consent of instructor. May be repeated. S/NC only. E

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

503 Air Vehicles (3) Current capabilities and future requirements for civilian and military air vehicles. Parameters significant for air vehicle type selection. Integration of air vehicle into aviation system. Prereq: 501. E

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

506 Aircraft Design (3) Process design, compromise of conflicting requirements, economical, industrial and legal aspects. Definition of mission requirements, synthesis and optimization techniques, safety and reliability, systems integration, standards and regulations, teamwork and decision-making process. Prereq: 501. E

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


Biochemistry

(College of Liberal Arts)

MAJOR DEGREES

Biochemistry M.S., Ph.D.

Wesley D. Wicks, Head

Professors:

Churchich, Jorge E., Ph.D., Florida State University; Sheffield, Harold

Huang, Leaf, Ph.D., Michigan State University; Joshi, J. G., Ph.D., Penn State University; Monty, Kenneth J., Ph.D., Rochester University; Salo, T. P. (Emeritus), Ph.D., University of Wisconsin; Wicks, Wesley D., Ph.D., Harvard University

Associate Professor:

Koonz, John W., Ph.D., Kentucky University

Assistant Professors:

Fairfield, Frederic R., Ph.D., SUNY Stony Brook University; Feinberg, R. H. (Emeritus), Ph.D., California State University, Fullerton; Howard, Robert E., Ph.D., Lehigh University; Serres, Engin H., Ph.D., University of California, Davis

Adjunct Faculty:

Constantinides, P., Ph.D., Brown University; Farkas, W., Ph.D., Duke University; Georgiou, S., Ph.D., Manchester University; Kennel, S., Ph.D., California Institute of Technology

THE MASTER'S PROGRAM

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

2. A minimum of 8 semester hours of approved biology courses beyond the introductory level and including the subjects of genetics and physiology.

3. Biochemistry 511-12 and 515-16.

4. At least 6 hours of advanced seminar courses from the following: 601, 603, 604, 605, 606.

5. At least 6 hours of Master's research and a thesis.

6. A final examination that covers both the thesis endeavor and the subject matter of the course requirements.

THE DOCTORAL PROGRAM

1. Introductory Organic Chemistry*, Introductory Physics*, Differential and Integral Calculus*, approved physical chemistry, and at least 12 hours of biology beyond the introductory level and including the subjects of genetics and physiology.

2. Biochemistry 511-12 and 515-16.

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

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

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

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

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

8. A final oral examination which will be concerned primarily with the student's dissertation.

Petitioning for Master's Degree

Students who have passed the comprehensive examination in the Ph.D. program and have completed at least 30 hours of approved coursework for graduate credit, at least two-thirds of which must be at or above the 500 level, may petition the department for award of a Master's degree. The additional requirements for such a degree are:

1. The preparation of a research manuscript suitable for publication in a major scientific journal and oral defense of that manuscript before an examining committee of three faculty members appointed by the head of the department, at least two of whom shall be members of the department; or

2. Publication of at least one full-length paper in a major biochemical journal as senior author.

*Though completion of these courses or their equivalent is required, they may not be taken for graduate credit.

GRADUATE COURSES

410 Cellular and Comparative Biochemistry (4) Electrolyte behavior, chemistry and structure of proteins; enzyme behavior and biological function; catabolism and energy capture; synthetic metabolism; nucleic acid function, protein synthesis, and biochemical genetics; regulation of biological processes. Prereq: Chemistry 350-360 and Biology 116-20. E


430-40 Introduction to Physical Biochemistry (3.3) Development of concepts from physical chemistry for application to biological problems. 430—Thermodynamics; intermolecular bonding; transport; shape and motion of macromolecules; kinetics of enzyme-catalyzed reactions; 440—Quantum mechanics; molecular orbitals; interactions of light with biological molecules; macromolecular studies through nuclear magnetic resonance and electron spin resonance; case studies of studies of selected macromolecules. Prereq: Mathematics 141-42, Chemistry 350-360, and Biology 110-20. F

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

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

511 Advanced Concepts in Protein Structure, Protein Function, and Intermediary Metabolism (4) Protein structure and dynamics; regulation of enzyme activity; intermediary metabolism; membrane structure and function. Original literature and review articles; contemporary experimental approaches. Prereq: 410, 420 or consent of instructor. 3 hrs and 1 discussion. F

512 Advanced Molecular Biology (4) Replication, repair, transcription, translation and control mechanisms. Prior knowledge of fundamentals of gene expression. Prereq: 511 or Life Sciences 511. 3 lectures and discussions. (Same as Life Sciences 512.) Sp

515 Experimental Techniques I (3) Modern experimental methodology and instrumentation. Prereq: Consent of instructor.

516 Experimental Techniques II (3) Laboratory rotations. Student works in laboratory of faculty member on clearly defined project. Written proposal and oral report. Primarily for departmental graduate students. Prereq: Consent of instructor.

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

525 Graduate Research Participation (3-12) Tutorial laboratory experience. May be repeated. Maximum 12 hrs. E
Biomedical Sciences

(Office of the Provost)

MAJOR DEGREES

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

Raymond A. Popp, Acting Director

Professor: Olins, Donald E., Ph.D. .......... Rockefeller Research Professor: Olins, Ada L., Ph.D. .......... New York Research Associate Professor: Uberbacher, Edward C., Ph.D. .......... Pennsylvania Shared Faculty:

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


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

The program of study, which incorporates a high faculty-to-student ratio, is based on intensive graduate courses supplemented by tutorial instruction, participation in a wide variety of seminars, and a heavy emphasis on communication skills, research training, and independent study. The program encourages students to pursue graduate studies to the limits of their abilities. Each student’s curriculum is planned to meet individual needs, with the aim of giving (1) strength in the basic sciences; (2) perception of the biomedical sciences as a whole; and (3) experience and training in a chosen specialty.

The concentration areas available for Master’s thesis and Ph.D. dissertation work are biochemistry, biophysics, carcinogenesis, genetics, cellular and 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, exercise, molecular and mammalian genetics, mutagenesis, and problems of aging.

ADMISSION REQUIREMENTS

A Bachelor’s degree or its equivalent is required. Students with M.S., D.V.M., or M.D. degrees are also encouraged to apply. Completed applications, Graduate Record Examination scores and letters of reference should be sent to the address below. The student will need preparation in biology, calculus, physics, and general chemistry. A course in physical chemistry is offered by the school in order to meet the last requirement. It is recommended that deficiencies in preparation, as identified in the admission process, be eliminated prior to entrance.

Requests for application forms, information on financial aid, and housing should be directed to:

Director, University of Tennessee-Oak Ridge Graduate School of Biomedical Sciences, Biology Division, ORNL, Box 2009, Oak Ridge, Tennessee 37831-8077.

THE DOCTORAL PROGRAM

1. Satisfactory (B grade or better) completion of the following core courses or their equivalent: Biochemistry (511); Biophysical Biochemistry (514); Genetics (515); Molecular Genetics (517); Cell Biology (518-19); Computing for the Life Sciences (525); and Statistics for Biologists (574).

2. Three semesters of Biomedical Sciences Laboratory (331-33-33).

3. Participation in at least one of the seminars during each term 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. Passing both written and oral comprehensive examinations.

6. A dissertation reporting the results of original and significant scientific research. A minimum of 24 semester hours of course 600 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. The requirements for the degree are:

1. Graduate credit or a proficiency in the following core courses: Biochemistry (511); Biophysical Biochemistry (514); Cell Biology (516-19); plus any three of the following courses: Genetics (515); Molecular Genetics (517); Statistics for Biologists (574); or Computing for the Life Sciences (525). Additional credits may be obtained (6 to 15 hours) with special permission.

2. Thirty hours of approved graduate courses including a minimum of 6 semester hours for thesis.

3. For admission to candidacy: Completion of any required prerequisite courses and one semester of graduate coursework with a B average. Admission to candidacy forms must be filed at least one full semester prior to receipt of degree.
Botany

MAJOR

DEGREES

Botany

Karen W. Hughes, Head

Professors:

Caponetti, J. D., Ph.D.............. Harvard
Clebsch, E. E., Ph.D.............. Duke
DeSelms, H. R., Ph.D.............. Ohio State
Evans, A. M., Ph.D.............. Michigan
Hendron, W. R. (Distinguished Prof.), Ph.D.............. Vanderbilt
Hickok, L. G., Ph.D.............. Massachusetts
Holton, R. W., Ph.D.............. Michigan
Hughes, K. W., Ph.D.............. Utah
Jones, L. W., Ph.D.............. Texas
McCracken, J. F., Ph.D.............. Emory
Norris, F. H. (Emeritus), Ph.D.............. Ohio State
Petersen, R. H. (Distinguished Prof.), Ph.D.............. Columbia
Sharp, A. J. (Emeritus), (Distinguished Prof.), Ph.D.............. Ohio State
Smith, W. O., Ph.D.............. Duke
Waile, P. L. (Distinguished Prof.), Ph.D.............. Tennessee

Lecturers:

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

The Department of Botany offers the Master of Science and Doctor of Philosophy degrees with concentrations in anatomy, biology, cytology, cytogenetics, ecology, genetics, lichenology, morphology, mycology, photobiology, physiology, pteridology, and taxonomy.

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

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

ADMISSION REQUIREMENTS

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

1. Bachelor's degree: A B.A. or B.S. from an accredited college or university with a cumulative grade point average of 2.5 or better (on a 4.0 scale), with evidence of ability to do work of graduate quality.

2. General botany or general biology: 8 semester hours.

3. Advanced botany or closely allied biological sciences: 12 semester hours.

4. Physical sciences: general inorganic chemistry: 8 semester hours; organic chemistry: Physics highly recommended.
5. College mathematics: 6 semester hours including 1 term of calculus.

Evidence of a broad undergraduate background, an ability to do work of graduate quality, and an interest in the study of plant science are considered to be much more important than the particular courses taken as an undergraduate. Accordingly, students lacking specific courses but otherwise qualified may be admitted to graduate studies in botany. In such cases, the deficiencies should be removed as soon as possible, typically during the first year of the student’s graduate program. The determination of deficiencies and the manner in which they will be removed will be decided upon by the student’s pro-temp committee during the first meeting with the student.

THE MASTER’S PROGRAM

The program for the Master of Science is patterned to fit the needs of students who desire a less extensive course of study than the Ph.D. program. However, the applicant must be equally well prepared and display an aptitude and ability for advanced study. The M.S. includes thesis and non-thesis options.

Thesis Option

The thesis program is the normal route taken by botany students for the M.S. in accordance with the emphasis of the University and the department on research, it involves writing and defending a thesis to describe the results of a completed research project of original work. It is important that the entering student promptly identify a major professor and a suitable research project. It may be either a terminal degree or a preliminary step to studying for a Ph.D. degree.

1. Satisfactory preparation of a written formulation and an oral defense to the student’s committee of a research proposal suitable for a thesis. This must be completed before enrollment in Botany 500.
2. Successful completion of 30 hours of graduate credit, at least two-thirds of which must be at 600 level.
3. Demonstrated reading proficiency in one modern foreign language or in the use of computers for data analysis. Proficiency in a foreign language may be demonstrated by satisfactory completion with a grade of A or B of the following computer science courses or their equivalent: C.S. 101 or 102, 112, and 403 or Stat. 201.
4. Satisfactory completion of two hours at the 600 level.
6. Presentation of a seminar paper suitable for a thesis. This must be completed before enrollment in Botany 500.

Note: The listed requirements for the M.S. and Ph.D. are as follows: should be interpreted as minimal requirements. Specific stipulations or requirements such as additional foreign languages or an additional oral comprehensive examination may be required by the student’s faculty committee.

Graduate Courses

401-02 Field Studies in Botany (3,3) Field experience and taxonomy of special plant groups. Topics vary: Bryology, lichenology, pteridology, agrostology, mycology, phycology, aquatic vascular plants, synantherology, woody plants, and botanical photography. May be repeated under different topic. Maximum 8 hrs.


431 Plant Ecology (3) Interactions between individuals, species, communities and their environments. Circulation of energy and matter in ecosystems. Weekly field trips or laboratory periods, and at least two weekend field trips. Prereq: 330 or equivalent. Su

451 Plant Tissue Culture (3) Methods for culture of cells, tissues, and organs: media preparation and maintenance of tissue cultures. Prereq: 110-20 or Biology 110-20 or equivalent and Chemistry 120-30 or equivalent. Recommended prereq: 310-20, 321, 412; Microbiology 310 or 319; Ornamental Horticulture and Landscape Design 330; and Plant and Soil Science 331.

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

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

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

503 Non-Thesis Research (2) Library, field, or laboratory research leading to M.S. or Ed.S. May be repeated. Maximum 4 hrs.

506 Phycology (4) Comparative study of major algal phyla, both freshwater and marine: morphological, biochemical, ultrastructural and cell physiology; genetic aspects. Prereq: 431 or equivalent, or consent of instructor. F.A

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

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

512 Taxonomy of Grasses and Grass-like Plants (3) Collection, identification, classification of grasses, sedges and rushes, phylogeny of the grass subfamilies and tribes. Prereq: 330 or consent of instructor. F.A

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


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

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

535 Plant Communities and Plant Geography (4) Plants in their communities and their classification and ordination; geographic distribution of communities—their climate and soils relationships. Prereq: 431.

537 Natural Resource Management and Environmental Assessment in Developing Nations (3) (Same as Ecology 537 and Planning 553).

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

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

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

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

578 Plant Cell Biology (4) Plant cellular organization, structure and function; interaction of cellular components and correlation of their structures and functions. Principles and application of analytical and experimental laboratory procedures in cell biology research. Prerekq: Biology 220 or equivalent. Recommended prereq: Biochemistry 410-19, 3 hrs and 1 lab. F.A

580 Bryophytes and Pteridophytes (4) Taxonomy, phytology, ecology and developmental morphology; field trips and current research. Prerekq: 310-20 or consent of instructor. 2 hrs and 2 labs. F.A

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

582 Methods and Instrumentation in Laboratory Investigation (1) Project experience and theoretical background in various research methods, on exchange resins, adsorption spectrometry, disc electrophoresis, polargraphy, zonal and ultracentrifugation, gas chromatography, automatic analyzers, microscopy, culture methods, use and detection of radioisotopes. Prerekq: Chemistry 350, 360, Physics 121, 122. May be repeated. Maximum 5 hrs. S/N/C only.

583 The Field Research Problem (3) Conceptualization, planning, and implementing field research criteria. For choosing instruments, sampling methods, and locations for study of populations, communities, and ecosystem. Field practice. Development and critique of formal research proposal like those required by granting and contracting agencies. Prerekq: 431, or 535 or 539.

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

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

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


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

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

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

Broadcasting

(College of Communications)

MAJOR

DEGREE

Communications........................................M.S.

Norman R. Swan, Head

Professors:

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

Associate Professor:

Moore, B. A., Ph.D. ..............................Ohio

Assistant Professors:

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

Adjunct Professor:

Nelson, Lindsey, B. A. ..........................Tennessee

The Department of Broadcasting offers a concentration area for the Master's with a major in Communications. See Communications for additional information.

GRADUATE COURSES

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

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

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


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

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

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

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

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

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

598 Internship (3) Full-time (30-40 hrs per week) work experience in news, production, or sales and management with non-university professional organization. Educational experience beyond that available at university. Final term paper. No retroactive credit for previous work experience. Prerekq: Senior or graduate standing, completion of at least 15 hrs of broadcasting courses, GPA 3.0 or better, and consent of department head.

Business Administration

(College of Business Administration)

MAJOR

DEGREES

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

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

To obtain application materials, write or call:

Associate Dean for Graduate Business Programs
Suite 527, Stokely Management Center
College of Business Administration
The University of Tennessee
Knoxville, TN 37995-0550
Telephone: (615) 974-5033

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UTK on an in-state basis. The Ph.D. in Business Administration is available to residents of Virginia; the MBA is available to residents of Arkansas, Louisiana, or Virginia; and the Ph.D. and MBA concentration in logistics and transportation is available to residents of West Virginia.

ACADEMIC STANDARDS

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

THE MBA PROGRAM

The MBA program is designed for students with undergraduate degrees in the social and natural sciences, the humanities, and professional fields such as engineering, business, agriculture, and architecture. For full-time students, the MBA program is a...
two-year, lock-step program with students beginning in the fall of each year and graduating in the spring, two years hence. During the summer between the first and second year, students must complete an internship with a company using those skills acquired during the first year of the MBA program.

The complete MBA program with a concentration in management or new venture analysis and entrepreneurship is offered for part-time evening students. The part-time program has the same admissions requirements, curriculum (except for the summer internship, which is not required of part-time students), and faculty as the full-time program. Part-time students enter in the fall semester and take approximately 4 years to complete the program. Part-time students are required to successfully complete six hours of graduate credit per semester.

The program consists of 15 MBA core courses and 5 concentration/elective courses. Each course is 3 semester hours of graduate credit with the exceptions of Business Administration 501 and 503, which are one semester hour of graduate credit each.

Admission Requirements

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

To be considered for admission, the applicant’s file must be complete. A complete file includes the Graduate School Application, transcripts of prior college work, the MBA program application, two completed applicant recommendation forms, and the Graduate Management Admission Test (GMAT) score report. The first items should reach The Graduate School ten days before the MBA application deadline to allow for processing. Additional information is required by The Graduate School for international students (see page 14).

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

Prerequisites

College-level mathematics through at least one course in college-level calculus taken within the past 2 years, with a grade of B or better, is the only prerequisite requirement for entry into the program. Students whose undergraduate training does not include calculus should arrange to take it at UT or another accredited institution prior to the fall semester of entry into the program. Those electing the management science or statistics concentration must have completed two years of college-level calculus.

MBA Core

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

- Third semester: Economics 503, Business Administration 506.

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

Concentration and Electives

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

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

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

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

Transfer Credits

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

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

The maximum number of hours that may be transferred is 6 semester hours. Transfer credit will be considered upon formal petition to the Associate Dean for Graduate Business Programs.

Other Requirements

The Application for Admission to Candidacy must be approved by two faculty members and the department head in the student’s area and submitted to the Associate Dean for Graduate Programs in the College of Business Administration. It should be submitted to the Graduate Office at least one full semester prior to the date the degree is to be conferred or extension to candidacy in the fall semester permits graduation in the following spring semester.

To qualify for the degree, the student must achieve a B average (3.0) or above in MBA core courses required in his/her program, a B average or higher in courses comprising the concentration area, and a B average or higher in the overall program. The student must demonstrate competency in these areas in a comprehensive examination administered in the capstone course, Business Administration 509.

BUSINESS ADMINISTRATION CONCENTRATION

For complete listing of MBA program requirements, see above.

MBA Concentration: New Venture Analysis and Entrepreneurship

This MBA concentration has been designated a Center of Excellence by the Tennessee Higher Education Commission. The concentration is comprised of three specifically designed courses which are interdisciplinary in nature. This concentration strives to build a strong academic foundation for both entrepreneurial and intrapreneurial activities. The new venture analysis and entrepreneurship concentration courses may be combined with two elective courses in another area (finance, management, etc.) to achieve a dual concentration.

Minimum course requirements are Finance 551, Management 551, and Marketing 550. These course descriptions are listed under their fields of instruction.

PRE-MBA PROGRAM

The College offers a joint BA/MBA program with the College of Liberal Arts. Students in this program take their first three years of coursework in Liberal Arts, and their last two years in the College of Business Administration. Within their first three years, students fulfill all general education requirements for the BA degree, both upper and lower division along with a minor offered by one of the Liberal Arts departments. They may use one Economics course only to fulfill distribution requirements, and they are required to take a year of calculus as the only prerequisite requirement for the MBA.

Admission requirements are higher than those normally expected of MBA applicants. Desired qualifications include a minimum 3.4 GPA and a GMAT score of 550 or higher. Students interested in the program are counseled initially in the Liberal Arts Advising Center regarding admission standards and Liberal Arts requirements. At the end of their second year, there is a conference with the Associate Dean for Graduate Business
Programs and are advised of their prospects for formal admission. Students who are likely candidates are advised to take the Graduate Management Admission Test in October of the year they wish to enter the MBA program. The admission decision is made by January of the third year.

Upon admission, students begin MBA coursework in the fourth year and are awarded a BA degree at the end of that year. Students take 3 hours of graduate coursework during their senior year under the senior privilege rule, which requires them to notify The Graduate School in advance of plans to take graduate courses during their senior year.

The Dual J.D.-MBA Program

The College of Business Administration and the College of Law offer a coordinated dual program leading to the conferral of both the Doctor of Jurisprudence and the Master of Business Administration. The dual program saves the student one semester over the time that would be required to earn both degrees independently.

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

Admission Requirements

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

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

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

Curriculum

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

The College of Law will award up to 8 semester hours of credit toward the J.D. for acceptable performance in approved graduate-level courses offered by the College of Business Administration. The College of Business Administration will award up to 9 semester hours of credit toward the MBA for acceptable performance in approved courses offered in the College of Law. The approval of courses is the responsibility of the Dual Programs Committee and the student's assigned advisor.

Students may begin their studies in either the J.D. or the MBA program, but may not enroll in MBA coursework while completing the first year of the law curriculum and may not enroll in J.D. coursework while completing the first year of the business curriculum. During the first year in the J.D. program, students register through the College of Law. For any term in which students take MBA courses, even though they are also taking law courses, they must register through The Graduate School. The Graduate School registration form must be approved by the Associate Dean for Graduate Business Programs.

Awarding of Grades

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

Approved Dual Credit

MBA courses to be counted toward the J.D. program must include Accounting 503 or a more advanced graduate accounting course and 6 semester hours approved by the College of Law. Law courses to be counted toward the MBA must be selected from those approved by the Associate Dean for Graduate Business Programs.

The Doctoral Program

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

Admission Requirements

Students seeking a Ph.D. degree must be recommended for acceptance by the College of Business Administration to The Graduate School. Actual admission is based on the applicant's overall background. Students are encouraged to consult with other applicants and with the number of vacancies in each department. The Graduate School requires the Graduate School Application, transcripts from all previous college work, and additional information from international students. The college requires the Ph.D. application, scores from the GMAT and four written recommendations. All materials should be received by the College of Business Administration not later than March 1. Late applications are considered only if space is available.

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

Program of Study

The Ph.D. normally requires at least three years of intensive study and research beyond the Master's degree. Typically, the first two years of a student's program consist of coursework, writing, and research.

The third year usually focuses on completion of the dissertation research and writing. It is emphasized that the Ph.D. program of study is structured for full-time students only. Upon acceptance of a student by a particular departmental faculty, the student is expected to remain in residence until the dissertation has been completed and all requirements are met for completion of the Ph.D.

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

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

There are five concentrations offered in the Ph.D. program:

Accounting
Finance
Management (Operations Management and Strategic Management)
Marketing
Logistics and Transportation

More detailed information concerning these specializations is available by writing directly to each department chairperson and by
referring to the appropriate fields of instruction.

Degree Requirements

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

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

2. Students must complete appropriate courses at the graduate level, or other approved concentrations of coursework, in the following areas:
   - Accounting
   - Behavioral Science
   - Business Policy
   - Calculus
   - Computer Science
   - Economics

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

3. Basic Core: Economics 510 (or approved substitute) is required, except that Management 567 (or equivalent) may be substituted with prior approval.

4. Research Tools: A minimum of 9 semester hours of graduate research methods must be completed. At least 6 semester hours in statistics courses beyond Statistics 531 are required. The remaining 3 semester hours may be completed in additional statistics courses (not to include Statistics 531) or in other areas such as research methodology, management science, computer science, econometrics, and psychometrics.

5. Concentrations: The concentration is the focal point of the Ph.D. program. Students are expected to master the literature and research techniques in the concentration area to do quality research as evidenced by the preparation of an acceptable dissertation. A minimum of 12 semester hours of coursework is required, including at least 9 hours of doctoral seminars. Graduate work taken in the concentration at other institutions is considered by the temporary doctoral advisory committee in approving the specific coursework required. Available concentrations are: accounting, finance, management operations management and strategic management, marketing, and transportation/logistics. See the appropriate fields of instruction for specific course requirements.

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

Comprehensive Examinations

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

Comprehensive examinations must be taken within five years of matriculation. When either the concentration or cognate area examination is passed, the remaining examination must be passed within the next 13 months.

Doctoral Committee

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

Admission to Candidacy

Students may apply for admission to candidacy for the Ph.D. after maintaining at least a "B" average during the fall and spring term of the concentration. At least 9 semester hours of coursework is required, including at least 6 semester hours in statistics courses beyond Statistics 531. Application for admission to candidacy must be approved at least one full semester prior to the date the degree is conferred. (Admission in the fall permits graduation in the following spring semester.)

Application for admission to candidacy must include a listing of all courses taken in each of the fields required for the degree (business functional areas, basic disciplines, concentration and cognate area). Graduate courses accepted from other institutions must be included. Under "Other Requirements," the date of acceptance of the research proposal by the doctoral committee should be indicated. The application must be approved by the student's doctoral committee and the Associate Dean for Graduate Business Programs before submission to the Graduate School.

Dissertation

Minimum of 24 semester hours: The student must complete a dissertation embodying the results of original research demonstrating the ability to do scholarly writing. The dissertation is supervised by the candidate's doctoral committee, which must certify its completion and acceptability after oral defense of the candidate's research effort.

The dissertation normally must be completed within three years of the student's advancement to candidacy.

Graduate Programs

501-03 Integrative Management I, II (1,1) Introductory integrative managerial policy and strategy for MBAs. Use of tools of analysis, data, information, design, and management to identify, solve, and correct problems in and of organizations.

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

509 Managerial Policy and Strategy (3) Strategy and policy that affect character and success of total enterprise. Capstone course integrating all functional areas in formulation and implementation of strategy that enables organization to reach objectives. Prereq: MBA core.

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

Chemical Engineering

(Graduate School of Engineering)

MAJOR

DEGREES

Chemical Engineering

M.S., Ph.D.

Joseph J. Perona, Head

Professors:

Bogue, Donald C., Ph.D. Delaware

Byers, Charles H. (Adjunct), Ph.D. California

Clark, Edward S., Ph.D. California

Crawford, Loyd W. (UTSI), Ph.D. Cincinnati

Culberson, Oran L. (Emeritus), Ph.D. Texas

Fellers, John F., Ph.D. Akron

Frazier, George C., Jr. Johns Hopkins

Holmes, John M. (Emeritus), Ph.D. Tennessee

Hsu, Hsiien-Wen, Ph.D. Wisconsin

Johnson, Homer F. (Emeritus), Ph.D. Yale

Moore, Charles F., Ph.D. Louisiana State

Perona, Joseph J., Ph.D. Northwestern

Prados: John W., Ph.D. Pennsylvania

Scott, Charles D. (Adjunct), Ph.D. Thomas

Watson, Jack S., Ph.D. Tennessee

Associate Professors:

Bienkowski, Paul R., Ph.D. Purdue

Blackburn, James W. (Research), Ph.D. Tennessee

Bruns, Duane D., Ph.D. Louisiana State

Cochran, Henry D. (Adjunct), Ph.D. MIT

Counce, Robert M., Ph.D. Tennessee

Donaldson, Terry L., Ph.D. Pennsylvania

Sheath, Atul C. (UTSI), Ph.D. Northwestern

Weber, Frederick E., Ph.D. Minnesota

Assistant Professors:

Scott, Timothy C. (Adjunct), Ph.D. Wisconsin

Wang, Tse-Wei, Ph.D. MIT

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

THE MASTER'S PROGRAM

The standard Master's program includes a thesis and leads to the Master of Science. Minimum departmental requirements are as follows:

1. A total of at least 21 hours in graduate coursework in chemical engineering and related areas excluding thesis. The minimum requirements are 18 hours in chemical engineering; 3 hours in other engineering, scientific, or business areas (as approved by the departmental faculty); and 3 optional hours from either one of these two categories.


3. Active participation in graduate seminars in the department. Resident students must register for CHE 501 every semester it is offered.

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

Under certain conditions, a candidate may apply for a non-thesis program. To be eligible, a candidate must show evidence of significant professional experience after the baccalaureate degree; at least five years of industrial experience or research publications would be examples of such evidence. The departmental faculty will consider each application individually. Upon acceptance, the requirements for completion of the non-thesis option are as follows:

1. A total of at least 33 hours in graduate courses in chemical engineering and related areas. The minimum requirements are 18 hours in chemical engineering; 6 hours in other engineering, scientific, or business areas (as approved by the departmental faculty); and 9 optional hours from either one of these two categories.

2. Completion of a critical review of the literature and other sources in an area related to chemical engineering (CHE 580).

3. A written comprehensive examination over the major field and an oral examination covering the review paper and related areas.

THE DOCTORAL PROGRAM

Students applying for entrance into the doctoral program must submit evidence of ability to perform and report independent research to the satisfaction of the department. The Master's thesis may be offered as a non-thesis option.

Department requirements consist of the satisfactory completion of:

1. Graduate courses in chemical engineering, amounting to approximately 24 semester hours, at least 9 of which must be in 600 series courses.

2. Supporting courses in related scientific and engineering fields amounting to approximately 24 semester hours, subject to approval by the student's faculty committee. These related fields will normally include chemistry, mathematics, physics, and engineering.

3. The comprehensive examination, usually given in two parts, and covering such topics as chemical engineering operations and processes, thermodynamics, technology, and other related fields.

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

GRADUATE COURSES

401 Chemical Engineering Data Analysis (3) Experimental data; identification of system extremals; statistical properties of samples; empirical modeling of processes; statistical process control; optimization techniques.

403 Introduction to Optimization (3) Principles and applications of optimization techniques to chemical process design; unconstrained and equality constrained nonlinear programming; dynamic programming, and geometric programming. Prereq: Mathematics 241.


440 Transport Phenomena (3) Momentum, heat and mass transfer processes, analysis and dimensional and macroscopic balances, applications involving molecular diffusion, simultaneous mass transfer and chemical reaction. Prereq: 340.

461 Advanced Process Dynamics and Control (3) Process and control system simulation and advanced industrial system design. Cascade, feedback, forward, multivariable, deadtime, adaptive, and nonlinear control system design with both computer and laboratory work. Lab. Prereq: 305.


485 Hydrocarbon Processing (3) Chemical and physical properties of selected petroleum and those processes utilized in conversion of raw material into various fuels and selected chemical feedstocks. Prereq: 340.

486 Coal Processing to Liquid Fuels (3) Characterization of various coals with respect to current gasification and liquefaction technologies; modeling of conversion processes and estimation of product yields and associated water, oxygen, and energy requirements; catalytic hydropyrolysis; kinetic considerations; economic assessments. Prereq: 485.

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

501 Graduate Seminar (1) Prereq: Admission to graduate program. May be repeated. S/NC only.

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

505 Engineering Analysis (3) Formulation and solution of problems in chemical engineering and materials areas, ordinary and partial differential equations; types of ODE, PDE, and solution techniques, transform methods; conformal mapping; variational methods; introduction to numerical methods. (Same as Materials Science Engineering 505.)

506 Approximate Methods in Chemical Engineering (3) Chemical engineering problems requiring approximate solution; introduction to some approximate methods. Prereq: 505.


631 Advanced Chemical Engineering Thermodynamics (3) Phase equilibrium in ideal and nonideal solution; composition relationship between phases, solution behavior and application to macroprocesses; introduction to microscopic approaches to thermodynamics.
Students majoring in Chemistry for the Master's or doctoral degree are required to present as a prerequisite one year each of general, analytical, organic, and physical chemistry with a satisfactory record. At least one-half year of inorganic chemistry is also recommended. Students lacking any of these prerequisites may be admitted with appropriate deficiencies that must be removed without graduate credit. Applicants are required to take the general Graduate Record Examination.

Students minoring in Chemistry are required to present as a prerequisite two years of chemistry including quantitative analysis.

THE MASTER'S PROGRAM

The department offers concentrations in six areas for the M.S.: analytical chemistry, environmental chemistry, inorganic chemistry, organic chemistry, polymer chemistry, and physical chemistry.

The requirements for the M.S. in Chemistry consist of the satisfactory completion of:

1. Research and a thesis to give at least 6 hours of graduate credit in Chemistry 500.
2. Participation in seminar (Chemistry 501) during the entire period of graduate study, including the presentation of at least one seminar. (No more than 2 hours may be applied to the course requirements.)
3. Prescribed remedial courses based on performance on entrance examinations.
4. Sufficient graduate coursework in chemistry at the 400 level or above and/or a related field to make an overall total of 30 hours, including one of the following sequences: 510-11-12, 530-31-32, 550-51-52, 570-72-73, 590-94-95. At least 14 hours of this graduate coursework must be at the 500 level or above.
5. A final oral examination.

THE DOCTORAL PROGRAM

The department offers concentrations in eight areas for the Ph.D.: analytical chemistry, chemical physics (in cooperation with the Department of Physics), environmental chemistry, inorganic chemistry, organic chemistry, polymer chemistry, and physical chemistry.

The requirements for the Ph.D. in Chemistry (except for the chemical physics concentration) consist of the satisfactory completion of:

1. Research and a dissertation to give at least 24 hours of graduate credit in Chemistry 600. Registration must be continuous from the beginning of research.
2. Participation in seminar (Chemistry 501) during the entire period of graduate study, including the presentation of at least one seminar.
3. Prescribed remedial courses based on performance on entrance examinations.
4. Completion of the comprehensive examination series and defense of an original research proposal to give 2 hours of credit in Chemistry 601.
5. Demonstration of a reading knowledge of French, German, Russian, or an alternative approved by the Chemistry faculty.
6. Eighteen additional hours in courses at the 600 level (above including at least one course above 601) and one of the following sequences: 510-11-12, 530-31-32, 550-51-52-53-54, 570-71-72-73, and 590-94-95.
7. A final oral examination.

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

GRADUATE COURSES

430 Advanced Inorganic Chemistry (3) Atomic and molecular structure, bonding theories, descriptive chemistry of elements, kinetics and mechanism of inorganic reactions, applications of modern techniques for characterization, coordination and organometallic chemistry. Prereq: 230. Prereq or coreq: 360 or 361. Sp

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


470 Advanced Physical Chemistry (3) Chemical dynamics, statistical thermodynamics, quantum mechanics of atomic and molecular systems, crystal structure and solid state. Prereq: 380 or 381. Sp

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

501 Chemistry Seminar (1) Lectures and discussion on current research. May be repeated. Continuous registration required for resident graduate students. S/NYC only. E

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

505 Special Problems (3) Specially assigned theoretical or experimental work on problems not covered in other courses. Prereq: consent of department. May be repeated. Maximum 6 hrs. S/NYC only.

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

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

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

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

530 Chemical Bonding (3) Wave mechanical atom, group theory, quantum approach to molecular orbital theory, covalent, ionic, and metallic bonding, ligand field theories, solid state. Prereq: 1 yr of physical chemistry.

531 Characteristics of Inorganic Compounds (3) Descriptive chemistry of the six metals, structure, reactions, kinetics, mechanisms, equilibria, and spectra of coordination, organometallic, bioorganic compounds. Prereq: 530. Sp

547 Advanced Physical Chemistry (5) Chemical dynamics, statistical thermodynamics, quantum mechanics of atomic and molecular systems, crystal structure and solid state. Prereq: 380 or 381. Sp

548 Advanced Inorganic Chemistry (5) Atomic and molecular structure, bonding theories, descriptive chemistry of elements, kinetics and mechanism of inorganic reactions, applications of modern techniques for characterization, coordination and organometallic chemistry. Prereq: 230. Prereq or coreq: 360 or 361. Sp

551 Advanced Physical Chemistry (5) Chemical dynamics, statistical thermodynamics, quantum mechanics of atomic and molecular systems, crystal structure and solid state. Prereq: 380 or 381. Sp

552 Physical Chemistry Seminar (1) Lectures and discussion on current research. May be repeated. Continuous registration required for resident graduate students. S/NYC only. E

553 Special Problems (3) Specially assigned theoretical or experimental work on problems not covered in other courses. Prereq: consent of department. May be repeated. Maximum 6 hrs. S/NYC only.

560 Physical Chemistry (3) Chemical dynamics, statistical thermodynamics, quantum mechanics of atomic and molecular systems, crystal structure and solid state. Prereq: 380 or 381. Sp

561 Physical Chemistry Seminar (1) Lectures and discussion on current research. May be repeated. Continuous registration required for resident graduate students. S/NYC only. E

562 Special Problems (3) Specially assigned theoretical or experimental work on problems not covered in other courses. Prereq: consent of department. May be repeated. Maximum 6 hrs. S/NYC only.

563 Special Problems (3) Specially assigned theoretical or experimental work on problems not covered in other courses. Prereq: consent of department. May be repeated. Maximum 6 hrs. S/NYC only.
532 Experimental Methods of Inorganic Chemistry (3) Electronic, infrared, Raman, microwave, NMR, ESR, nuclear quadrupole, Mossbauer, mass, and photoelectron spectroscopies for characterization of inorganic compounds. Prereq: 530. F
540 Nuclear and Radiochemistry (3) Nuclear properties, radioactivity, radioactive decay processes, nuclear structure and models, nuclear reactions, radiations and radiometry detection. Prereq: 1 yr of physical chemistry. F
550 Structure and Reactivity in Organic Chemistry (3) Structure and bonding in organic compounds; molecular orbital theory, stereochemistry, conformational analysis, and molecular mechanics; substituent effects on acidity and reactivity; introduction to reaction mechanisms. Prereq: 360. F
552 Organic Reaction Mechanisms (3) Techniques and principles in study of organic reaction mechanisms; applications and interpretations in polar, radical, and pericyclic reactions; reactive intermediates. Prereq: 550. F
553 Spectroscopic Characterization of Organic Compounds (2) Organic structure elucidation using spectroscopic methods: nuclear magnetic resonance, infrared, ultraviolet, and mass spectrometry. Prereq: 360 or equivalent. Sp
554 Advanced Organic Chemistry Laboratory (1) Synthesis of organic compounds illustrating modern techniques. Prereq: 360 or equivalent. Sp
570 Quantum Chemistry and Spectroscopy (3) Basic principles of quantum mechanics and their applications to molecular orbital theory, molecular structure, and spectroscopy; introduction to group theory. Prereq: 1 yr of physical chemistry. F
571 Advanced Quantum Chemistry and Spectroscopy (3) Prereq: 570 or consent of instructor. Sp
572 Thermodynamics and Statistical Mechanics (3) Macroe and microscopic description of equilibrium systems. Basic principles of thermodynamics and statistical mechanics, and application to selected chemical systems. Prereq: 1 yr of physical chemistry. F
573 Chemical Kinetics and Transport (3) Time-dependent phenomena in chemistry: chemical kinetics, chemical dynamics, transport theory. Prereq: 1 yr of physical chemistry. F
580 Fundamental Topics in Physical Chemistry (3) Quantum chemistry, spectroscopy, chemical kinetics, transport properties, thermodynamics, and statistical thermodynamics. Prereq: 1 yr of physical chemistry. F
580 Polymer Chemistry (3) Fundamentals of polymer synthesis and characterization through application of organic and physical chemical principles. Prereq: 1 yr each of organic and physical chemistry. F
595 Physical Chemistry of Polymers (3) Conformation of macromolecules, solution and bulk properties; rubber elasticity, kinetics of polymerization, polymer thermodynamics. Prereq: 590 or equivalent. Sp
600 Doctoral Research and Dissertation (3-15)P/N P
601 Chemistry Research Proposal (2) Preparation and oral defense of original written research proposal based on thorough survey of chemical literature. Prereq: Consent of department head. S/NC only. E
610 Selected Topics in Analytical Chemistry (3) Topics of current significance. Prereq: 510-11-12 or consent of instructor. May be repeated. Maximum 12 hrs.
630 Selected Topics in Organic Chemistry (3) Topics of current significance. Prereq: 530-31-32 or consent of instructor. May be repeated. Maximum 12 hrs.
650 Selected Topics in Inorganic Chemistry (3) Topics of current significance. Prereq: Two of 550-51-52 or consent of instructor. May be repeated. Maximum 12 hrs.
670 Selected Topics in Physical Chemistry (3) Topics of current significance. Prereq: 570-72-73 or consent of instructor. May be repeated. Maximum 12 hrs.
690 Selected Topics in Polymer Chemistry (3) Topics of current significance. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

ADMISSION REQUIREMENTS

A completed file for review includes a Statement of General Objectives, Graduate Record Examination (GRE) scores for the general section, and completion of three Graduate School Rating Forms by individuals who can attest to the potential for graduate study. Forms may be obtained from the Dean's Office, College of Human Ecology. Admission to the program is contingent upon faculty evaluation of GRE scores, undergraduate/graduate GPA, rating forms, and work experience. Prerequisites for admission to the Master's or doctoral program are 9 semester hours of either upper division undergraduate or graduate social science.

THE MASTER'S PROGRAM

An individual program of study may be designed by the student in collaboration with his or her major professor and committee. The program provides for a concentration in either child development or family studies.

Specializations in the child development concentration consist of early childhood education, early childhood special education, early childhood administration, and child development. Specializations in the family studies concentration consist of family life intervention and family science. Thesis and non-thesis options are available in both concentrations.

All students in the child development concentration must enroll in CZS 510, 511, 533, and 571. At least 6 hours in a cognate area outside the department must be completed. Thesis students are required to take the following: 3 hours of 500-level research methods, 3 hours of 500-level statistics, 6 hours of CZS courses in the area of specialization, 6 hours of thesis credit and an oral comprehensive examination. Non-thesis students are required to take the following: 3 hours of 500-level research methods, statistical methods, or interpretation of methods and statistics; CZS 564, 565; 9 hours of CZS courses in the area of specialization, 6 hours of thesis credit and an oral comprehensive examination. Non-thesis students are required to take the following: 3 hours of 500-level research methods, 3 hours of 500-level statistics, 6 hours of CZS courses in the area of specialization, and a written comprehensive examination.

Students in the family studies concentration must enroll in CZS 550, 571, and 540 or obtain at least 6 hours in a cognate area outside the department. Thesis students are required to take the following: 3 hours of 500-level research methods, 3 hours of 500-level statistics, 6 hours of CZS courses in the area of specialization, 6 hours of thesis credit and an oral comprehensive examination. Non-thesis students are required to take the following: 3 hours of 500-level research methods, statistical methods, or interpretation of methods and statistics; CZS 564, 565; 9 hours of CZS courses in the area of specialization; and a written comprehensive examination.

Students seeking the M.S. in Child, Child and Family Studies are required to file a plan of study with the department head after 15 hours of graduate credit have been completed.

THE PH.D. CONCENTRATION

The doctoral program in Human Ecology prepares scholars in the concentration areas of child development and of family studies. The strength of the doctoral program is based on three major components: the inte-
530 Families of Handicapped Children (3) Developmental nature of families' experiences in caring for handicapped children, especially during infancy and early childhood. Prereq.: 510 or consent of instructor.

533 Peer Relations (3) Significance of peer context in socialization. Development of social skills and consequences of peer rejection for subsequent adjustment. Prereq.: 510 or equivalent or consent of instructor.

540 Parent-Child Relations (3) Influence of parents on children, influence of children on parents, reciprocal interaction between parents and children, applications of systems models, child abuse, and impact of divorce on children. Prereq.: 550 or equivalent or consent of instructor.

550 Survey of Theory & Research in Family Studies (3) Research issues and literature in family studies: use of family conceptual frameworks, development of new families, and application to research and family life programs.

560 Marital Dyad (3) Communication, power, sexuality, marital stability, and marital satisfaction. Prereq.: 550 or equivalent or consent of instructor.

561 Family Resource Management and Decision-making. Prereq.: Management courses. Prereq.: 560 or equivalent or consent of instructor.

562 Families in Crisis (3) Family processes during times of stress. Vulnerabilities and coping mechanisms of families. Prereq.: 550 or equivalent or consent of instructor.

563 Family Life Education Programs (3) Planning, implementing, and evaluating programs in marital, parental, and family relationships, and parenthood education. Prereq.: Consent of instructor. (Same as Home Economics Education 563.) F, A

564 Practicum in Human Development or Family Studies (3) School and community programs. Education for human development and family living. Prereq.: Consent of instructor. S/NC only.

565 Practicum in Human Development or Family Studies II (3) School and community programs concerned with education for human development and of theoretical models and supervised within project. Prereq.: 564 and consent of instructor.

566 Approaches to Family Intervention and Counseling (3) Various theoretical approaches for family intervention and counseling. Structural, strategic, experiential and social learning schools of practice. Effects of intervention from perspective of their impact on family systems. Prereq.: 550 or equivalent or consent of instructor.

570 Research Methods in Child and Family Studies (3) Empirically based methods. Research, data gathering and analysis, and presenting research findings. Prereq.: 510 or equivalent or consent of instructor.

580 Special Topics in Human Development or Family Studies (1-3) Research, theory and current issues in specific topics in child development and early childhood education. Prereq.: 510 or equivalent or consent of instructor.

591 Assessment of Family Behavior (3) Analysis of methods and measures used in family science research. Prereq.: 561 or equivalent or consent of instructor.

592 Naturalistic Interventions for Parents and Teachers of Young Children (3) Common problems faced by parents and teachers; methods available to modify problem behavior. Prereq.: 510 or equivalent or consent of instructor.
The Department of Civil Engineering offers degrees leading to the Master of Science and Doctor of Philosophy with a major in Civil Engineering concentrating in construction engineering, environmental engineering, geotechnical/materials engineering, public works engineering, structural engineering, and transportation engineering; to the Master of Science in Environmental Engineering with concentrations in water quality, water resources, air quality, and waste management.

MASTER OF SCIENCE PROGRAM

The Master of Science programs in Civil Engineering and Environmental Engineering are offered to graduates of recognized undergraduate curricula.

Civil Engineering

The Department of Civil Engineering offers two options for the Master of Science with a major in Civil Engineering.

Thesis Option: A minimum of 30 semester hours, including at least 6 hours of thesis, is required.

Non-Thesis Option: A minimum of 33 semester hours, including a 3-hour special problems is required. The special problem will culminate in a written report which must be approved by the student's major professor.

Environmental Engineering

For a Master of Science with a major in Environmental Engineering, normally a Bachelor's degree in a field of engineering is required. For a student who does not have an engineering degree, the following minimum prerequisite courses will be required: Basic Engineering or Computer Science 101; Basic Engineering 121, 131; Engineering Science and Mechanics 231, 321; Civil Engineering 390, 395, 398; Mathematics 142, 231, 241; Chemistry 120, 130. 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.

Thesis Option: The student must present a minimum of 30 semester hours of approved graduate courses. The major shall include a minimum of 6 semester hours beyond the bachelor's degree, exclusive of credit for the M.S. thesis. Of this number, a minimum of 24 semester hours in 600 Doctoral Research and Dissertation will be required.

2. A minimum of 24 semester hours of graduate courses in civil engineering, exclusive of thesis or dissertation credit, at least 6 hours of which must be 600-level courses.

Supporting courses in related scientific and engineering fields, amounting to approximately 24 semester hours, subject to approval by the student's faculty committee. These related fields will normally include such disciplines as mechanics, chemistry, mathematics, microbiology, physics, and other engineering fields. A minimum of 9 semester hours of mathematics will be required beyond the civil engineering undergraduate requirements.

4. One foreign language if the student's faculty committee feels that a reading knowledge of a foreign language is crucial to the student's research efforts.

5. Upon completion of at least one-half of all coursework, each student must pass a comprehensive examination.

After completion of the dissertation, prior to graduation, each student must pass a comprehensive examination administered by a faculty committee.

ACADEMIC COMMON MARKET

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

Civil Engineering

GRADUATE COURSES


406 Legal and Ethical Aspects of Engineering (2) Legal principles underlying engineering work: laws of contracts, torts, real property; problems of professional registration and ethics. Prereq: Senior standing.

410 Land Surveying (3) Procedures of locating properties; evaluating evidence; procedures to describe property lines; create legal description, and to prepare plots, plats of land surveying. Prereq: 210.

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

451 Highway Engineering (3) Design, construction, specification and maintenance of highways and traffic facilities. The application of various engineering principles and techniques to process of planning, locating and design of highway facilities; both geometric and pavement design. Prereq: 210, 251, 352.

452 Traffic Engineering (3) Characteristics of driver, vehicle, and roadway and their interrelationship; traffic studies; basic considerations of traffic circulation and control, lighting, capacity analysis, roadway safety analysis and design. Prereq: 210, 251, 352.

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

461 Analysis of Framed Structures II (3) Maximum stress due to moving loads; use of influence lines; lateral forces due to wind and earthquake; analysis of portals, building frames, and space frames; matrix methods; use of computer in structural analysis. Prereq: Analysis of Framed Structures I.

472 Steel Design (3) Design of piste girders and composite beams; consideration of members subjected to combined stresses; design of typical framing buildings, connections. Prereq: 471.

474 Reinforced Concrete Design (3) Reinforced concrete continuous beams and floor slabs, columns with combined axial loads and bending, footings and retaining walls. Prereq: 471.

490 Water Resources Project Design (3) Coherent development of multipurpose reservoir and dam project, data acquisition; spillway and outlet works design; earth and dam stability analysis; drains and filters; maintenance and operation principles; and dam safety concepts, dam break analyses. Prereq: 390, 395.

494 Urban Drainage Engineering (3) Design and management of stormwater conveyance and control structures. Application of hydrologic and hydraulic principles to design of drainage systems for urban, strip mining, and highway development; design of inlet structures, ditches, culverts, and detention/retention basins; application of computer simulation models; evaluation of land-use on streamflow quantity and quality. Prereq: 390, 395.

495 Water Resources Development and Management (3) Principles of water resources project development and planning and management. Institutional framework: water law, evaluation procedures for comparing and selecting among water resources development alternatives, multi-objective planning, principles of engineering economics, benefit-cost analysis, and cost allocation methods; environmental impact assessment procedures; decisions using risk-based methods; case studies. Prereq: Senior standing.

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

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

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

510 Urban Systems: Engineering and Management (3) Various urban systems are usually under the responsibility of county manager and/or city engineer: streets, lighting, water, sewerage, refuse collection. Personnel management, financial planning and public relations. Prereq: Graduate standing.
551 Pavement Design (3) Empirical and theoretical basis of pavement design and analysis; strengthening existing pavements; pavement distress and economical design alternatives. Prereq: 321 and 339.


555 Planning and Transportation (3) Preparation of transportation plans as elements of comprehensive development plans; relationships between transportation and other community features. Use of planning process to establish travel patterns, modeling of transportation systems, and proposing alternatives and evaluation. Prereq: Graduation standing. (Same as Planning 557.)


562 Analysis and Design of Plate Structures (3) Plate bending and buckling theory; analysis and design of bridge and building floors and structural plate components. Prereq: 361.

563 Statically Indeterminate Structures (3) Deflections of beams and trusses; force methods; moment distribution and other displacement methods; secondary stresses. Prereq: 361.

564 Finite Element Structural Analysis (3) Application of finite element method to structural analysis; plate stress, plate strain, axisymmetric, and three-dimensional elements; use of typical computer programs. Prereq: 561.

565 Structural Dynamics (3) Analysis of free and forced vibrations, and transient response of structures having many degrees of freedom; dynamic behavior considered for structural systems: earthquake design and response of structures. Prereq: 561.

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

571 Behavior of Steel Structures (3) Behavior of structural steel members due to static and fatigue loading; relation between research results and current special sections for design. Prereq: 570.

572 Connections for Structural Steel Frames (3) Design, analysis, and behavior of connections for structural steel frames. Simple, rigid and semi-rigid connections; column bases and column splices. Prereq: 472.

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

574 Behavior of Reinforced Concrete Members (3) Moment-curvature and load-deflection relationships for rectangular joist and beam, bending and axial load; shear and torsion; relation between research results and specifications for design. Prereq: 471.

575 Repair and Retrofitting of Structures (3) Techniques, methods, and materials for repair and retrofitting of deteriorated or overstressed structures, foundation underpinning, retrofitting of steel fatigue failures. Prereq: 472.

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

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

590 Special Problems in Civil Engineering (1-4) Enrollment limited to civil engineering students. Prereq: 589, Engineering Science and Mechanics 589, Electrical and Computer Engineering 589, Mechanical Engineering 589, and Aerospace Engineering 589.

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

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

599 Environmental Engineering GRADUATE COURSES

520 Open Channel Hydraulics (3) Open channel flow principles, properties, and classifications, uniform and non-uniform flows, sediment transport, bed and suspended load, and applications; open channel design; unsteady flow theory and analysis; dynamic routing; spatially varied flow; non-linear alignment; microcomputer applications, featuring HEC-2 model. Prereq: Civil Engineering 390.

522 Floodplain and Urban Flood Management (3) Review of national, regional, and local flood problems; state of the art flood damage reduction alternatives; open structural and non-structural institutional responses: policies, programs, organizations, regulations, and legal mandates; floodplain boundary analysis; hazardous materials to promote efficiency and comfort and to safeguard balances in natural ecosystems. Prereq: Consent of instructor.

657 Numerical Models for Geologic Materials (3) Numerical models to represent the stress/strain/volume relationships for soils, rock, and concrete; nonlinear elastic models; classical plasticity models; critical state and capping plasticity models; multiple surface formulations; estimation of parameters from laboratory tests; numerical implementation. Prereq: 550 and Engineering Science and Mechanics 539.

659 Soil Dynamics (3) Behavior of soils and soil-structure systems and their loading; wave propagation in elastic media; principles of seismic refraction techniques; effects of earthquakes and vibrating machines on soils and foundations; dynamic cyclic soil testing and determination of soil parameters. Prereq: 335 and 565 or Engineering Science and Mechanics 547.

651 Analysis Techniques for Transportation Systems I (3) Analysis of trip generation, trip distribution, modal split and traffic assignment, employing mathematical, statistical, and computer science techniques. State of the art and new modeling techniques. Prereq: 554 or 558.

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

666 Advanced Structural Reliability (3) Monte Carlo methods, structural reliability methods, random process concepts: dynamic loads on structures. Prereq: 566.

671 Behavior of Steel Bridges and Buildings (3) Behavior, analysis and design of plate girders, columns, and composite members subjected to static and dynamic loading. Prereq: 556.

674 Behavior of Reinforced Concrete Beams and Slabs (3) Strength and behavior of statically indeterminate reinforced concrete beams and slabs; limit analysis; behavior, analysis, and design of reinforced concrete slabs: yield-line theory, finite element solutions, and ACI Code Method. Prereq: 574.

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

Environmental Engineering
524 Sediment Transport (3) Sediment properties and measurements; principles of dynamics of suspended and bed sediment transport in rivers and estuaries; erosion, transportation, and deposition of sediment by flowing water; erodible channel design; channel regime theory; common computer models. Prereq: Civil Engineering 390.


531 Ground Water Hydrology (3) Dynamics of flow in porous media, physical processes important in subsurface hydrology. Hydrodynamics, dispersion, anisotropy, layered soils and unsaturated flow phenomena. Analytical and numerical solution of flow equations; Elements of groundwater contamination and groundwater law. Prereq: Civil Engineering 390 or Engineering Science and Mechanics 341.

540 Remote Sensing for Transportation and Facilities Siting (3) Principles of remote sensing; sources of images for remote sensing applications; photo interpretation, analog and digital techniques for analysis of aerial and terrestrial photos, radar and thermal imagery with application to transportation and facilities planning, construction and operations. Prereq: Consent of instructor.

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

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

552 Biological Treatment Theory (3) Theory and design applications of biological processes to treatment of wastewater and solid wastes. Prereq: Civil Engineering 380. 2 hrs and 1 lab.

553 Environmental Engineering Chemistry (3) Theoretical, applied and analytical chemistry principles concerning chemical generation, measurement and treatment of environmental contaminants. Prereq: Chemistry 130. 2 hrs and 1 lab.

555 Solid Waste Management (3) Magnitude and characteristics of solid waste problems; collection systems; design of disposal systems; landfill, incineration, and composting, design of resource recovery systems; current and future regulations. Prereq: Senior standing.

556 Hazardous Waste Management (2) Analysis and design of operations and processes for hazardous waste disposal and processing; regulations analysis; industrial applications. Prereq: Graduate standing or consent of instructor.

570 Air Quality Management/Pollution Control (3) Introductory course on concepts of air pollution, analysis of relationships among sources, meteorology, effects; stack sampling; emission control systems. Prereq: Consent of instructor.

571 Design of Air Pollution Control Systems (3) Design and evaluation of systems used to control emission of gaseous and particulate air pollutants. Comprehensive design of specific devices and systems. Prereq. 570.

572 Air Quality Dispersion Modeling (3) Diffusion in atmosphere; application of atmospheric dispersion models and evaluation of meteorological and air quality data. Prereq: Consent of instructor.

573 Sampling of Air Pollutants (3) Standard sampling methods for particulate and gaseous air pollutant emissions from industrial processes; ambient air monitoring instrumentation/techniques. Prereq: Consent of instructor.

575 Applied Microbiology and Bioengineering (3) (Same as Chemical Engineering 575 and Microbiology 575.

590 Special Problems in Environmental Engineering (1-4) Enrollment limited to environmental engineering students in non-thesis program. Prereq: Graduate standing. May be repeated. Maximum 6 hrs. S/NC only.

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

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


630 Advanced Stormwater Modeling (3) Advanced topics in stormwater modeling; stormwater quality modeling; advanced applications of available stormwater computer models. Prereq. 530.

651 Industrial Waste Unit Operations and Processes (3) Theoretical design and laboratory modeling of industrial waste treatment processes and operations. Prereq. 551, 552. 2 hrs and 1 lab.


653 Pollutant Fate Modeling and Risk Assessment (3) Application of scientific principles concerning movement and fate of chemicals at interfaces of air, water, and earth/solid environment. Methods of assessing risk posed by presence of those chemicals. Prereq. 551.

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

Classics

(Class of Liberal Arts)

Harry C. Rutledge, Head

Professors:

Gesell, G. C., Ph.D. ............... North Carolina
Rutledge, Harry C., Ph.D. .......... Ohio State

Associate Professors:

Craig, C. P., Ph.D. ............... North Carolina
Shelton, J. E., Ph.D. .......... Vanderbilt
Tandy, D. W., Ph.D. .......... Yale

Assistant Professor:

Martin, S. D., Ph.D. .......... Michigan

The graduate courses in the Classics include the wider reading of Greek and Latin authors in a selected field, a more detailed study of one of the great departments of classical literature, and the development of background for the appreciation of Greek or Roman life and literature.

GRADUATE COURSES

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


405-06 Selected Readings from Greek Literature (1.3) For advanced students in Greek, plays, historical writing, poetry of ancient Greece in original Greek. Prereq: 401-02 or consent of instructor. May be repeated. Maximum 9 hrs. Sp

414 Cicero and Techniques of Latin Prose Composition (3) For advanced students in Latin, practice in prose composition, writings of Cicero the model. Prereq. 351-52 or consent of instructor. Sp

422 Seminar in Classical Studies (3) Field of classical studies today; recent achievements in areas of both philology and archaeology; impact of developments in field. May be repeated. Maximum 9 hrs.

431-32 Selected Readings from Latin Literature (3.3) For advanced students in Latin oratory, historical writings, poetry of ancient Rome in original Latin. Prereq: 351-352 or consent of instructor. May be repeated. Maximum 9 hrs.

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

441 Special Topics in Classical Civilization (1-3) Art, literature, religion, and society of Greece and Rome. Prereq: 405-06. May be repeated with consent of department. Maximum 9 hrs.

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

462 Roman Law (3) Development of Roman law through examination of cases from writing of Roman jurists, world's first legal professionals. Understanding legal institutions in relationship to Roman society. Roman property and contract law.

501 Special Topics in Greek Literature (3) Advanced study of classical Greek literature, authors selected by students and instructor. May be repeated. Maximum 9 hrs.

531 Special Topics in Latin Literature (3) Advanced study of classical or medieval Latin literature, authors selected by students and instructor. May be repeated. Maximum 9 hrs.

451-42 The Latin Epic: Lucretius, Vergil (3.3) Advanced study of epic masterpieces of Lucretius and Vergil; both Georgics and Aeneid of Vergil.

561 Special Topics in Classical Civilization (3) Advanced study of Latin literature: translation; problems in cultures of Greece and Rome. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. (Same as Anthropology 962.)

Communications

(Majors, Combined Majors, Minors)

MAJOR DEGREES

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

Professors:

Adamson, June N., M.S. .......... Tennessee
Ashdown, Paul G., Ph.D. ....... Bowling Green
Croc, James A., Ph.D. .......... Iowa State
Ellington, George A., Ph.D. ...... Iowa
Holt, Darrel W. (Emeritus) .... Northwestern
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 on-campus basis. The Ph.D. program in Communications is available to residents of the states of Alabama, Arkansas, Georgia, Louisiana, South Carolina, Virginia, or West Virginia. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.

ACADEMIC STANDARDS

A student in the College of Communications whose current 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 grade-point average is 3.0 or higher at the end of the probationary period. The probationary period is defined as the next 12 semester hours of graduate coursework attempted that is specified in the student's degree program. Exceptions to this policy may be made only with the approval of the Assistant Dean for Graduate Studies of the College of Communications.

THE MASTER'S PROGRAM

The Master of Science with a major in Communications is intended for students who desire a career in the mass media with an emphasis on communications management and a deeper understanding of the communication process and social role of the mass media. The program follows a broad-based multi-media approach while allowing the student to concentrate in one of four fields: advertising, broadcasting, journalism, or public relations.

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

Degree Requirements

The M.S. program emphasizes communications management in the areas of advertising, broadcasting, journalism (publications), and public relations. A minimum of 31 hours of approved graduate work is required:

1. Ten hours of core courses—Communications 510, 512, 540, and 550, the first three of which must be taken during the first two semesters of the student's program, except with written approval of the Assistant Dean for Graduate Studies. The fourth course will be selected from among a list of recommended core courses.
2. Twelve hours within one department of the college, at least 6 hours at the 500 level or above. An internship, if needed, is included.
3. Three hours elective from a list provided by the department in area of concentration.
4. Six hours of thesis work (Communications 598), including a thesis seminar.

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

A student's internship experience requires approval by his/her advisor. Credit will be given through Advertising 598, Broadcasting 598, or Journalism 598 on the basis of 3 hours of credit for the equivalent of 15 weeks of full-time professional experience. This credit is to be included in the student's 31-hour M.S. program. Previous professional experience will be evaluated by the student's committee.

Students interested in subsequent entry into a doctoral program are advised to take additional courses in communications theory and research, subject to advisor's approval. After completion of the formal program coursework and thesis research, the student must pass an oral examination conducted by his/her graduate committee. The student also must pass a written examination after completion of the core courses and communications law.

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

THE DOCTORAL PROGRAM

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

The program is interdisciplinary, consisting of a required core curriculum and recommended courses outside the College in the related social and behavioral sciences. The program is flexible and will accommodate a wide variety of career goals in communications. New students may be admitted to the program at any time; however, core courses begin only in the fall semester.

The Master's degree is not required for entry into or completion of the doctoral program. Program planning, however, will permit the Master's degree to be earned if desired. Students lacking academic or professional experience in graduate coursework will be required to take prerequisite courses. In general, however, the program may be completed within three academic years of full-time study beyond the Bachelor's degree. Those holding Master's degrees should anticipate two or more years of full-time study for completion of the Ph.D.

The following are normally minimal requirements for admission to full potential candidate status:

1. A 3.0 (4.0 system) grade-point average in undergraduate studies, or 3.5 for graduate work if applicant holds a Master's degree.
2. A writing sample that demonstrates proficiency in oral and written English.
3. A statement of the applicant's goals and reasons for pursuing the degree.
4. Personal interviews with members of the Ph.D. Admissions Committee are recommended and may be required. Communication experience in some field of communications is a highly desirable criterion for admission.

A minimum of 88 hours of approved graduate work is required for the Ph.D.
1. Twenty-eight hours of core courses—Communications 610, 612, 620, 640, 641; 6 hours of statistics*; and three of the following courses: Communications 622, 632, 642, 652, and 692.

2. Fifteen hours in a primary concentration (advertising, broadcasting, journalism, public relations, or speech communications).

3. Twelve hours in secondary concentration (outside the College of Communications).


5. Twenty-four hours of dissertation.

*Specific courses to be taken require the approval/consent of student's advising committee.

Admission to candidacy must be attained at least two semesters prior to graduation and requires successful completion of a written comprehensive examination.

A diagnostic exam must be taken during the second semester after entering the doctoral program. This exam covers Communications 610, 612, 640, 641, and one statistics course.

Candidates without prior teaching experience must register for Communications 521, Tutorial in Communications Teaching.

Planned course offerings in the College of Communications for a full calendar year are published in the College newsletter the preceding November. This information is available from the Dean's Office, 302 Communications Building, 974-3031. See also courses listed under Advertising, Broadcasting, and Journalism.

## GRADUATE COURSES

### 400 Mass Communications Law and Ethics (3) Legal issues directly affecting the mass media: libel, privacy, free press—far trial, judicial controls, governmental regulations. Ethical standards and practices of mass media in America. Prereq: Writing for Mass Communication or consent of instructor. E

### 500 Thesis (1-19) P/NP only. E

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

### 510 Orientation to Master's Studies (1) Degree and thesis requirements. Committee formation and program planning. Overview of research methods, and informational sources. Prereq: Consent of instructor or admission to program. S/NC only. F

### 512 Fundamentals of Media Research (3) Applications of communications research techniques for management. Gathering and analysis of data for assessing media audiences and advertising impacts. Prereq: Consent of instructor or admission to program. S

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

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

### 550 Seminar in Media Economics and New Technology (3) Electronic and print media ownership, finance and corporate structure. Roles of new technologies and marketing techniques in changing media content and function in future. Prereq: Consent of instructor or admission to program. S

### 593 Seminar in Mass Communications Issues (3) Contemporary topics in communications. Consent of instructor. Maximum 6 hrs. E

### 597 Independent Study (3) Reading, research or projects on special topics in communication. On individual basis, under faculty direction, with consent. May be repeated. Maximum 6 hrs. E

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

### 610 Orientation to Doctoral Research (1) Degree and dissertation requirements. Committee formation and program planning. Overview of research methods and informational sources. Prereq: Consent of instructor or admission to program. S/NC only. F

### 612 Fundamentals of Communications Research (3) Universal research process from defining ideas and problems to reporting results. Causal inference and relative strengths of various research designs. Fundamentals and specific applications of most common data-gathering and measurement techniques in communications research: experimental, survey, content analysis, historical and qualitative. Prereq: Consent of instructor or admission to program. F

### 620 Seminar in Mass Communications Education (3) Role and scope of mass communications teaching unit, historical perspectives of curricular trends. Teaching methods and instructional objectives; classroom testing and measurement; design of professional curricula, research and extension; program evaluation; grants and contracts in research. Prereq: Consent of instructor or admission to program. Su

### 622 Quantitative Research (3) Techniques for evaluation of research design and measurement. Survey, content analysis, and experimental techniques. Assessment of reliability and validity. Data analysis, hypothesis testing, and inference strategies. Prereq: 612. Sp

### 623 Mass Communications History and Historiography (3) Origins and development of mass media in America. Philosophies of history. Historical sources and their verifications. Synthesis and interpretation of data. Prereq: 612 or consent of instructor. Su

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

### 641 Mass Communications Theory II (3) Selected topics in theory. Critical evaluation of extant theory, derivation of hypotheses, and advanced theory construction. Prereq: 640. Sp

### 642 Qualitative Research (3) Theory and application of qualitative research methods to social science and communications research. Theoretical considerations underlying symbolic interactionism as translated into research strategies of participant observation, life history, interviewing, archival analysis, and case studies. Prereq: 612 or consent of instructor. F

### 652 Mass Communications Law and Legal Research (3) Legal restrictions under which mass media operate. Finding, interpreting and analyzing sources of legal information. Prereq: 612 or consent of instructor. F

### 662 Advanced Topics in Communications Theory and Methodology (3) Advanced study of communication issues, theories and methods. May use qualitative, quantitative, historical or legal approaches. May be repeated: Prereq: 622, 632, 642 or 652 or consent of instructor. F

### Comparative and Experimental Medicine

(Office of the Provost)

#### MAJOR

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Hyram Kitchen, Chair

Joint Graduate Coordinating Committee:

Fuhr, J. E., Ph.D., Medical Biology
Kitchen, Hyram, D.V.M., Veterinary Medicine
Lawler, J. E., Ph.D., Psychology
Leonio, C., M.D., Medical Biology
Michel, R. L., D.V.M., Veterinary Medicine

The Comparative and Experimental Medicine degree program (M.S. and Ph.D.) is a jointly-administered graduate program intended to prepare students for teaching and/or research careers in the health sciences. This program emphasizes the comparative approach to the study of pathology, immunopathology, aberrant metabolism, oncology, and genetic disorders. The Ph.D. program is open to approved graduate students seeking training in this area and is especially useful for individuals with professional degrees. For the student with an undergraduate biological science background, the Comparative and Experimental Medicine program provides an unusual opportunity to study disease processes common in humans and animals from a multidisciplinary perspective. The scope of this intercollegiate program, which pools faculty resources from both veterinary and human medicine, is broadened by faculty members representing animal science and numerous areas of the life sciences. The interdisciplinary training environment includes such diverse support as facilities and personnel at the Veterinary Teaching Hospital, the Oak Ridge National Laboratory, Knoxville Zoological Park, Hemophilia Clinic, Birth Defect Center, Aberrant Metabolism Laboratory, and Hematology service.

For specific course listings, see Veterinary Medicine and Medical Biology under Fields of Instruction.

### ADMISSION REQUIREMENTS

#### General Requirements

Admission requirements of The Graduate School of UTK will apply. In addition, all applicants will be required to furnish three letters of recommendation from individuals who are familiar with their scholastic or professional records.

#### Requirements for Admission to the Master of Science Degree Program

Applicants will be required to have a professional degree in one of the medical sciences (M.D., D.D.S., D.V.M.) or a baccalaureate degree with coursework including chemistry through organic; mathematics through calculus; one year of physics; and one year of basic biology plus an additional half-year of more advanced study in the field of biology including courses such as biochemistry, mammalian anatomy, histology, cell biology, or others that are appropriate for individuals aspiring to research careers in biomedical science.

Applicants for admission to the Master of Science program whose backgrounds include no formal training in the biomedical field beyond the baccalaureate degree will be required to present evidence of satisfactory performance on the Graduate Record Examination.
Requirements for Admission to the Doctor of Philosophy Program

Applicants will generally be expected to have a Master's degree in one of the biological sciences or a professional degree in one of the medical sciences. Selected individuals having baccalaureate degrees with strong backgrounds in the physical and biological sciences may be admitted upon presenting evidence of satisfactory performance on the Graduate Record Examination.

Exceptions to the above requirements may be made at the discretion of the Admissions Committee if the minimal requirements of The Graduate School have been met. Applicants who are admitted to graduate programs but who are lacking in course requirements will be required to correct these deficiencies early in their graduate programs.

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

THE MASTER'S PROGRAM

Vose, M. D., Ph.D  Texas
Straight, David W., Ph.D  Texas
Assistant Professors:
Zemankova, M., Ph.D  Florida State
Blair, J. R. S., Ph.D  Pittsburgh
Whitehead, Bruce, Ph.D  Michigan
Associate Professors:
Case, Jeffrey D., Ph.D  Illinois
Char, Bruce W., Ph.D  California
MacLennan, Bruce J., Ph.D  Purdue
Pfleeger, Charles P., Ph.D  Penn State
Whitehead, Bruce, Ph.D  Michigan
Assistant Professors:
Blair, J. R. S., Ph.D  Pittsburgh
Lee, Seung-Chul (UTSI), Ph.D  Florida
Mutchler, David, Ph.D  Duke
Straight, David W., Ph.D  Texas
Vose, M. D., Ph.D  Texas
Zemankova, M., Ph.D  Florida State

Instructor:
Mayo, J. W., M.S  Tennessee

THE MASTER'S PROGRAM

Thirty semester hours of graduate credit are required, 24 of which must be 500 level or above. 511 and 513 are required unless explicitly waived by the department. One course in programming in a modern recursive, high-level programming language is required as entrance to 511 and one year of college mathematics beyond algebra and trigonometry is required for 513. Graduate courses outside the department are allowed but must be approved by the Graduate Committee before enrollment.

Thesis Option
The student must reach agreement on a thesis topic with a faculty advisor and must take at least 6 hours of 500 Thesis. No more than 6 hours of 500 Thesis may count in the 24-hour requirement at the 500 level or above.

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

Master's Minor in Computer Science
The graduate minor consists of 511 or its equivalent plus an additional 6 hours of computer science graduate level courses at or above the 400 level.

THE DOCTORAL PROGRAM

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

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

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

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

Precandidacy Coursework
The departmental precandidacy course requirements include a set of 400-level core courses and a distribution among 500-level and 600-level courses as determined by the departmental graduate committee. Information about specific requirements is available from the department.

Admission to Candidacy
Admission to the Ph.D. program does not guarantee admission to candidacy for the degree. Official admission to candidacy is based on the following procedures:

1. The student completes the coursework requirements as defined above.

2. The student passes written comprehensive examinations. Information concerning these examinations is available in the departmental office. The Computer Science Graduate Committee administers these exams, which must be passed prior to admission to candidacy and at least two semesters in advance of conferral of the degree. 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 the doctoral degree program.

3. The student requests a member of the Computer Science Department's faculty to become the major professor, dissertation director, and chair of the student's committee. The committee must have at least four members, with at least three from the Computer Science Department and at least one holding an appointment in another department. At least three members, including the chair, must be approved by the Graduate Council to direct doctoral research.

4. The student's dissertation committee evaluates the student's background and performance and outlines a coherent program of study, which may include additional courses and outside readings in the technical literature. This program is subject to periodic revision within reasonable limits and will be reviewed by the committee no less frequently than once a year. Completion of the entire program is not required before admission to candidacy.

5. In a public meeting, the student presents to the committee a survey of current literature in the area of proposed Ph.D. research.

6. The student completes Graduate School requirements for formal admission to candidacy.

Dissertation Proposal
After consultation with the committee and initial investigation of a topic, the student submits a written proposal to the committee and makes an oral presentation of this proposal in a meeting which other faculty may attend. The written version must be typed, conform to high standards of scholarly writing, and contain an overview of previous research in the area of interest. Based on the written and oral presentations, the committee must accept, reject, or modify the topic to make it suitable for doctoral research.

Dissertation and Residency Requirements
The student continuously registers in CS 600 (minimum of three hours each semester) from the time the topic proposal is approved, admission to candidacy occurs, or registration for course 600 is begun, whichever comes first. The semester in which the dissertation is accepted by The Graduate School and the summer semesters are included in this continuing registration. The minimum residency for a doctoral degree is one academic year or two consecutive semesters of full-time study (minimum of nine hours each semester) in the graduate program subsequent to admission to candidacy. Part-time enrollment does not count toward this requirement.

Dissertation Defense
The student presents and defends the dissertation in a public meeting. The committee determines pass or fail.

GRADUATE COURSES
401 Applications of Computer Graphics (3) Commercial software, techniques, hardware. Prereq. 100 or 102. Not for credit for computer science majors. 3 hr lab required.
402 Applications of Artificial Intelligence (3) Commercial software, techniques, hardware. Prereq: 100 or 101 or 102. Not for credit for computer science majors. 3 hr lab required.

403 Applications of Microcomputers (3) Microcomputers, D06, commercial software and hardware. Prereq: 100 or 101 or 102. Not for credit for computer science majors. 3 hr lab required.

404 Applications of Database Systems (3) Commercial software, systems, techniques. Prereq: 100 or 101 or 102. Not for credit for computer science majors. 3 hr lab required.

421 Introduction to Artificial Intelligence (3) Basic techniques of heuristic search, gaming, and theorem proving. Prereq: 320. 3 hr lab required.

422 Expert Systems (3) Production rule model and its extension into many-valued and fuzzy logics. Deriving statements, examples of expert system tools and building expert systems. Other methodologies—frames, scripts, decision expressions. Prereq: 421. 3 hr lab required.

423 Natural Language Processing (3) Phase-structured and slot grammars, error-correcting interfaces and semantics. Applications in database and expert systems. Prereq: 391 and 421.

424 Robotics Software (3) Software for robotic control. Prereq: 331 and 360. 3 hr lab required.

425 Functional Languages (3) Functional, applicative and object-oriented languages, LISP and SMALL-TALK, used for research applications. Prereq: 111, 112 and Mathematics 222. 3 hr lab required.

432 Computer Graphics (3) Interactive computer graphical software, perspectives, shading, vector generation. Graphics hardware, tablets and chips, with goal of understanding techniques for designing computer systems for graphics capability. Prereq: 331. 3 hr lab required.


434 Networks and Communications (3) ISO open system interconnection, local area networks. Study several existing wide area networks, local area networks. Prereq: 331 and 360.

435 Microcomputer Systems (3) Disk operating systems, peripheral's, local area networks and communication protocols. Introduction to multiprocessor microcomputer systems. Prereq: 331 and 360. 3 hr lab required.

436 Computer Systems Hardware Design (3) Computer system design, design of processor structures, I/O device interrupt support hardware, direct memory access logic, timing budgets, and system considerations. Lab construction, testing, and debugging or either or both of: prototyped subsystem; system based on commercially available microcomputer component devices. Prereq: 435.

439 Microprogramming (3) Microprogramming concepts and techniques for control systems of large and small machines. Bit-slice architecture, sequencers. Prereq: 331. 3 hr lab required.

441 Science Information Systems (3) Design of scientific data banks, document repositories, information retrieval and electronic dissemination services. Control and dissemination of scientific information at national and international level. Prereq: 549.

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

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


4545 Pattern Recognition and Analysis (3) Elements of syntactic pattern recognition, learning algorithms, decision theory, classification rules. Prereq: 111, 112 and 311. 3 hr lab required.

457 Image Processing and Analysis (3) Methods for digitalizing, storing, processing, and displaying image enhancement, restoration. Prereq: 451. 3 hr lab required.

460 Human Factors in Software (3) Interface between people and machines and ease of use of software in intended environment. Prereq: 111 and 112.


462 Software Engineering (3) Exploration of software design and application process from initial requirement and specification statements to coding, testing, implementation, and maintenance. Prereq: 111 and 112.

463 Programming Languages (3) Study and comparison of programming languages and their environments. Human interfaces, formalisms, domain of applicability, object manipulation, syntax. Prereq: 111 and 112.


465 Parallel Computation I (3) Examination of non-numerical algorithms for parallel computation, operating system, design and classification of parallel processing, compilers, concurrent computation. Prereq: 433.


471 Numerical Analysis (3) (Same as Mathematics 471.)

472 Numerical Algebra (3) (Same as Mathematics 472.)


482 Graph Theory and Applications (3) Planarity, flow network, critical paths. Prereq: 111, 112 and 311.


484 Special Topics in Computer Science (1-3) May be repeated. Maximum 9 hrs.

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

502 Registration for Use of Facilities (3-16) Required for the student not otherwise registered during any semester when student uses University facilities and, or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

511 Immigration to Computer Science (5) Advanced programming techniques in high-level language; control of input/output devices; file systems; machine organization and assembly language programming, data structures and analysis of algorithms. Computing laboratory. Prereq: Course in programming.

513 Boolean Algebra and Logic Design (3) Relations, functions, proofs in discrete math; Boolean algebras. Number systems, base conversions. Combinatorial and sequential logic design. Logic design lab. Prereq: One or two college mathematics beyond algebra and trigonometry.

521 Artificial Intelligence (3) Heuristic search, automatic theorem proving, symbolic methods, semantic information processing, representation theory. Prereq: 513 and 513.

522 Cybernetics (3) Various functions in living systems and their actual or potential realization in computers. Prereq: 511 and 513.

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

535 Computer Architecture (3) Parallel processing control methods, pipelining, vector processors, functional units, memory organization and control, data flow, reduced instruction sets, symbolic processors. Prereq: 511 and 513.


538 Computer Networks (3) Design and operation of networks. Hardware and software systems; communications subsystems. Prereq: 511 and 513.

541 Database Management Systems (3) Data model theory, optimization, and normalization; intelligent database systems; comparison of implementations; analysis of distributed and networked databases. Techniques for evaluation of performance, integrity, security and reliability. Prereq: 511.

544 Information Storage and Retrieval (3) Organization, storage and retrieval of bibliographic data; analysis of commercial IR system; information analysis and automatic indexing; database design; database systems; comparison of implementations; analysis of distributed and networked databases. Techniques for evaluation of performance, integrity, security and reliability. Prereq: 511.

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

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


571-72 Numerical Mathematics (3) (Same as Mathematics 571-72.)

573 Finite Difference Methods for Partial Differential Equations (3) (Same as Mathematics 573.)

574 Finite Element Methods (3) (Same as Mathematics 574.)

575 Matrix Theory and Techniques in Numerical Analysis (3) (Same as Mathematics 575.)


593 Independent Study (1-15) Maximum 6 hrs toward degree requirements.
Asian Studies

**GRADUATE COURSES**

421 Readings in Islamic Literature (3) Prereq: Mastery of intermediate-level Arabic or consent of instructor. May be repeated. Maximum 9 hrs.

431 Readings in Chinese Literature (3) Prereq: Mastery of intermediate-level Chinese or consent of instructor. May be repeated. Maximum 9 hrs.

451 Readings in Japanese Literature (3) Prereq: Mastery of intermediate-level Japanese or consent of instructor. May be repeated. Maximum 9 hrs.

471 Selected Topics in Asian Studies (3) Content varies. May be repeated. Maximum 9 hrs.

Comparative Literature

**GRADUATE COURSES**

401-02 Special Topics in Comparative Literature (3,3) Content varies. May be repeated. Maximum 9 hrs.

Latin American Studies

**GRADUATE COURSES**

401 Cultural Plurality and Institutional Changes in Latin America (3) Value systems, behavioral patterns, political parties, role of military, church, educational institutions, dictatorship and nationalism.

402 Latin American Studies Seminar (3) Selected topics. May be repeated. Maximum 6 hrs.

Linguistics

**GRADUATE COURSES**

400 Topics in Linguistics (3) Content varies. May be repeated. Maximum 6 hrs.

411 Linguistic Anthropology (3) Same as Anthropology 411.

420 The Development of Historical Linguistics as a Science (3) Scientific understanding of language change. Emergence of Neogrammarian paradigm from 19th-century intellectual trends. Impact of synchronic, descriptive, structural and transformational-generative linguistics on contemporary diachronic theory. Prereq: 6 hrs of courses required for linguistics concentration or consent of instructor.

425 Introduction to Descriptive Linguistics (3) Same as French 425, German 425, Russian 425, and Spanish 425.

426 Methods of Historical Linguistics (3) Same as German 426, French 426, Russian 426, and Spanish 426.

429 Romance Linguistics (3) Same as French 429 and Spanish 429.


435 Structure of the German Language (3) Same as German 435.

436 History of the German Language (3) Same as German 436.

471 Sociolinguistics (3) Same as English 471 and Sociology 471.

472 American English (3) Same as English 472.

474 Teaching English as a Second or Foreign Language I (3) Same as English 474.

**Urban Studies**

**GRADUATE COURSES**

401 The City in the U.S. (3) Same as Planning 401.

441 Urban Geography (3) Same as Geography 441.

464 Urban Ecology (3) Same as Sociology 464.

Women's Studies

**GRADUATE COURSES**

400 Topics in Women's Studies (3) Content varies. May be repeated.

422 Women Writers in England (3) Same as English 422.

425 Women's Health (3) Same as Health 425.

434 Psychology of Gender (3) Same as Psychology 434.

466 Rhetoric of the Women's Rights Movement (3) Same as Speech 466.

483 Afro-American Women in American Society (3) Same as Afro-American Studies 483.

**Curriculum and Instruction**

(Blocking of Education)

MAJOR DEGREES

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

Theodore W. Hipple, Head

Professors:

Alexander, J. E., Ed.D. Kentucky

Allison, C. B., Ph.D. Oklahoma

Bellow, Jerry J., Ed.D. California

Blank, Kermit J., Ph.D. Ohio State

Butefish, William L., Ed.D. Texas Tech

Christensen, Mark A., Ph.D. Kansas

Coak, E. Dale, Ed.D. Maryland

Franzen, Henry, Ph.D. Illinois

Hippie, Theodore W., Ph.D. Illinois

Howard, R., Ph.D. Ohio State

Knight, Lester N., Ph.D. Texas

Kolker, B. M., Ed.D. Indiana

Mays, N., Ph.D. Southern Illinois

McIntyre, Lonnie D., Ed.D. Indiana

Myer, M. E., Ph.D. Florida

Ray, John R., Ed.D. Tennessee

Roeske, C. E., Ph.D. Ohio State

Rowell, C. Glennon, Ed.D. George Peabody

Sawson, W. S., Ed.D. Virginia

Terwilliger, Paul N., Ed.D. Penn State
421 Elementary and Middle School Science and Social Studies Instruction (3) Methods and materials for teaching science and social studies. Development of functional relationships and entities of two fields. Not open to students with recent course or background in teaching science and/or social studies. Prereq: Admission to teacher education. F, Sp

429 Language Arts/Reading Instruction in Elementary and Middle Schools (3) Language and language development as aspects of literacy (listening, speaking) and aspects of literacy (reading process, readiness and writing). Not open to students with recent course or background in reading methods. Prereq: Admission to teacher education. F, Sp

430 Elementary and Middle School Developmental Reading Instruction (3) Word recognition (including phonics), comprehension, evaluation, and materials. Open to students with recent course in reading methods. Prereq: Admission to teacher education. F, Sp

434 Topics in Reading Education (1-6) Prereq: Admission to teacher education and course in reading education. May be repeated. Maximum 6 hrs. E

443 Elementary and Middle School Mathematics Instruction (3) Procedures for helping children learn mathematics. Unit planning, daily planning, grouping, general factors, and related topics. Prereq: Not open to students with recent course in teaching of elementary school mathematics. Cannot apply toward M.S. degree. Prereq: Admission to teacher education. F, Sp

445 Early Childhood Education: Program Development and Teaching in Kindergarten (3) Curriculum planning, classroom organization, and management practices for teaching young children; relationship of kindergarten to total elementary school. Prereq: Admission to teacher education. E

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

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

461 Developing Reading Skills in Content Fields (3) Techniques for teaching reading and study skills in content areas of school program. Extensive assessment of textbooks. Middle school and high school. E

475 Utilization of Instructional Media (3) Basic concepts of communication and instructional development for improving instruction through use of media. (Same as Library and Information Science 475). E

486 Introduction to Instructional Computing (3) Classroom use of computers, applications for teachers, overview of computer communication and software for teachers of all grades. F, Sp

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

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

502 Registration for Use of Facilitics (3-18) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E


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

507 Teaching Poetry Grades 7-12 (3) Research and theory in application to teaching of poetry. Design of strategies and materials for teaching and writing and reading of poetry. Review of texts and materials. F

508 Teaching Composition in the Secondary School (3) Teaching narration, description, exposition, and argumentation; writing process and marking of student papers. Sp

509 Teaching Fiction in the Secondary School (3) Teaching of novels and short stories. F


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

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

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

518 Educational Specialist Research and Thesis (2) May be repeated. Maximum 4 hrs. P/NP only. E

519 Educational Specialist Research and Thesis (2) P/NP only. E

520 Techniques of Research in Education (3) Study and application.

521 Teaching Social Studies in Elementary and Middle Schools (3) Planning and techniques. Trends in curriculum, development of concepts and generalizations, integration of social sciences. Prereq: Course in teaching of social studies or consent of instructor. Sp

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

523 Diagnosis and Correction of Children's Difficulties in Learning Mathematics (3) Children's difficulties in learning mathematics and procedures for helping classroom teacher correct difficulties. Prereq: 522 or equivalent or consent of instructor. Sp


525 Strategies, Programs and Materials for Teaching Elementary Social Studies (3) Analysis of new and innovative social studies program materials and techniques. Exploration of current materials and social studies education. Prereq: Previous course in teaching of social studies or consent of instructor. Sp

526 Philosophy of Education (3) Truth, knowledge, and valuation in relation to work of schools. F, Su

527 Elementary School Curriculum (3) Examination, evaluation and application of curriculum design in elementary school. Trends and issues which affect elementary education. Prereq: Consent of instructor. F, Su

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

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

530 Teaching Reading in Elementary and Middle Schools (3) Trends in methods, materials, basic approaches, skill development and attitudes toward procedures for teaching reading at elementary school.
546 Topics in History of Education (3) May be repeated. E
547 Topics in Philosophy of Education (3) May be repeated. F,Su
548 Topics in International Education (3) Historical, philosophical, and sociological foundations; selected nations and their cultures. May be repeated. E
550 Assessment and Correction of Language Arts Difficulties (3) Procedures and materials for diagnosing and correcting language arts difficulties; analysis of children's work. Prereq: At least one language arts course or consent of instructor. Su
552 Developmental Reading Practicum (2) Diagnosing and teaching children having developmental and corrective reading needs. Prereq: Course in diagnosis and correction of reading problems or consent of instructor. May be repeated. Maximum 4 hrs. Su
557 The Junior High and Middle School Curriculum (3) Curriculum and instructional design for junior high and middle school. Characteristics of students, curriculum designs, instructional patterns, and organization and structure of junior high and middle schools. Sp,Su
558 Curriculum Planning and Development (3) Foundations and principles of curriculum planning and development. Historical analysis of curriculum theory, principles of planning and development, and classroom applications for improved learning. E
561 Educational Statistics (3) Applications of descriptive and inferential statistics to educational and instructional problems. Use of electronic calculators in educational and instructional research. Prereq: One year of college mathematics, an elementary course in statistics, or consent of instructor. F,Su
562 Direction and Supervision of Student Teaching (3) Roles and responsibilities of cooperating teachers and student teacher; objectives and policies of student teaching program; elements of clinical supervision; overview of research. F,Su
564 Curriculum for Early Childhood Education (K-3) (3) Theoretical foundations and current research in content and skill areas of curriculum for kindergarten-grade 3; application to local school setting. Prereq: Consent of Instructor. May be repeated. Maximum 9 hrs. Sp,Su
565 Programs, Materials and Strategies in Teaching Elementary Science (3) Analysis of new and innovative science program materials. Instructional strategies and current curricular issues inherent in use of materials. Prereq: Graduate course in elementary science, at least one year teaching experience, or consent of instructor. Sp
566 Administering Instructional Media Programs (3) Leadership roles and responsibilities of professional media administrator in variety of organizational settings. F
567 Application of Theory in Early Childhood Education (K-3) (3) Principles and practices from selected theoretical orientations. Prereq: Course in early childhood education or consent of instructor. May be repeated. Maximum 6 hrs. F,Su
568 Teacher-Parent-Community Relations (3) Techniques for effective relations between parents and teachers; examination of roles and expectations; parental involvement; volunteer programs; influence of community on educational process. Prereq: Consent of instructor. Sp,Su
569 Advanced Production of Audiovisual Software (3) Hand and mechanical lettering, flat picture mounting, laminating, overhead projection, audio production, on TV studio orientation, sync-tapping, multi-screen presentations, and printing techniques. (Same as Library and Information Science 569) Sp,Su
573 Utilization of Educational Television and Radio (3) Television and radio as instructional and training media. Selecting, making and evaluating instruction/translation video and audio tapes. F
577 Introduction To Data Processing in Curriculum and Instruction (3) Analysis of current activities in educational computing and data processing. Curricular, instructional, research, and classroom management applications from microcomputers to supercomputers. Prereq: Consent of instructor. F,Su
578 Teaching English as a Second Language (3) Theoretical and practical applications of selected learning procedures to diagnose English linguistic proficiency; materials for non-native speaker in K-12 classroom. Required for Tennessee ESL (K-12) certification. Prereq: Consent of instructor.
579 Career Development: Workshop (1-6) E
580 Techniques for Research in Curriculum and Instruction (3) Fundamentals of research methodology applicable to curriculum, instruction, and other areas of educational inquiry. Critical reading of research and development of skills needed for proposal development. E
581 Seminar in Mathematics Education (3) Current issues influencing instruction in mathematics, elementary, through college. Related teaching methodology. Opportunities for work on special problems. Prereq: Undergraduate course in teaching of mathematics. Su
582 Teaching Enrichment Mathematics in Middle and Junior High Schools (3) Topics to enrich middle and junior high mathematics. Geometrical, laboratory, and problem solving activities. Special attention to metric system. Opportunities for individual projects. Prereq: 581. Su
583 Teaching Mathematics in Senior High Schools and Community Colleges (3) Topics appropriate for high school and college classroom. Pedagogical, psychological, and sociological foundations. Curriculum planning, designing, and evaluation. Prereq: Consent of instructor. F,Su
584 Seminar in Early Childhood Education (3) Analysis of probability and statistics in schools, elementary through college. Probabilities and statistical experiments, demonstrations, and applications. Prereq: 581. F,Sp
586 Instructional Theory and Design (3) Relationship of curriculum to learning. Development of educational theories and their applications in learning environment. Educational evaluation and related teaching theories; instructional models and teaching styles. E
588 Seminar in Teaching English in Secondary Schools (3) Content varies. Theoretical and practical approaches to teaching English in secondary school. May be repeated. Su
592 Linguistics and the Teaching of English (3) Grammar, usage, semantics, dialectology, history of language, and related sociolinguistics. F,Sp
593 Independent Study (1-3) May be repeated. S/NC or letter grade. E
594 Supervised Readings (1-3) May be repeated. S/NC or letter grade. E
596 Special Topics (1-3) May be repeated. S/NC or letter grade. E
599 Teaching of Natural Science and Environmental Education (3) Strategies, labor,ory techniques, assessment of current programs and professional guidelines for middle, junior and senior high schools, and community colleges. Prereq: Consent of instructor. F
597 Teaching Drama Grades 7-13 (3) Strategies and materials for teaching creative dramatics, enacting and writing of plays, reading of scripts. Sp

598 Developing Speaking and Listening Skills, Grades 7-12 (3) Teaching approaches to nonverbal communication, interpersonal and group communication, public address and listening. Review of tests and materials. Sp

599 Seminar in Social Studies Education (3) Research, trends, and issues in secondary social studies. Su

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

601 Studies in English Education (3) Issues and research in teaching of English. Su

602 Seminar in Reading Education (1-6) May be repeated. Maximum 6 hrs. E

603 Advanced Studies and Theoretical Models of Reading (3) Research on reading processes. Current theoretical models related to how learners process print. Prereq: 500-level courses in reading education or consent of instructor. Sp

604 Seminar in Curriculum and Instruction (1) Required 2 consecutive semesters. S/NC only. E

605 Organizing and Administering Reading Programs (3) Analyzing and synthesizing instructional, learning, and materials components into classroom, school and system programs. Prereq: 2 500-level courses in reading education or consent of instructor. Su

606 Research in Elementary Education (3) Analysis of research in elementary education with application to classroom teaching. Prereq: research course. Su

608 Seminar in Philosophy of Education (3) Selected philosophical issues in education. Prereq: 2 courses in history or philosophy of education. May be repeated with consent of instructor. E

621 Seminar in Social Studies Research and Theory (2) Status of research and theory. Needed research, related research from other fields, and application of research. Prereq: Recent course in social studies or consent of instructor. May be repeated. Maximum 4 hrs. E

623 Programs for Curriculum Improvement (3) Research methodology; application to descriptive/ethnographic curricular materials. Critical reading of research, methodological development in descriptive and ethnographic areas. Sp

625 Seminar in History of Education (3) Selected historical issues in education. Prereq: 2 courses in history or philosophy of education. May be repeated with consent of instructor. Sp

626 Advanced Studies in Elementary School Science (2) Current research in elementary school science as applied to classroom practice. Prereq: Graduate course in science education or equivalent or consent of instructor. May be repeated. Maximum 4 hrs. E

635 Teacher Education in America (3) For students preparing to enter teacher education. Brief historical development, program analysis and evaluation, current issues, and future directions. F

640 The Dynamics of Educational Change (3) Interdisciplinary approach to change process in education. Prereq: Consent of instructor. Sp

648 Topics in Sociology of Education (3) May be repeated. Sp

650 Advanced Studies in Early Childhood Education (3) Prereq: 2 graduate courses in early childhood education or consent of instructor. May be repeated. Maximum 6 hrs. S/NC only. E

651 Advanced Studies in Elementary School Language Arts (3) Selected issues in elementary school language arts. Prereq: Graduate course in elementary school language arts or consent of instructor. Sp

652 Advanced Studies in Educational Anthropology and/or Sociology (3) Ethnographic methods applied to formal and non-formal educational settings. Analysis of selected research in field. Prereq: 451, 2 courses in cultural anthropology, or consent of instructor. Sp

669 Instructional Media Research (3) Identification, location, and collection of developmental and experimental research on instructional media. Application of research. Sp

671 Advanced Educational Statistics (3) Application of parametric and non-parametric statistical inference to educational and instructional problems. Use of microcomputers in educational research. Prereq: 561. Sp/Su

672 Interpretation and Application Curriculum and Instruction Research (3) Analysis of research in curriculum and instruction, newer methodologies and strategies. Utilization of research to improve curriculum and instruction practice, application of research principles in context of specific professional assignments. Prereq: Consent of instructor. E

675 Curriculum Evaluation: Theory and Application (3) Evaluation trends and issues. Theoretical frameworks to design evaluation studies for various educational programs. Sp

676 Curriculum Theory (3) Influential curriculum theories and approaches, implications for structure and design of educational programs. Nature and function of theory, theory building activities. Prereq: Consent of instructor. E

683 Advanced Studies in Elementary School Mathematics (2) Research in elementary school mathematics. Prereq: Graduate course in mathematics education or consent of instructor. Sp

685 Educational Leadership: Theory and Practice (3) Theories of leadership applied to variety of educational settings. Prereq: Consent of instructor. F/Su

689 Internship (1-3) Experiences in application of theories and research for middle, junior and senior high schools, and community colleges. Prereq: Program prerequisites and consent of instructor. May be repeated. Maximum 9 hrs. S/NC only. E

693 Independent Study (1-3) May be repeated. S/NC only. E

694 Supervised Readings (1-3) May be repeated. S/NC or letter grade. E

695 Special Topics (1-3) May be repeated. S/NC or letter grade. E

696 Advanced Studies in Secondary Science and Environmental Education (3) Trends in science and environmental programs, materials methods and research for middle, junior and senior high schools, and community colleges. Prereq: 589 or equivalent and consent of instructor. Sp

Ecology (College of Liberal Arts)

MAJOR DEGREES

Ecology .......................................................... M.S., Ph.D.

Dewey L. Bunting, Director
B. L. Dearden, Associate Director
Paul A. Delcourt, Associate Director

Shared Faculty:

Amundsen, C. C., Ph.D., Botany
Auerbach, S. I., Ph.D., ORNL
Bartell, Steve, Ph.D., ORNL
Blaylock, B. G., Ph.D., ORNL
Buckner, E. R., Ph.D., Forestry
Bunting, Dewey L., Ph.D., Zoology
Burghardt, G. M., Ph.D., Psychology
Carter, Janis, Ph.D., Geography
Clebsch, E. E., Ph.D., Botany
Coutant, C. C., Ph.D., ORNL
DeAngels, D. L., Ph.D., ORNL
Deardens, B. L., Ph.D., Ph.D., Botany
Delcourt, Hazel, Ph.D., ORNL
Delcourt, Paul A., Ph.D., Geology
DeSelm, H. R., Ph.D., Botany
Dimmick, Ralph W., Ph.D., Fisheries and Wildlife
Drake, James A., Ph.D., Zoology
Eichertnacht, Arthur C., Ph.D., Zoology
Elwood, J. W., Ph.D., ORNL
Etner, D. A., Ph.D., Zoology
Evans, A. M., Ph.D., Botany
Farkas, Walter, Ph.D., Environmental Practice
Fribourg, Henry A., Ph.D., Plant & Soil Science
Gardner, R. H., Ph.D., ORNL
Gehrs, C. W., Ph.D., ORNL
Gist, C. S., Ph.D., ORAU
Gillow, John L., Ph.D., Zoology
Greenburg, Neil, Ph.D., Zoology
Gross, L. J., Ph.D., Mathematics
Hallam, Thomas G., Ph.D., Mathematics
Hammitt, W. E., Ph.D., Forestry and Wildlife
Hansen, J. H., Ph.D., UTSA
Hardin, Carol P., Ph.D., Geography
Hay, R. L., Ph.D., Forestry
Herbes, S. E., Ph.D., ORNL
Hildebrand, S. G., Ph.D., ORNL
Hility, J. W., Ph.D., Entomology & Plant Pathology
Horn, Sally P., Ph.D., Geography
Houston, M., Ph.D., ORNL
Kelly, J. M., Ph.D., TVA
Kimmel, B. L., Ph.D., ORNL
Kitchen, Hyram, D.V.M., Ph.D., Veterinary Medicine
Kot, M. Ph.D., Mathematics
McCarthy, J. F., Ph.D., ORNL
McCracken, G. F., Ph.D., Zoology
McKinney, M. L., Ph.D., Geology
McLaughlin, S. B., Ph.D., ORNL
Olson, J. C., Ph.D., ORNL
O'Neil, R. V., Ph.D., ORNL
Page, M. C., Ph.D., Chemistry
Parramore, Paul W., Ph.D., Anthropology
Peterson, Michael R., Ph.D., Fisheries & Wildlife
Pimm, S. L., Ph.D., Zoology
Pliess, C. D., Ph.D., Entomology & Plant Pathology
Post, W., Ph.D., ORNL
Reed, R. M., Ph.D., ORNL
Rehder, J. B., Ph.D., Geography
Reichle, D. E., Ph.D., ORNL
Rennie, J. C., Ph.D., Forestry
Reynolds, John H., Ph.D., Plant & Soil Science
Riechert, Susan E., Ph.D., Zoology
Saylor, Gary S., Ph.D., Microbiology
Schlaubach, S. E., Ph.D., Forestry & Wildlife
Schneider, Gary, Ph.D., Forestry
Shugart, H. H., Ph.D., UV
Smith, W. O., Ph.D., Botany
Stacey, G., Ph.D., Microbiology
Stewart, A., Ph.D., ORNL
Strange, R. J., Ph.D., Fisheries
Van Hook, R. L., Ph.D., ORNL
VanWinkle, W., Ph.D., ORNL
Vaught, G., Ph.D., Zoology
Walton, B. T., Ph.D., ORNL
Wehry, E. L., Ph.D., Chemistry
West, D. C., Ph.D., ORNL
White, David C., Ph.D., Microbiology
White, P. S., Ph.D., UNC
Withrop, J. L., Ph.D., Fisheries & Wildlife
Witherspoon, J. P., Ph.D., ORNL
Woods, F. W., Ph.D., Forestry
The Graduate Program in Ecology offers Master of Science and Doctor of Philosophy degrees. The interdepartmental program provides advanced courses in contemporary ecology for students from undergraduate programs in basic and applied biology, social sciences, mathematics, and engineering. Research opportunities in both fundamental and applied ecology are intended to prepare students for academic careers as well as professional positions in industry or government. The Environmental Sciences Division of the Oak Ridge National Laboratory, the national Park Service, and the Tennessee Valley Authority provide advisors and research facilities. The Great Smoky Mountains, Cumberland Plateau, valley and ridge topography, TVA lakes and wild rivers provide locally a spectrum of natural habitats and consequent biological diversity that is truly unique. In addition, faculty research programs provide opportunities for student research elsewhere on this continent and abroad.

ADMISSION REQUIREMENTS

Requirements for admission to this program are:
(1) admission to The Graduate School; (2) chemistry including organic, mathematics including calculus, and 3 semester hours of ecology at the upper division level (physics highly recommended); (3) departmental application and 3 rating forms; (4) the Graduate Record Examination.

Application forms for admission should be obtained from the Graduate School and the Ecology Program. Inquiries concerning the admission requirements should be addressed to the Director, Graduate Program in Ecology, University of Tennessee, Knoxville, Tennessee 37996-1610.

THE MASTER’S PROGRAM

Within the minimum requirements of The Graduate School, the program of study must include Ecology 573 and 574 or an approved equivalent and one course from an approved list of quantitative methods offerings. The list is available from the ecology office and is updated annually by the Ecology Curriculum Committee. The remainder of a student's course work is chosen in consultation with the graduate committee. A listing of approved campus-wide ecology offerings is provided to each student during orientation.

A graduate minor in ecology is available on an individual basis.

THE DOCTORAL PROGRAM

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

ADVISORS

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

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UTK on an in-state tuition basis. The Ph.D. program in Ecology is available to residents of the state of Alabama. Additional information may be obtained from the Resident Assistant in the Office of Graduate Admissions and Records.

GRADUATE COURSES

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

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

510 Special Problems in Ecology (1-3) Individual investigations in ecology. May be repeated with consent of instructor. Maximum 6 hrs.

520 Ecology for Planners and Engineers (3) Ecological principles and effects that human-caused changes have on living organisms. Lectures and field trips. Appropriate for students in Planning and Environmental Engineering.

530 Implementation of Environmental Policy (3) Goals and problems of environmental legislation, National Environmental Policy Act; purpose, preparation, and evaluation of environmental impact statements and similar multidisciplinary studies. Prereq: 520 or 573 or course work or experience in environmental law.

537 Natural Resource Management and Environmental Assessment in Developing Nations (3) Assessment of environmental and resource development issues. Scientific basis for integrated resource management and environmental assessment in developing nations. Prereq: General ecology or equivalent. (Same as Planning 553 and Botany 557.)

552 Development Planning in the Third World (3) (Same as Planning 552.)

555 Environmental Planning (3) (Same as Planning 555.)

561 Environmental Toxicology (3) (Same as Biochemistry 561.)

562 Techniques in Environmental Toxicology (3) (Same as Biochemistry 562.)

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

574 Communities and Ecosystems (3) Patterns underlying principles of short and long term community and ecosystem organization, dynamics, energetics and nutrient cycling.

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

604 Current Topics in Environmental Toxicology (1) (Same as Biochemistry 604.)

610 Special Topics in Ecology (3) Seminars on advanced topics and recent developments. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

620 Seminar in Ecology (2) May be repeated. Maximum 12 hrs.

637 Applied Ecology (3) Review of contemporary and historical issues. Analysis of scientific basis of environmental assessment and natural resource management. Analysis of careers and career planning in applied ecology. Prereq: 573-74 or equivalent or consent of instructor. (Same as Botany 637.)

Economics

(College of Business Administration)

MAJORS

DEGREES

Economics

M.A., Ph.D.

Business Administration

MBA

Anne Mayhew, Head

Professors:

Bohn, Robert A., Ph.D.

Washington (St. Louis)

Bowby, Roger L., Ph.D.

Texas

Carroll, Sidney L., Ph.D.

Harvard

Chang, Hui S., Ph.D.

Vanderbilt

Cole, William E., Ph.D.

Texas

Davidson, Paul (Chair of Excellence)

Ph.D.

Pennsylvania

Feiwell, George R. (Distinguished Prof.)

Ph.D.

McGill

Fox, William F., Ph.D.

Ohio State

Garrison, Charles B., Ph.D.

Kentucky

Herzog, Henry W., Ph.D.

Maryland

Jensen, Hans E., Ph.D.

Texas

Lee, Feng-Yao, Ph.D.

Michigan State

Mayhew, Anne, Ph.D.

Texas

Moore, John R., Ph.D.

Cornell

Neale, Walter C., Ph.D.

London

Quindry, K. E. (Emeritus), Ph.D.

Kentucky

Sclottman, Alan M., Ph.D.

Washington (St. Louis)

Spiva, George A., Ph.D.

Texas

Associate Professors:

Clark, Don P., Ph.D.

Michigan State

Glustoff, Errol, Ph.D.

Stanford

Mayo, John W., Ph.D.

Washington (St. Louis)

Phillips, Keith E., Ph.D.

Washington

Assistant Professors:

Gauger, Jean A., Ph.D.

Iowa State

Kunkin, Matthew, M.A.

Wisconsin

Mandy, David M., Ph.D.

Illinois

Murray, M. N., Ph.D.

Syracuse

The Department of Economics offers graduate programs leading to the M.A. and Ph.D. The M.A. may be completed by either a thesis or non-thesis option, while the Ph.D. requires successful completion of a dissertation. Applicants to these programs should contact the Director of Graduate Studies, Department of Economics, for further information. The Department also offers an area of concentration for the MBA degree. Students interested in the MBA program should contact the Associate Dean for Graduate Programs, College of Business Administration.

ACADEMIC STANDARDS

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

THE MASTER'S PROGRAM

Admission to the M.A. program is based on undergraduate academic performance and on scores from the general portion of the GRE or on scores from the GMAT. The student may choose either the thesis or non-thesis option.

The non-thesis option requires 30 hours of coursework at the 400 level or above. Of these, at least 24 hours (at least 18 hours of which are in economics courses) must be at the 500 level or above. Of the minimum 18 hours in economics at the 500 level or above, 12 hours must consist of 511, 512 and 513, 514, and the remaining 6 hours must be in one field of economics. Of the 30 hours, a maximum of 9 hours in courses approved by the department may be taken in fields other than economics. Students electing the non-thesis option are required to pass a final comprehensive examination.

The thesis option requires 30 hours of coursework at the 400 level or above, including at least 24 hours at the 500 level or above (no more than 6 hours of which may be thesis hours). Of the remaining 18 hours at the 500 level or above, at least 15 hours must be in economics and must include 511, 512, 513, and 514. A maximum of 6 hours may be in an area other than economics.

THE DOCTORAL PROGRAM

Admission to the Ph.D. program is based on promise of outstanding scholarship as demonstrated by scores achieved on the GRE or on scores from the GMAT. The student may choose either the thesis or non-thesis option. Students electing the non-thesis option are required to pass a final comprehensive examination.

The thesis option requires 30 hours of coursework at the 400 level or above, including at least 24 hours at the 500 level or above (no more than 6 hours of which may be thesis hours). Of the remaining 18 hours at the 500 level or above, at least 15 hours must be in economics and must include 511, 512, 513, and 514. A maximum of 6 hours may be in an area other than economics.

For complete listing of MBA program requirements, see Business Administration. MBA Concentration: Economics. Minimum course requirements are as approved by the area MBA faculty advisor.

GRADUATE COURSES

400 Special Topics (3) Topics vary. Prereq: Determined by department.

415 History of Economics (3) Methods of study of doctrinal history. Origins and evolution of major doctrines: classical and neoclassical economics, economics of Keynes and his followers, principal developments of second half of 20th century. Major writing requirement. Prereq: 201 or equivalent and consent of instructor.

424 Political Economy of World Development (3) Topics vary. Latin America, Asia, Soviet Union and Eastern Europe. Analysis of S.S. major economic strategies, policies, and problems. Prereq: 201. This course includes a major writing requirement.


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

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

472 Public Finance: Taxation and Intergovernmental Relations (3) Analysis of individual taxes and of tax systems, non-tax sources of revenue, fiscal federalism. Prereq: 201.

482 Introduction to Mathematical Economics (3) Application of algebra, matrix algebra, differential and integral calculus to micro and macroeconomics. Prereq: 201 and Mathematics 121-22 or 141-42.

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


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


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

612 Advanced Microeconomic Theory (3) Prereq: 512 or equivalent.

613 Advanced Macroeconomic Theory (3) Prereq: 514 or equivalent.


621-22 International Economics (3,3) Comparative advantage, trade migration, commodity composition of trade, protectionist devices, protectionist arguments, trade liberalization, trade policy, exchange rate determination, balance of payments adjustment, multinational corporations, and international capital flows. Prereq: 512 and 514 or equivalent.

623 Economic Development: Theories and Policies (3) Principal theories explaining economic behavior in developing countries and policies and strategies used to promote development. Prereq: Undergraduate degree in economics or consent of instructor.

624 Economic Development: Western Impact on Asia and Africa (3) Studies of consequences of contact between developed world and developing countries of Asia and Africa. Prereq: Undergraduate social science or consent of instructor.

634 Comparative Economic Systems (3) Study and appraisal of alternative economic systems in comparative perspective.

641 Labor Economics (3) Theory of labor markets and wage determination under competitive conditions. Labor markets under conditions which interfere with competition, unions and discrimination. Human capital and estimation of returns to schooling. Topics vary. Prereq: 311 and 313, or equivalent.

642 Labor History and Legislation (3) Development of organized labor as important economic and political force in U.S., from Colonial times to present. Evolution of legal status of labor unions and of individual workers vis-a-vis their employers.

651 Monetary Theory (3) Study of money, credit, and liquidity as related to real output determination, interest rates, employment, and prices. Prereq: 513.

652 Topics in Monetary Theory (3) Advanced monetary models, issues in monetary policy, open economy monetary theory and policy. Student participation. Prereq: 615.

661 Regional and Urban Location and Development Theory (3) Theory of industrial and agricultural locations and human migration. Economic bases for land-use patterns, central places, and urban form. Spatial inequalities and urban problems. National policies for regional and urban assistance.

662 Methods of Regional and Urban Analysis (3) Theoretical and methodological approaches to regional/urban economic structure and growth. Regional income and product accounts, shift and share analysis, economic base studies, and regional/urban input-output models. Theory and problem solution.

683 Environmental and Resource Economics (3) Topics in environmental quality, natural resource allocation by private markets, and issues in formulating public policy toward environmental problems.


672 Public Finance: Taxation and Intergovernmental Relations (3) Theory of taxation; tax incidence and tax efficiency; policy analysis of U.S. tax structure at federal, state, and local levels. Theory of fiscal federalism and intergovernmental relations.

681-82 Econometric Methods (3,3) Theory and techniques of statistical testing of economic hypotheses and construction and estimation of econometric models. Review of classical least squares regression model, and approaches to simultaneous equation models with application to current econometric research. Prereq: 582 or equivalent.

690 Workshop (3) Advanced topics in economics. Student participation. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

Education

(Majors of College of Education)

MAJOR DEGREE
Education ........................................ Ph.D.

THE DOCTORAL PROGRAM

The Ph.D. program with a major in Education provides six concentrations. The departments participating in the Ph.D. program are Curriculum and Instruction; Educational Leadership; Educational and Counseling Psychology; Health, Leisure, and Safety; Physical Education and Dance; Special Services Education; and Technological and Adult Education.

The program requirements, concentrations and specializations are:

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<tr>
<th>Requirements</th>
<th>Minimum Hours</th>
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<tbody>
<tr>
<td>Research Area</td>
<td>14</td>
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<tr>
<td>Foreign or Computer Language (demonstrate proficiency)</td>
<td>6</td>
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<tr>
<td>General Core Requirements</td>
<td></td>
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<tr>
<td>Courses in history of education, philosophy of education (two areas must be represented)</td>
<td>4</td>
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<tr>
<td>Courses in learning theory, curriculum theory, and administrative theory (three areas must be represented)</td>
<td>6</td>
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<tr>
<td>Alternative Core Requirements</td>
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<tr>
<td>Courses in philosophy of science</td>
<td>3</td>
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<tr>
<td>Trans-college Seminar—three consecutive semesters (including summer)</td>
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<tr>
<td>Seminar in area of specialization</td>
<td>3</td>
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<tr>
<td>Courses in learning theory/group or independent study</td>
<td>3</td>
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<tr>
<td>Concentrations</td>
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<tr>
<td>Primary Concentration—A minimum of 16 hours normally selected from one or two specializations within the primary concentration</td>
<td>16</td>
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<tr>
<td>Supporting Specialization—A minimum of 9 hours selected from a specialization in a concentration other than the primary concentration</td>
<td>9</td>
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<tr>
<td>Cognate—A minimum of 6 hours selected from outside the college in addition to the designated research courses</td>
<td>6</td>
</tr>
<tr>
<td>Dissertations</td>
<td>24</td>
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</tbody>
</table>

CONCENTRATIONS

Administrative Theory and Practice Specializations:
1. School administration
2. Higher education administration
3. Organizational leadership and policy studies

Theories of Curriculum Development and Foundations of Education Specializations:
1. Anthropological, historical, philosophical, and sociological bases for educational planning and curriculum
2. Principles and models for planning, developing, and evaluating educational programs
3. Research design for educational programs

Instructional Theory and Practice Specializations:
1. Principles and models for instructional improvement
2. Elementary and early childhood instruction and practices
3. Secondary/community colleges: (English, foreign language, mathematics, science, social studies education)
4. Elementary: mathematics, science, social studies education
5. Reading education
6. Instructional media and technology
7. Technological and adult education
8. Special education and rehabilitation

Theories and Practice of Educational and Personal Adjustment Specializations:
1. Counselor education
2. Counseling psychology
3. Educational psychology
4. School psychology

Foundations of Human Movement Specializations:
1. Adapted physical education
2. Philosophical foundations of sport
3. Sociological foundations of sport
4. Physical activity and positive health
5. Metabolic and cardiovascular adaptations to acute and chronic exercise
6. Motor behavior: motor control, motor learning, psychology of sport

Health Education Specializations:
1. Public health
2. Safety

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UTK on an in-state tuition basis. The Ph.D. program in Education is available to residents of the states of Georgia and South Carolina. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.

See College of Education for additional departmental listings.

GRADUATE COURSES

601 Trans-College Seminar (1) Introduction to Ph.D. program in Education: research requirements, meaning of scholarship in academe and issues/problems in education. Minimum of two consecutive semesters preceded or followed by summer term required of all Ph.D. students. Prereq: Admission to Ph.D. program or consent of Ph.D. program coordinator. May be repeated. Maximum 3 hrs. May not be used to meet 600 requirement. S/NC only.

Educational and Counseling Psychology

(College of Education)

MAJORS DEGREES

Guidance ........................................ M.S.

Educational Psychology ..................... M.S., Ed.D.

Educational Psychology and Guidance . Ed.S.

Education ........................................ Ph.D.

Siegfried C. Dietz, Acting Head

Professors:

Davis, K. L.: Ed.D. ......................... Georgia
DeRidder, Lawrence M. (Emeritus), Ph.D. ......................... Michigan
Dickinson, Donald J., Ed.D. .................. Oklahoma State
Siegfried C., Ed.D. ................. Arizona State
Hector, M. A., Ph.D. ......................... Michigan State
Huck, Schuyler W., Ph.D. ................ Northwestern
Specialist Programs

Admission requirements include up-to-date scores from the GRE, the departmental admissions application form and letters of recommendation. All programs include thesis and non-thesis options. The program in school psychology requires a minimum of 66 hours. When students are admitted to the Ed.S. programs in educational psychology, school counseling, or community agency counseling, it is assumed that they have completed a Master's degree. In this case, the minimum hours beyond the Master's required to complete the Ed.S. are as follows: educational psychology, 24; school counseling, 22; and community agency counseling, 25. The specialist programs require supervised practicum and internship experiences with students or clients, either in the public schools or in community human services agencies. A final examination is required of all specialist students.

Doctoral Programs

The Ph.D. with a major in Education includes concentrations and specializations as listed under Education. For students applying to the Ph.D. program concentration located in this department, two applications are required: one for the Ph.D. in Education program and one for the department that specifies which specialization is desired (i.e., counseling psychology, counselor education, educational psychology, or school psychology). Applicants for the Ed.D. with a concentration in either counselor education or educational psychology fill out only the departmental application form.

Departmental admissions requirements include up-to-date scores from the GRE; the departmental admissions application form; letters of recommendation; a writing sample; and, in the case of the counselor education program only, an audio or video-taped sample of the applicant's counseling work.

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. The M.S. program in Educational Psychology is available to residents of the state of South Carolina. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.

Graduate Courses

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

410 Sex Role Development: Implications for Education and Counseling (3) Theories and research concerning development of person’s sexual role and its relevance in educational and counseling settings. E

431 Personality and Mental Health (2) Various perspectives of mental health with application to education and other social institutions. E

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

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

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

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

502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

503 Problems in Lending of Thesis (1-3) May be repeated. Maximum 12 hrs. S/NC only. E

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

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

511 Cognitive Development: Implications for Education (3) Applications of theory and research related to higher mental problem-solving. Prereq: 510 or consent of instructor. F

515 Educational Applications of Behavioral Theories of Learning (3) Behavioral theories and research, cognitive/motor, observational learning, and ethological learning as systems apply to student motivation, discipline and learning. Sp,Su

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

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

520 Statistics and Research Design: Conceptual (3) Conceptual, conceptual treatment of statistics, research design, and quantitative basis of testing. E
521 Statistics and Research Design: Application (3) Data collection and analysis. Descriptive techniques, estimation, tests of hypothesis testing and selected parametric and nonparametric tests. For Master's students conducting thesis and beginning doctoral students. Use of computer and statistical packages. F,Su

526 Formal Measurement in Education and Counseling (3) Principles of test construction and item analysis. Survey of standardized tests of intelligence, achievement, aptitude, vocational interest, attitudes and personality. Prereq: 525 or equivalent. F,Su

526 Informal Methods of Assessment (3) Development and use of rating scales, check-lists, observation, test scores and case reports in assessment and counseling of children and adults. Prereq: 525. Sp

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

541 Psychoeducational Assessment (3) Direct, psychological and naturalistic assessment methods in learning environments. Prereq: Admission to school psychology program or consent of instructor. E

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

545 Psychoeducational Consultation (3) Use of two and three-person model in consultation in educational and therapeutic settings based on behavioral, ecological, social learning and cognitive-behavioral theories. Prereq: 541. F,Su

546 Practicum in Consultation (2) Application of consulting skills to educational settings. Coreq: 545. Sp,Su

549 Internship in School Psychology (1-6) Supervised employment in departmentally approved school psychology internship sites. Prereq: Enrollment in school psychology program and consent of instructor. May be repeated. Maximum 12 hrs. Same as Psychology 549. S/NC only. E F

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

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

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

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

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

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

556 Seminar in Community Agency Counseling (1) Orientation to professional organizations, code of ethics, certification requirements, and role identity of community agency counselors. May be repeated. Maximum 2 hrs. E

558 Internship in School Counseling (1-6) Supervised postpracticum employment at departmentally approved site. Prereq: 550 and consent of instructor. May be repeated. Maximum 12 hrs. S/NC only. E

559 Internship in Community Agency Counseling (1-6) Supervised postpracticum employment at departmentally approved human services agency. Prereq: Admission to community agency program, 555 and consent of instructor. May be repeated. Maximum 12 hrs. S/NC only. E

560 Models of Classroom Discipline (3) Applications of major models of discipline in development of constructive atmospheres for classroom learning. Sp,Su

566 Approaches to Family Intervention and Counseling (3) (Same as Child and Family Studies 566.)

570 Cross-Cultural Counseling: Theory and Research (3) Theory and research on issues and problems in counseling of clients from different cultural backgrounds in U.S. and abroad. Sp

585 Seminar in Gerontology (1) (Same as Human Ecology 585, Nursing 585, Public Health 585, Physical Education 585, and Social Work 585.)

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

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

602 Directed Research (1-3) Instructor- or student-initiated group investigation of empirical and theoretical problems in educational and counseling psychology. May be repeated. Maximum 12 hrs. S/NC only. E

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

625 Advanced Study in Personality (3) Theory, research and conceptual analysis of studies with application to education and counseling. Prereq: 431 or equivalent. Sp

635 Ethical, Legal, and Professional Issues in Psychology (3) Research, human services, teaching and public policy. Prereq: Admission to doctoral program in psychology, or consent of instructor. (Same as Psychology 638.) Sp

649 Advanced Internship in School Psychology (1-9) Supervised experience as school psychologist in departmentally-approved internship site for doctoral level students. Prereq: Enrollment in doctoral level school psychology program and consent of instructor. May be repeated. Maximum 9 hrs. S/NC only. E

650 Seminar in Counselor Education (1) Professional issues related to role and function of counselor educator. Prereq: Admission to doctoral program in counselor education. May be repeated. Maximum 2 hrs. F

655 Practicum in Counselor Education (3) Supervised practice and application of counseling skills with clients. Prereq: Admission to counselor education program and consent of instructor. May be repeated. Maximum 6 hrs. E

659 Internship in Counselor Education (1-6) Supervised employment in departmentally approved internship sites in counselor education. May be repeated. Maximum 12 hrs. S/NC only. E

660 Seminar in Educational Psychology (1) Major professional issues, role and scope of educational psychology as field of study and practice. Prereq: Admission to doctoral program in educational psychology. May be repeated. Maximum 2 hrs. S/NC only. E

661 Educational Implications of Neuropsychology (3) Educational implications of neuropsychological bases of students' cognition, behavior, and emotions. Prereq: 515 and 516, or consent of instructor. Sp


663 Scale Construction (3) Development, pilot testing, and revision of attitude inventories, rating scales, and other types of instruments for base level constructs. Prereq: 525, and two-course sequence in statistical analysis. F

674 Practicum in Counseling Psychology (3) Supervised practice of individual counseling. Minimum 135 clock hrs required each semester. Prereq: Admission to counseling psychology doctoral program, 555, and consent of instructor. May be repeated. Maximum 6 hrs. E

678 Theory and Practice of Counseling Supervision (3) Theory and practice of supervision in counseling. Prereq: 655, or 674, or consent of instructor. S/NC only. Sp

679 Internship in Counseling Psychology (1-6) Supervised employment in departmentally approved counseling psychology internship sites. Prereq: Admission to counseling psychology doctoral program and consent of instructor. May be repeated. Maximum 12 hrs. S/NC only. E

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

Educational Leadership (College of Education)

MAJORS

DEGREES

College Student Personnel .......... M.S., Ed.S., Ed.D. Education .......... Ph.D.

Mary Jane Connolly, Head

Professors:

Coffield, William H. (Emeritus), Ph.D., Iowa
Goddard, Joseph P., Ed.D............. Tennessee
Harris, G. W., Jr., Ph.D.............. Michigan
Hyde, R. A. (Adjunct), Ed.D........... Tennessee
McMinn, Malcolm C., Jr., Ph.D. Florida State
Associate Professors:
- Trusty, Francis M., Ed.D. (Stanford)
- Stollar, Dewey H. (Emeritus)
- Pettibone, Tim J., Ph.D. (New Mexico State)

Assistant Professors:
- Quarles, Dan R., Ed.D. (Tennessee)
- Mertz, Norma T., Ed.D. (Columbia)
- Husen, Peter M., Ed.D. (Stanford)
- Connelly, Mary Jane, Ed.D. (VPI)
- Roney, Robert K., Ed.D. (Tennessee)
- Bowles, J. K. (Adjunct), Ed.D. (Tennessee)
- Grubbs, James J., M.S. (Indiana State)

The Department of Educational Leadership offers graduate programs leading to the Master of Science with majors in Educational Administration and Supervision and in College Student Personnel (higher education), the Master of Arts in the Doctor of Education with a major in Educational Administration and Supervision, and the Doctor of Philosophy with a major in Educational Administration and Supervision, and the Doctor of Philosophy with a major in Educational Leadership.

Requirements include an interview with a minimum of 18 hours in the major. An internship is highly recommended but not required. A written comprehensive examination is given as well as an oral exam over the thesis.

Non-Thesis Option
A minimum of 60 hours beyond the baccalaureate degree including 6 hours of Educational Administration and Supervision 518 is required. Six hours must be in a cognate area within the college and 6 hours outside the college. An internship is highly recommended but not required. A written comprehensive examination is given as well as an oral exam over the problem papers.

THE DOCTORAL PROGRAM
For the Ed.D. program, the minimum hours are determined by the student's doctoral committee. Six to 9 hours must be in a cognate area within the college and 6-9 hours outside the college. The student must complete a major's degree in a field outside the College of Education. Three consecutive semesters of 604 must be taken during residency. An internship is highly recommended but not required. A foreign language requirement is at the discretion of the committee. A written comprehensive examination is given as well as an oral exam over the dissertation.

THE MASTER'S PROGRAM IN EDUCATIONAL ADMINISTRATION AND SUPERVISION

Thesis Option
A minimum of 33 credit hours including 6 hours of Thesis 500 is required. A major consists of a minimum of 18 hours. An internship is highly recommended but not required. A final oral examination is required with a written exam at the option of the committee.

Non-Thesis Option
A minimum of 36 credit hours is required with a minimum of 18 hours in the major. An internship is highly recommended but not required. A final written comprehensive examination is required with an oral exam at the option of the committee.

THE MASTER'S PROGRAM IN COLLEGE STUDENT PERSONNEL

This program is designed for individuals interested in entering the field of student personnel administration in colleges and universities and in community or junior colleges. The program offers both a thesis and non-thesis option. A minimum of 39 hours, which includes 6 hours of practicum experience, is required in either option.

Students entering any of the M.S. options are advised to first complete the introductory core consisting of Educational Administration and Supervision 513, 515, 516, and 535 or a demonstrated computer proficiency. The courses are prerequisites to other courses in the department.

THE EDUCATIONAL SPECIALIST PROGRAM

Thesis Option
A minimum of 60 hours beyond the baccalaureate degree including 6 hours of Educational Administration and Supervision 518 is required. Six hours must be in a cognate area within the college and 6 hours outside the college. An internship is highly recommended but not required. A written comprehensive examination is given as well as an oral exam over the thesis.

Non-Thesis Option
A minimum of 60 hours beyond the baccalaureate degree including 6 hours of Educational Administration and Supervision 503 is required. Six hours must be in a cognate area within the college and 6 hours outside the college. An internship is highly recommended but not required. A written comprehensive examination is given as well as an oral exam over the problem papers.

THE DOCTORAL PROGRAM
For the Ed.D. program, the minimum hours are determined by the student's doctoral committee. Six to 9 hours must be in a cognate area within the college and 6-9 hours outside the college. The student must complete a major's degree in a field outside the College of Education. Three consecutive semesters of 604 must be taken during residency. An internship is highly recommended but not required. A foreign language requirement is at the discretion of the committee. A written comprehensive examination is given as well as an oral exam over the dissertation.

THE GRADUATE PROGRAM

Graduate Courses

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

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

503 Problems in Lieu of Thesis (3-5) May be repeated. S/NC only. E

513 Administrative and Organizational Theory in Education (3) Introduces students to the theoretical, administrative and organizational foundations of management and leadership of educational programs and institutions. F,S

515 Human Relations and Communication in Administration (3) Describes the use of effective interpersonal communication skills and channels, intergroup relations, supportive work climates, personal motivation, conflict management skills, and role of values, attitudes, and expectations in administration. F,S

516 Research for School Administrators (3) Descriptive, experimental, and quasi-experimental designs to help students without quantitative backgrounds to read and understand technical professional literature. Introduction to inferential statistics, needs assessments, and evaluation procedures. Sp,S

518 Educational Specialist Research and Thesis (3) May be repeated. Maximum 6 hrs. P/NP only. E

529 Politics of Education and Educational Environment (3) School/community and political context of modern, complex society. Administrator and supervisory competencies: political, social, ethnic, cultural, and racial environments in which schools operate. Prereq: M.S. introductory core or consent of instructor. F,S

535 Administrative Applications of Micro Computers (3) DOS, word processing, data based management, spreadsheets, and computer communications. Review and development of specific administrative applications: scheduling, attendance, student record systems, and accounting. F,S

544 School Finance and Business Management (3) For prospective building level administrators. Financial and logical management tasks and procedures in individual school setting. Prereq: M.S. Introductory core or consent of instructor. F,S

547 Educational Facility Planning (3) Concepts and skills for development, evaluation, construction, renovation, maintenance, and operations of quality educational environments and facilities. Prereq: M.S. Introductory core or consent of instructor. Sp,S

548 Introductory Supervision and Personnel (3) Basic supervisory and personnel concepts and related competencies; building (or micro-organizational) level; interviewing, personnel planning, collecting and maintaining employee information, teacher evaluation, and non-instructional personnel, clinical supervision, staff evaluation, and staff development. Prereq: Introductory M.S. core or consent of instructor. Sp,S

553 Strategies of Educational Planning (3) Processes for improving decision-making function through use of both quantitative and qualitative planning techniques. Policy analysis, CPM, PERT, Delphi. Prereq: Introductory M.S. core or consent of instructor. F,S

554 School Law (3) Logical arrangement of case and statutory materials for public school administrators and teachers; problems concerning law and public education. Prereq: M.S. Introductory core or consent of instructor. Sp,S

580 Internship in Educational Administration (3) Field experience in appropriate educational setting working directly with administrator. At end of planned program of study. Placement by department assignment. Some on-campus classes in conjunction with 583 or 582. Prereq: 21 hrs in educational administration and supervision or consent of instructor. E

582 Educational Leadership and District-Level (3) Role of central administrative team; relationships, behaviors, concepts and competencies for development and maintaining effective school organization. At end of planned program of study. Prereq: 21 hrs in educational administration and supervision or consent of instructor. F,S
583 Educational Leadership — Principalship (3) Knowledge, skills and relationships for principal to be effective instructional leader. Simulation materials and field-based activities. Culminating course with internship and problems paper. At end of planned program of study. Prereq: 21 hrs in educational administration and supervision or consent of instructor. F,Sp

590 Special Topics (3) May be repeated. E

592 Field Problems in Educational Administration and Supervision (3) Topic to be assigned. May be repeated. S/NC or letter grade. E

593 Independent Study in Educational Administration (3) Prereq: Consent of instructor. May be repeated. E

595 Elementary Principals Seminar (1-3) For in-service training of elementary school administrators. Developments, problems, programs, and trends of elementary schools and management skills of elementary school administrators. Prereq: Presently elementary school administrator or consent of instructor. May be repeated. S/NC or letter grade. F,Sp

596 Middle School Principals Seminar (1-3) For in-service training of middle school administrators. Developments, problems, programs, and trends of middle schools and management skills of middle school administrators. Prereq: Presently middle school administrator or consent of instructor. May be repeated. S/NC or letter grade. F,Sp

597 Secondary Administrator Seminar (1-3) For in-service training of secondary school administrators. Developments, problems, programs, and trends of secondary schools and management skills of secondary school administrators. Prereq: Presently secondary school administrator or consent of instructor. May be repeated. S/NC or letter grade. F,Sp

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

601 Seminar in Educational Administration and Supervision (1) Current educational issues, problems, and research. Required two consecutive semesters during doctoral residency. May be repeated. S/NC only. E

610 Internship in Educational Administration (3) Opportunity for doctoral students and advanced graduate students to gain experience in performance of critical tasks of educational administration under supervision of practitioner and University representative. May be repeated at discretion of student's committee. Maximum 12 hrs. S/NC only. E

611 Current Issues in Educational Administration (1-4) Critical discussions concerning school administrators, selected each semester and presented by specialist. Prereq: Presently school supervisor or administrator, or consent of instructor. May be repeated. S/NC or letter grade. E

614 Statistical Methods for School Administrators (3) Statistical methods through parametric and non-parametric statistical techniques used in research in educational settings. F

615 Research Designs (3) Statistical methods through multi-variate techniques and applications to various research designs. Prereq: 614 or consent of instructor. Sp


622 Programs for the Professional Preparation of Educational Administrators and Supervisors (3) Exploring designs and methodology for training school administrators at both pre-service and in-service levels. F

629 Seminar in Politics of Education (3) Political theories and practices as they affect operation of public school systems and higher educational institutions. Interdisciplinary discussions of community power structures and special interest groups, based on literature and research from education, sociology, and political science. Prereq: 529, 516 or equivalent or consent of instructor. F

638 Advanced Supervision (3) Supervision at district level: roles, responsibilities, and operations: goal development, instructional supervision, school improvement, curriculum development, program evaluation, and personnel evaluation. Prereq: 548 or consent of instructor. F,Su

644 Educational Finance and Business Management (3) Contemporary educational finance policies and their influence upon education, nation and citizen. Supervintendency team concept, management of school logistical services. Prereq: 544 or consent of instructor. F,Su

645 Research Designs (3) Contemporary educational research policies and their influence upon education, nation and citizen. Supervintendency team concept, management of school logistical services. Prereq: 544 or consent of instructor. F,Su

646 School Personnel Administration (3) Personal administration functions for professional and supporting staff in educational organizations. Recruitment, selection, placement, personnel policies, employee wage and salary administration, fringe benefits, collective negotiations, human relations, staff development, and staff evaluation. Prereq: 548 or consent of instructor. F,Su

653 Seminar in Educational Planning Methods (3) Exploration of alternative futures and advanced planning methodology. Sophisticated planning/forecasting techniques. Prereq: 553 or consent of instructor. F,Su

655 State-Federal Relations in Education (3) Interrelationships of federal, state, and local responsibilities and organization for education by analysis of traditional, legal, fiscal and functional aspects of educational partnership. Prereq: Consent of instructor. F,Su

656 Legal Foundations of Public Education (3) School law; constitutional foundations as they relate to public education at state and local levels. F,Su

658 Conflict Management (3) Social conflict and its management. Causes of interpersonal, intergroup, and organizational conflict, skills and strategies used to manage conflict, conflict management models associated with different sectors of human activity, and current organizational practices for managing destructive conflict. F

680 Administration of Complex Organizations (3) Concepts and theoretical formulations to understand, analyze, evaluate, and change complex educational programs and organizations. Prereq: 513 or consent of instructor. Sp,Su

687 Seminar in Educational Facility Planning (3) Concepts and techniques for evaluating educational facilities, conducting comprehensive school surveys, and developing educational specifications. Prereq: 547 or consent of instructor. Sp

690 Specialized Seminar (3) Prereq: Consent of instructor. May be repeated. E

693 Independent Study (3) Prereq: Consent of instructor. May be repeated. S/NC or letter grade. E

Electrical and Computer Engineering (College of Engineering)
Admission Requirements

Students applying for admission to the Master of Science program and who hold a B.S. in Electrical Engineering are considered for admission on an individual basis. The minimum expectation is an undergraduate cumulative grade-point average of 3.0 out of 4.0 and a GPA of 3.0 for the senior year.

Students who hold the B.S. or B.A. in a field other than electrical engineering are also expected to have a minimum cumulative grade-point average of 3.0 and a minimum senior year average of 3.0 in that field. These students should also have a background equivalent to that obtained by earning credit with a minimum 3.0 grade-point average in the Electrical Engineering courses normally taken at the 200 and 300 levels in the Bachelor's program in this department, and two 400-level courses in the student's major area of concentration in the Master's program. Students from fields other than electrical engineering who have met the admission standards except for this background will be admitted only as non-degree students until they have completed coursework to provide this background.

Master's Degree Requirements

Specific degree requirements which must be met include:

1. Electrical and Computer Engineering 503 and 504. Six semester hours of graduate credit in mathematics consisting of mathematics courses of 400 level or higher which have been approved by the ECE Graduate Committee.

2. A minimum of 48 semester hours of 500-level work in one area of electrical and computer engineering courses and 6 semester hours of 500-level work in another area approved by the student's Master's committee.

3. Master's thesis, totaling 6 semester hours or more.

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

DOCTORAL PROGRAM

The Ph.D. with a major in Electrical Engineering may be pursued in the concentration areas of circuit theory, computers, electromagnetics, communication theory, control, plasma engineering, power systems, solid-state electronics, and computer systems. Applicants must submit scores on the General Graduate Record Exam. Specific departmental requirements for the Ph.D. include the following:

1. A Master of Science or Master of Engineering degree.

2. A student must complete 48 semester hours of coursework beyond the B.S. excluding thesis, research, and dissertation credit.

   a. A minimum of 24 semester hours of work in electrical and computer engineering courses at the 500 and 600 levels.

   b. A minimum of 9 semester hours of 600-level coursework. At least 3 semester hours of this work must be in an area other than the student major area.

   c. A minimum of 12 hours of mathematics courses approved by the Electrical and Computer Engineering Graduate Committee. All 12 hours must be 500-level or above, and at least 6 hours must be in 600-level coursework.

3. One foreign language if the student's faculty committee feels that a reading knowledge of a foreign language is crucial to the student's research efforts.

4. Satisfactory performance on both a qualifying and comprehensive examination. The qualifying examination is prepared by the department faculty and consists of a 3-hour written examination in the student's major area, a 2-hour written examination in a related area, and an oral examination. The comprehensive examination is normally taken after the completion of 24 hours of graduate coursework or immediately after completion of the Master's degree. A minimum of 16 hours of graduate coursework must be completed after the student has taken the qualifying examination the first time.

The comprehensive examination is prepared by the student's doctoral committee and consists of a 3-hour written examination in the student's major area, a 2-hour written examination in a related area, and an oral examination. The comprehensive examination is normally taken after the completion of 24 hours of graduate coursework or immediately after completion of the Master's degree. A minimum of 16 hours of graduate coursework must be completed after the student has taken the qualifying examination the first time.

The comprehensive examination is prepared by the student's doctoral committee and consists of a 3-hour written examination in the student's major area, a 2-hour written examination in a related area, and an oral examination. The comprehensive examination is normally taken after the completion of 24 hours of graduate coursework or immediately after completion of the Master's degree. A minimum of 16 hours of graduate coursework must be completed after the student has taken the qualifying examination the first time.

The comprehensive examination is prepared by the student's doctoral committee and consists of a 3-hour written examination in the student's major area, a 2-hour written examination in a related area, and an oral examination. The comprehensive examination is normally taken after the completion of 24 hours of graduate coursework or immediately after completion of the Master's degree. A minimum of 16 hours of graduate coursework must be completed after the student has taken the qualifying examination the first time.

5. Participation in departmental seminars.


Many of the electrical and computer engineering courses are offered in the evening. Engineers working in industry are encouraged to participate in the department's graduate program. Departmental graduate programs are also available at the Space Institute, Tullahoma.

Departmental actions regarding a graduate student may be appealed in writing, first to the Department Graduate Committee and then to the Department Faculty.

GRADUATE COURSES

Courses required in the Electrical and Computer Engineering undergraduate curriculum cannot be used in either the M.S. or Ph.D. programs. No 400-level course may be used toward a graduate degree in Electrical and Computer Engineering except when required by the program.


413 Passive and Active Network Synthesis (3) Review of network analysis techniques, passive network driv- ing source synthesis, transfer function synthesis, approximation theory, topics in active network syn-

421 Power Systems (3) Bulk power system planning and
control, reliability; system stability. Prereq. 322.

422 Machines (3) Dynamic behavior of rotating machines: transfer functions and for common modern operation of d.c. machines; response to different
waveforms in supply; describing equations for a.c. machines and their numerical solutions. Prereq. 322.
Coreq: 426.

423 Power Electronics (3) Principles and character-
istics of power semiconductor devices, single- phase and polyphase phase-controlled converters, converter circuits, general controller, voltage-fed invert-
er and dc-dc converter principles, industry applications.
Prereq: Energy system components and electronic circuits.

424 Direct Electrical Energy Conversion (3) Princi-
pies and practices of energy conversion devices and
interfacing them to loads. Photovoltaics, thermoelec-

426 Machines Lab (1) Experiments and projects
demonstrating machine concepts. Coreq. 422.

429 Power Electronics Lab (1) Experiments and projects
demonstrating power electronics.

431 Digital and Analog Integrated Electronics (3) Basic concepts and applications of digital and ana-
sitive components for monolithic integrated circuits; characteristics of bipolar, MOS and JFET transis-
tors; integrated circuits for control applications; standard digital logic circuits including TTL, ECL, Schottky, NMOS, CMOS, and GaAs gates and arrays; design concepts for op-amps, comparators, refer-

432 Analog Signal Processing Electronics (3) Trans-
dercer signal and interfacing characteristics; analog inte-
grator circuits; general controller, voltage-fed invert-
er and d-c converter principles, industry applications.

433 Electronic Amplifiers (3) Feedback amplifier prin-
ciples; wideband linear amplifier design; radio frequency and audio power amplifier design; linear regulated power supply design; oscillator principles. Prereq. 332. Coreq. 436.

435 Digital and Analog Integrated Electronics Lab-
atory (1) Experiments and projects demonstrating
electronics. Coreq. 431.

436 Analog Signal Processing Electronics Labora-
tory (1) Experiments and projects demonstrating
electronics. Coreq. 432.

439 Electronic Amplifiers Laboratory (1) Experi-
ments and projects demonstrating electronic amplifiers. Coreq. 433.

441 Communication Systems II (3) Continuation of 342. Probability, random variables, and random processes as applied to communication systems. Analog modulation in presence of noise. Digital communica-
tion concepts: binary and M-ary signaling, synchronization, multipath, and equalization. Digital communications in presence of noise and matched filtering. Information and coding theory. Prereq: Com-
munication Systems.

442 Antennas and Propagation (3) Linear antennas, arrays, other simple antennas. Antenna gain, imped-
ance, radiation patterns. Wave propagation in earth bound free space, earth's troposphere and ionosphere. Reflections from earth; effects on link reliability. Prereq. 342.

443 Microwave Circuits and Electromagnetics (3) Scat-
terred wave description of circuits: isolators and
amplifiers, couplers and power dividers, circulators, phase shifters. Transmission line and interaction of sys-
tem. Power generation and amplification by vacuum

444 Electro-Acoustics (3) Wave equation for sound, radiation from pistons, impedance of piston. Loud
speakers, horns, speaker systems, phonograph record-
and reproducing, feedback and power amplifiers, noise reducing systems, digital recording. Prereq: 312, 342.

449 Microwave Circuits and Electronics Laboratory (1) Experiments and projects demonstrating micro-
wave circuit and electronics. Coreq. 443.

451 Microprocessors in Computer Engineering (3) Project-oriented course using microcomputer kit having
monitor program and development system with cross-
assembler, file manager, and simulation capability.
Interfacing and hardware/software trade-offs in
interrrupt driven applications. Term grade dependent on number of projects completed, homework solu-

452 Organization and Design of Digital Systems and
Computers (3) Considerations for hardware organi-
zation of computer and digital systems. ALU and CPU
structures, control unit organization, storage sys-
tems, and instruction set. Introduction to micro-

453 Data Acquisition Systems (3) Digital-to-analog
conversion techniques; sampled analog to digital con-
version; analog-to-digital conversion techniques; op-
ion loop systems; matrix converters; closed loop systems; dual slope and successive approxima-
tion; error analysis of A/D converters; accuracy,
linearity, drift, dynamic range, frequency response, gain, and shielding; automated testing of A/D and D/A con-
verters; device service routines; signature analysis.

454 Open System Interconnection Reference Model
Protocol (3) Computer networks designed and man-
aged in accordance with the ISO OSI reference model.
MAP and Internal and External ISDN standards; Draft
International Standards of Working Papers; IEEE
standards, MAP Specification and TOP Specification. Lab work on experimental MAP network and
programming in C language. Prereq: Small Computer Systems
and understanding of C language, or consent of instruc-
tor.

455 Microprocessor Laboratory (1) Experiments and projects

456 Digital System Design Laboratory (1) Experi-

459 Data Acquisition Systems Laboratory (1) Experi-
ments and projects demonstrating digital communications. Coreq. 453.

461 Plasma Magnetohydrodynamic Engineering (3) MHD approximations; MHD models and instabilities
in static and dynamic systems; MHD in pulsed and steady-state power generation. Applications to
fusion energy, industry, and astrophysics. Prereq. 361.

462 Plasma Kinetic Theory Engineering (3) Kinetic
theory; beam-plasma system; driven waves in plasma;
transition from multiple beams to continuum; Vlasov
and Landau theory; microwave generation in plas-
as and traveling wave tubes; microwave masers in
circular geometry; gyrotrope and electron. Design of
plasma devices. Prereq. 361; 481 or consent of instruc-
tor.

463 Introduction to Fusion Energy I (3) High temperature plasma physics relevant to fusion plasmas, principles
of fusion reactors, and engineering and physics con-
straints on fusion reactors. Prereq. 361 or consent of instruc-
tor. (Same as Nuclear Engineering 463.)

464 Introduction to Fusion Energy II (3) Principles
and phenomenology of tokamak reactor, alternate
magnetohydrodynamic concepts, advanced fusion fuels,
fusion technology, plasma engineering, and fusion
reactor design studies. Design project. Prereq. 463 or
consent of instructor. (Same as Nuclear Engineering 464.)

469 Plasma Laboratory (1) Experiments and design
projects for 461, 462, and 463, 464.

471 Introduction to Pattern Recognition (3) Design
of learning and adaptive machines. Elementary deci-
dion theory, perception algorithm, Bayes classification
rule, learning algorithms, elements of syntactic pat-
ttern recognition. Prereq: Consent of instructor.

472 Introduction to Digital Image Processing (3) Basic
techniques for digitizing, storing, processing, and
displaying images. Computational procedures for image
enhancement, restoration, coding, and segmenta-
tion. Prereq: Consent of instructor.

481 Electro-Optics I (3) Fourier optics, Diffraction lenses,
coherent and incoherent imaging. Engineering appli-
cations. Holography. Light propagation in optical
guides. Modulation by electro-optic devices. Prereq:
Consent of instructor. Coreq. 489.

482 Electro-Optics II (3) Sensitivity, resolution, fre-
quency response and noise limits for light detection
device. Optical communications channel design. Inter-
frequency. Fiber optic sensing. Stimulated emission of
radiation. Travelling-wave amplification and optical

489 Electro-Optics I Laboratory (1) Experiments and projects
demonstrating electro-optics. Coreq. 481.

494 Special Problems in Electrical Engineering (1-3)
Problems involving library and experimental research.
Prereq: Consent of instructor. May be repeated. Max-
mum 9 hrs.

495 Senior Seminar (1) Topics of interest discussed in
written and oral form. Prereq: Consent of instructor.
May be repeated. Maximum 6 hrs.

496 Electro-Optics II Laboratory (1) Experiments and
projects demonstrating electro-optics. Coreq. 482.

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

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

503 Modern Transform Methods (3) Fourier and Laplace
transform and complex variables theory. Z-
transform, difference equations and distributed param-
eter systems.

504 Random Process Theory for Engineers (3) Probabil-
ity and random variables as approached by
set theory. Statistical averages and transformations
of random variables. Random processes, stochastic pro-
cesses, correlation functions and temporal analysis, power spectra and spectral density functions as
applied to response of systems to random signals.

511 Linear Systems Theory (3) State space models
of linear dynamical systems, linear algebra, state tran-
sition map, matrix exponential, controllability, obser-
vability, realization theory, and stability theory.

512 Multivariable Linear Control System Design (3) Design
of controllers, for multivariable systems, which
satisfy constraints on robustness to plant uncertain-
ties, disturbance rejection, command following. Prereq.
511.

514 Digital Signal Processing (3) Analysis of discrete
signals, sampling theorem, digital filters, discrete Fou-
rier transform.

515 Adaptive Control and System Identification (2)
Adaptive control of linear deterministic and stochas-
tic systems. Adaptive learning algorithms, parameter
estimation for deterministic and stochastic systems.
Prereq: 511-12 or 518-19.

516 Passive and Active Network Analysis and Syn-
thesis I (3) Frequency and time domain techniques
for network analysis, approximation theory, network

517 Passive and Active Network Analysis and Syn-
thesis II (3) Frequency and time domain tech-
niques for network analysis, approximation theory, active

519 Control Systems Design II (3) Digital control, variable structure control, state-space design of SISO systems, use of estimators and observers, comparison of classical and state-space methods of control system design, considerations for control system instrumentation. Prereq: 518.

521 Power Systems Analysis I (3) Matrix-vector representation of power systems, vectors and scalar control of interconnected power systems, transient representations of power networks, sequence modeling of power system components, unbalanced shunt and series faults. Formulating and solving problems in matrix-vector form with application to large scale power systems. Prereq: 421 or equivalent.

522 Power Systems Analysis II (3) Operation and control of interconnected power systems, transient and dynamic stability. Formulating and solving problems in matrix-vector form with application to large scale power systems. Prereq: 521.

523 Power Electronics and Drives (3) Forced commutated inverters, advanced PWM techniques, current-fed, voltage-fed, and hybrid inverters, semiconductor switches, control of induction machines, parameter variations, control principles of synchronous machine.

524 High Voltage Systems (3) Phenomena, generation, measurement, practices and insulation in high voltage substations, electric arc and arc control, shielding, reliability. Prereq. Prereq: 421.

528 Advanced Electrical Machines I (3) Fundamental processes of electromechanical energy conversion; application in conventional devices. Differential equations for rotating machinery. Prereq: 422 or equivalent.

529 Advanced Electrical Machines II (3) Park's transformation and two-axis model, transient behavior of isolated and interconnected rotating machines. Prereq: 528.

531 Advanced Analog Electronics I (3) Physical operation of modern electronic devices: semiconductor devices; diodes, bipolar transistors, J-FETs, and MOS-FETS. Small-signal equivalent circuits and noise models of active devices. Project laboratory. Prereq: 431, 432, 433, or consent of instructor.


543 Information Systems I (3) Mathematical treatment of information transmission in communication systems; modulation and demodulation; discrete and analog systems. System performance with noise and bandwidth constraints, sampling theorem. Quantization effects; digital design in real time and real frequency; digital signal processing. Prereq: 504.

544 Information Systems II (3) Wiener's theory of filtering and prediction; optimum filtering and prediction for sampled signals; extension to nonlinear systems. Design and implementation of digital radar tracking; target resolution and accuracy; low-noise receivers. Prereq: 543.

545 Introductory Microwave Networks and Components (3) Scattering and transfer representation for multipole; unilateral and bilateral microwave and millimeter wave devices. Component and system parameter measurement by modern network analyzers. Electronic oscillators and amplifiers, frequency sweep oscillators, transient time devices, parametric devices, mixers, switches.


551 Digital System Design I (3) Design considerations for combinational and sequential circuits. Iterative systems. Fault diagnostics of logic circuits.

552 Digital System Design II (3) State identification and structure realizations of sequential machines. Digital system architecture design: microprogramming and interrupt control. Prereq: 551.

561 Plasma Diagnostics I (3) Principles of active, passive, perturbing and nonperturbing diagnostic methods used in low- and high-temperature plasmas of interest in fusion research. Laboratory safety, data reduction and presentation, microcomputer data analysis and analysis, and reduction of time series data. Prereq: 461, 463, or consent of instructor. (Same as Nuclear Engineering 561.)

562 Plasma Diagnostics II (3) Laboratory instruction in operation of plasma diagnostic instruments in plasma science laboratory, experience with high voltage, vacuum, RF, and digital data handling techniques. Prereq: Prereq: 561. (Same as Nuclear Engineering 562.)

563 Plasma Engineering (3) (Same as Nuclear Engineering 563.)

564 Fusion Technology (3) (Same as Nuclear Engineering 564.)

571 Pattern Recognition (3) Decision-theoretical and structural approaches to pattern recognition, deterministic and statistical decision rules, feature extraction and representation, syntactic and semantic methods. Prereq: 471 or consent of instructor.


573 Robot Sensing (3) Design and applications of various sensors such as vision, range, proximity, force, and torque. Multi-sensor integration for robotics applications. Prereq: 572 or consent of instructor.


584 Measurement Science I (3) (Same as Nuclear Engineering 584, Chemical Engineering 584, Civil Engineering 588, Engineering Science and Mechanics 588, Mechanical Engineering 588, and Aerospace Engineering 588.)

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

598 Graduate Seminar (1-3) Topics of interest discussed in weekly seminar. May be repeated. Maximum 6 hrs.

599 Special Topics (1-3) May be repeated. Maximum 9 hrs.

600 Doctoral Research and Dissertation (3-6) P/NP only. E


612 Advanced Systems Theory (3) Game theory, dual control problem, hierarchical systems, and information structures. Prereq: 611.


614 Optimal Control (3) Deterministic and stochastic dynamic programming in continuous and discrete time, minimum principle and matrix minimum principle, computational methods in optimal control. Prereq: 611.

615 Analysis of Nonlinear Networks and Systems (3) Systematic study and analysis of nonlinear electronic circuits. Network elements and equation, linear systems, nonlinear O.D.E.'s, geometric analysis and numerical techniques. Prereq: Consent of instructor.

616 Active Network Synthesis (3) Theory and design of active analog filters and practical RC realizations. Prereq: Consent of instructor.

617 Special Topics in Systems Theory (3) Topics of current interest to students and faculty: large scale systems, model order reduction, algebraic and geometric system theories, and advanced design methods. Prereq: 503 and consent of instructor.

618 Special Topics in Systems Theory II (3) Topics of current interest to students and faculty: large scale systems, model order reduction, algebraic and geometric system theories, and advanced design methods. Prereq: 617.


623 Advanced Power Electronics and Drives (3) Phase-controlled cycloconverters, cycloconverter-fed ac drives,FACTS cycloconverters for high power applications. High frequency, high temperature, high voltage, high current devices: diodes, bipolar transistors, J-FETs, and MOS-FETS. Small-signal equivalent circuits and noise models of active devices. Project laboratory. Prereq: 431, 432, 433, or consent of instructor.

624 Advanced Topics in Linear Control Systems (3) Phase of current interest to students and faculty: large scale systems, model order reduction, algebraic and geometric system theories, and advanced design methods. Prereq: 503 and consent of instructor.


641 Electromagnetic Diffraction and Scattering (3) Diffraction of electromagnetic waves by spheres, con- ners and cylinders; ground wave propagation; modern approximate methods; scattering waves, leaky waves. Prereq: Consent of instructor.

642 Asymptotic Techniques in Wave Propagation (3) Electromagnetic waves with spatial and temporal dispersion and with applications of geometrical theory of diffraction for electromagnetic waves, supported by results from canonical approximations of geometrical optics and geometrical ray theory. Field and power flux scattering. Single scattering radiative transport in tenuous
particulate media; multiple scattering theory; coherence and modulation. Fluctuation due to turbulence; rough surface scattering. Prereq: Consent of instructor.

643 Advanced Topics in Information Science I (3) Detection, coding theory; system identification. Signals with unknown parameters; optimal filter synthesis; adaptive systems; sequential detection; suboptimal detection. Prereq: 504 or consent of instructor.

644 Advanced Topics in Information Science II (3) Structure of algebraic and probabilistic codes; linear codes, convolutional codes, error-correcting codes, decoding methods. Identification schemes: deterministic, stochastic, and hierarchical methods. Prereq: 643.

645 Advanced Topics in Microwave Networks (3) Multipath scattering and transfer representations. Narrow band and wide band synthesis of networks containing lumped and distributed components; interstage matching and response equalization. Low noise, low distortion and high power designs of amplifiers and oscillators. Prereq: Consent of instructor.

646 Advanced Topics in Microwave Networks (3) Reciprocal and nonreciprocal devices, directional devices, high frequency switches and multiplexers, optimization in distortion control. Network analyzer measurement techniques and integration of measured data with design procedures. Prereq: Consent of instructor.

651 Computer-Aided Design of VLSI Systems I (3) Fabrication of microelectronic devices; computer architecture design; algorithmic state machines; partitioning; structured design methodology. Prereq: 551-52 or consent of instructor.

652 Computer-Aided Design of VLSI Systems II (3) Computer-aided design tools; design and implementation of fully custom very large scale integrated (VLSI) circuits; design for testability; testing of fabricated chips. Prereq: 651.

663 Advanced Plasma Physics I (3) Basic concepts of high temperature plasma physics. Magnetohydrodynamics and kinetic descriptions of plasma, plasma transport, plasma waves, equilibrium, and stability. Prereq: Physics 541-42, 481-82 or 563-64, or consent of instructor. (Same as Physics 563.)

664 Advanced Plasma Physics II (3) Plasma heating and radiation phenomena. Advanced topics of current interest. Must be taken in sequence. Prereq: 663. (Same as Physics 664.)

671 Image Processing and Robotics I (3) Three-dimensional scene modeling and recognition, multisensor systems. Prereq: 572 or 573 or consent of instructor.

672 Image Processing and Robotics II (3) Stereovision, shape theory. Prereq: 671.

673 Image Processing and Robotics III (3) Time-varying imagery, path planning and navigation. Prereq: 672.

681-82 Quantum Electronics (3,3) Prereq: Consent of instructor.

691 Advanced Graduate Seminar (1) Research in department. May be repeated.

692 Special Topics (1-3) Advanced topics of current interest to Ph.D students in Electrical Engineering. May be repeated. Maximum 9 hrs.

Jerry E. Stoneking, Head

Professors:

Wasserman, J., PE, Ph.D. .......... Cincinnati Research Professor:
Moriarty, T. F., PE, Ph.D. ........... Illinois Associate Professors:
Brooks, G. N., Ph.D. ..................... Stanford

Graduate programs leading to the degrees of Master of Science and Doctor of Philosophy in Engineering Science and Mechanics are available to graduates of recognized curricula in engineering, mathematics, or one of the physical or biological sciences. Program concentrations include solid mechanics, fluid mechanics, computational mechanics, biomedical engineering, and optical engineering (UTSI only). In each of these concentrations, interdisciplinary programs are arranged to meet individual needs or interests. Each applicant is advised as to any prerequisite courses before entering a program; the student's program of study must be approved by his/her advisory committee, and must comply with the requirements of The Graduate School. The student's major professor may be selected from a department other than the Department of Engineering Science and Mechanics; however, at least one member of the student's graduate advisory committee must be on the faculty of the Department of Engineering Science and Mechanics. A departmental application is required in addition to the Graduate School application. The names and addresses of four references must be included with the departmental application.

The flexibility and interdisciplinary aspect of the program concentrations are intended to be of particular interest to prospective students currently employed in research, development, or design activities and whose interests in continuing education (either full-time or part-time) lie at one of the interfaces between science and engineering or can best be met by interdisciplinary study in engineering. The department's course offerings and research activities are also intended to meet the needs of students who seek preparation for employment in engineering areas requiring specialization in mechanics or in related interdisciplinary studies such as biomechanics.

THE MASTER'S PROGRAM

Two M.S. options are offered: option I requires a thesis, while option II does not. The second plan is restricted to those students who have had significant professional work experience. In option I, a minimum of 30 semester hours including the thesis is required. In option II, a minimum of 33 hours is required. The requirements include the following:

Hours Credit
Mathematics
Engineering courses (Major concentration may include but is not restricted to courses offered by the Engineering Science and Mechanics Department.) ...................... 12 18
Related courses (May include additional courses in mathematics, computer science, or the physical and life sciences as well as engineering courses) ............... 6 9
Thesis ................................................. 6 9

"Engineering courses under option II may include advanced laboratory work or special problem work; for example, Engineering Science and Mechanics 581 or analogous courses in other departments.

A final examination is required under both options covering graduate coursework and the thesis.

THE DOCTORAL PROGRAM

Specific departmental requirements for the Ph.D. include:
1. A minimum of 72 semester hours beyond the Bachelor's degree, exclusive of credit for the Master's thesis. These shall include a minimum of 24 semester hours in Doctoral Research and Dissertation and a minimum of 48 semester hours in other courses.
2. A minimum of 24 semester hours in engineering graduate courses, exclusive of thesis and dissertation credit. These courses will normally be numbered 500 and above, with at least 9 semester hours of 600-level courses, which constitute one or two areas of concentration selected by the student. The number of courses in this group to be taken will depend on the program selected by the student and the approval of his/her advisory committee.
3. A minimum of 12 semester hours in mathematics or computer science in courses numbered 400 and above, exclusive of a first course in ordinary differential equations.
4. A minimum of 6 semester hours of courses numbered 500 and above, offered in departments other than mathematics, computer science, and the student's major department and not included in the areas of concentration under item 2.

Engineering Science and Mechanics 85
5. Attendance and participation in graduate seminars and colloquia.

6. Two doctoral examinations must be passed to be admitted to candidacy for the Ph.D. in Engineering Mechanics.

After being admitted as a potential candidate for the Ph.D., a qualifying examination must be taken at the first offering after the student has either completed a Master's degree or has taken at least 24 semester hours of graduate credit. The purposes of qualifying examinations are:

a. To determine the qualifications of the student to continue the Ph.D. program.

b. To identify the areas of strengths and weaknesses to guide the student's graduate coursework and research.

The qualifying examination will be administered by the department's Graduate Studies Committee. The examination will be written and will cover at least four graduate level subject areas. One subject area will be mathematics, and the others will be designated by the student subject to the approval of the department's Graduate Studies Committee.

The comprehensive examination is to be taken by the student no later than 6 credit hours of completion of graduate coursework required for the Ph.D. degree. This examination is to be administered by the student's advisory committee and shall consist of both a written and an oral portion.

7. After successfully passing the qualifying and comprehensive examinations, the student must present the Ph.D. dissertation research proposal to the student's advisory committee and receive committee approval of the proposal before being admitted to candidacy for the Ph.D.

8. A final examination on the student's dissertation and related fields will be taken by the student after completion of the Ph.D. dissertation and course requirements.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UTK on an in-state tuition basis. The Ph.D. program in Engineering Science is available to residents of the state of Florida. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.

GRADUATE CREDIT FOR 400-LEVEL COURSES

Four hundred-level courses in engineering may be used for graduate credit at the discretion of the advising committee. However, at least two-thirds of minimum required credit hours in a Master's degree program must be at or above the 500 level.

GRADUATE COURSES

421 Materials of Engineering (3) Mechanical properties of engineering materials; data collection and processing; time dependent and cyclic dependent properties. Prereq: 321, Materials Science and Engineering 201. 3 hrs or 2 hrs and 1 lab.

423 Fracture-Safe Design (3) Critical review of variables and fracture toughness: part and flaw geometry, temperature, loading rate, section size, material characterization of fracture toughness by stress intensity factors, strain energy release rates, J integral, COO data, transition temperature tests; use of fracture toughness data in design. Prereq: 321 and Materials Science and Engineering 201. (Same as Materials Science and Engineering 475.) 3 hrs or 2 hrs and 1 lab.

425 Principles of Nondestructive Testing (3) Principles and theory of nondestructive testing methods; liquid penetrant, magnetic particle, eddy current, ultrasonic, acoustic emission, and radiographic methods. Prereq: 321, Materials Science and Engineering 201. (Same as Physics 475.)

431 Fundamentals of Vibration (3) Free and forced vibrations of damped and undamped lumped parametr systems; energy methods, Lagrange's equations; stability, transfer functions. Prereq: Dynamics.

435 Engineering Acoustics (3) Concepts of acoustics, measures of sound and their units; noise generation and transmission, noise control principles and application, materials and procedures for noise abatement. Prereq: Introductory course in vibrations or acoustics.

442 Fluid Mechanics II (3) Differential forms of basic laws; compressibility, isentropic flow, shocks, duct flows with shock installation; characteristics, transcritical flow, critical flow, energy methods; internal and external viscous flows, boundary layers, elementary turbulent closure models. Prereq: 341. Coreq: 231.

454 Computational Mechanics III (3) Integration of fundamental physical laws, mathematical methods and computational techniques necessary to develop engineering analysis and design capabilities. Prereq: Computational Mechanics II.

461 Experimental Stress Analysis (3) Theory, techniques, and instrumentation of resistance strain gauges; theory and techniques of brittle coating method; introduction to other strain measuring devices. Prereq: 321, Electrical and Computer Engineering 301. 2 hrs and 1 lab.

463 Photomechanics (3) Introduction to photoelasticity, photoelastic coating method, Moire' method, interferometry, and holography. Prereq: 321, Physics 232. 2 hrs and 1 lab.

465 Dynamic Data Acquisition (3) Use and calibration of instrumentation for measuring and recording dynamic events; Fourier analysis, transfer function analysis, digital signal processing, transduction, experimental parameter estimation with applications to modal vibration and failure analysis. Prereq: 321, Electrical and Computer Engineering 301. 2 hrs and 1 lab.

471 Clinical Engineering and Bioinstrumentation (3) Function and characteristics of health care delivery systems: hospital organization and health care economics; development and management principles for hospital-based clinical engineering program. Biomedical instrumentation system operational characteristics; performance of transducers, signal conditioning, data readout and storage devices; evaluation of commercially available systems, selection and procurement methods, custom-designed system, equipment maintenance and control programs for hospitals. Ethical issues and professionalism in clinical engineering. Prereq: Biomedical engineering. Introduction to Pattern Recognition.

473 Biomechanics (3) Mechanical properties of living tissues; biomechanics of injury; mechanics of prosthesis; material compatibility of prosthetic devices; biomechanical problems related to implant. Prereq: 321.

475 Design of Artificial Internal Organs (3) Design, development and evaluation of artificial internal organs; analysis of transfusion and artificial organs for design optimization; review of currently available devices, federal regulation and technical considerations. Prereq: 341, Mathematics 231.

476 Transport Phenomena in Living and Life Support Systems (3) Application of mass, momentum and heat transport theory to quantitative analysis of in vivo physiological processes and extracorporeal organ support systems. Prereq: 321 and Materials Science and Engineering 201. 3 hrs or 2 hrs and 1 lab.

494-96 Special Engineering Science Topics (3,3) Problems related to recent developments and practice. Open only to seniors or consent of instruc- tor. May be repeated. Maximum 6 hrs.

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

502 Registration for Use of Facilities (1-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E

521-22 Advanced Mechanics of Materials (3,3) Three-dimensional transformations for stress and strain, unsymmetrical bending, energy methods, thick-walled pressure vessels, beams on elastic foundation, beam columns, introduction to elementary theory of elasticity. Prereq: 322 and Mathematics 431.


536 Advanced Engineering Acoustics (3) Introduction to theory and application of acoustic analysis; vibration of continuous systems, plane and spherical waves, transmission phenomenon, radiation and scattering. Resonators, filters, absorption mechanisms, microphones, ultrasonic, sonar transducers. Prereq: 431 or 435.

539 Introduction to Continuum Mechanics (3) Cartesian tensors, transformation laws, basic continuum mechanics concepts, constitutive equations, and variational methods. Conservation laws for mass, momentum, energy, Applications in solid and fluid mechanics.

541 Fluid Dynamics I (3) Kinematic, kinetic and thermodynamic properties of fluids. Development of rate deformation laws; mass, momentum and energy conservation equations; flow transverse to solid boundaries. Applications of Euler and Navier-Stokes equations: exact solutions, potential flow, transonic, boundary layer flow and coupled heat mass transfer models. Coreq: 539.
542 Fluid Dynamics II (3) Development of basic concepts and governing equations for turbulence and turbulent field motion. Formulation for computation function, energy spectra, diffusion, introduction to turbulent transport processes, free turbulence, wall turbulence; use of engineering turbulence descriptions, basic examination of modern numerical and experimental methods. Prereq. 541.


553 Finite Element Structural Analysis (3) Finite element analysis techniques in structural mechanics and elasticity, nonlinearities. Two and three-dimensional formulations; isoparametric elements, numerical quadrature. Equation solving; substructuring, skyline solvers, matrix iteration techniques. Applications in beams, plates and shells; use of representative computer programs. Concepts of mini-computer/work station environment. Prereq. 551.

557 Computational Mechanics Seminar (1) Current developments in computational fluid/thermal structural mechanics. For departmental thesis students only. May be repeated.

559 Computational Mechanics Laboratory (1) Introduction to networked computer/engineering work station environment for CAD/graphics/engineering numerical methods. Coreq. 551.

560 Photoelasticity (3) Polarized light; basic principles of photoelasticity; experimental techniques and equipment; numerical methods in photoelastic stress analysis; three-dimensional and other special applications. Prereq. Mathematics 431. 2 hrs and 1 lab.

560 Optical Engineering I (4) Wave optics; scalar diffraction theory; introduction to Fourier optics; ray or geometric optics; lens, mirror, gratings; paraxial design methods; introduction to aberrations.

567 Optical Engineering Laboratory I (2) Laboratory in support of Optical Engineering I (566). Prereq or coreq: 566.


571 Biomechanics of Hard and Soft Tissue (3) Introduction to biology, physiology, and analytical methods for mechanics of living tissue. Continuum mechanics analysis of hard and soft issue, biological fluid flow, capillary flow, intravascular pseudos and intracerebral blood flow in micro vessels; bioviscoelasticity of fluids and solids; mechanical properties of blood vessels; skeletal, heart and smooth muscle; bone and cartilage. Research paper.


588 Measurement Science I (3) Same as Nuclear Engineering 512, Electrical Engineering 588, Civil Engineering 590, Mechanical Engineering 588. Prereq. Consent of instructor. Consent of instructor. May be repeated with consent of department.

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

621 Analysis and Design of Thin Shell Structures (3) Geometry of surfaces, derivation of thin shell theory for arbitrary shell geometry; selected applications of theory in structural engineering. Prereq. 525 or Civil Engineering 562.


624 Viscoelasticity (3) Viscoelastic constitutive relations; isothermal boundary value problems; wave propagation in viscoelastic materials; material problems; determination of viscoelastic properties. Prereq. 523 and 539 or Polymer Engineering 541.

625 Theory of Plasticity (3) Yield conditions; strain hardening to general constitutive equations; plastic potential; uniqueness theorems; extremum and variational principles. Problems in perfectly plastic solids; finite plastic deformations; piecewise linear plasticity. Applications. Prereq. 523.


641 Advanced Topics in Fluid Mechanics and Convection (3) Free and forced convection in external and internal flow, heat and mass transfer, boundary layer analysis, stability, transition, turbulence, closure models; Navier-Stokes equations, closure procedures: time- and ensemble-averaging, large scale structures; high speed flow, reacting, nonreacting, excitation, ionization. Applications in propulsion, lasers, aerodynamics. Prereq. 542.

645 Theory of Turbulence (3) Mathematical descriptions of turbulence: isotropic turbulence, energy spectra. Kolmogoroff's hypothesis, large and small eddy structure for turbulent flows; turbulent diffusion by continuous movement; applications to turbulent jets, wakes, pipe flow, and boundary layers. Prereq. 542. (Same as Aerospace Engineering 645.)

651-52 Advanced Topics in Computational Fluid Dynamics (3) Approximation theory; analysis of accuracy, convergence, and stability for smooth and nonsmooth solutions; shocks, artificial dissipation; two- and three-dimensional, compressible viscous and inviscid flows; potential; Euler and complete Navier-Stokes descriptions; mixed subsonic-supersonic flows. Algorithm constructions: finite difference, finite element, approximate factorization, flux vector splitting, finite volume; generalized coordinate and adaptive grids; steady flows including second-order turbulence closure. Thin layer and parabolic Navier-Stokes equations, multi-dimensional, turbulent and reacting flow, Computer project. Prereq. Consent of instructor. Consent of instructor. May be repeated with consent of department.

657 Computational Mechanics Seminar (1) Current developments in computational fluid/thermal/structural mechanics. For departmental thesis students only. May be repeated.

661 Advanced Photoelasticity (3) Scattered light three-dimensional photoelasticity; dynamic photoelasticity; photoplasticity and photoviscoelasticity; holographic photoelasticity. Recent developments. Prereq. 562. 2 hrs and 1 lab.

681 Advanced Topics in Engineering Mechanics (3) Advanced problems in mechanics, group or individual. Prereq. Consent of instructor. May be repeated with consent of department.

English (College of Liberal Arts)

MAJOR DEGREES

DEGREES

English

M.A., Ph.D.

Dorothea Scara, Head

Professors:

Duke

Bratton, Edward W., Ph.D... Illinois

Carroll, D. Allen, Ph.D... North Carolina

Cox, Don R., Ph.D... Missouri

Drake, Robert Y., Jr., Ph.D... Yale

Dykeman, Wilma (Adjunct), B.A.

Enssor, Allison R., Ph.D... Indiana

Finniner, Richard J. (Hodges Chair of Excellence), Ph.D... North Carolina

Fitzgerald, Mary (Adjunct), Ph.D... Princeton

Goslee, Nancy M., Ph.D... Cambridge

Kelly, Richard M. (Lindsay Young Prof.), Ph.D... Duke

Laggett, B. J. (Distinguished Prof.), Ph.D... Florida

Lofaro, Michael A., Ph.D... Maryland

Miller, R. Baxter, Ph.D... Brown

Penner, A. Richard, Ph.D... Colorado

Reese, Jack E., Ph.D... Kentucky

Sanders, Norman J. (Lindsay Young Prof.), Ph.D... Shakespeare

Schneider, Daniel (Distinguished Prof.), Ph.D... Northwestern

Scara, Dorothy M., Ph.D... North Carolina

Shurr, William (Distinguished Prof.), Ph.D... North Carolina

Trahern, Joseph B., Jr., Ph.D... Princeton

Wheeler, Thomas V., Ph.D... North Carolina

White, Jon M. (Lindsay Young Prof.), M.A... Cambridge

Instructors:

English M.A., Ph.D.

DEGREES

Associate Professors:

Burghart, Lorraine S., Ph.D... Chicago

Dumas, Bethany K., Ph.D... Arkansas

Dill, J. E., Ph.D... North Carolina

Goslee, David F., Ph.D... Yale

Hatch, George, Ph.D... Indiana

Kallet, Marilyn, Ph.D... Rutgers

Kelly, Richard M. (Lindsay Young Prof.), M.D... Texas

Maland, Charles J., Ph.D... Illinois

Robinson, Frank K., Ph.D... Michigan

Stillman, Robert, Ph.D... Pennsylvania
Assistant Professors:

Bensel-Myers, Linda D., Ph.D..............Oregon
Dunn, Allen, Ph.D......................Washington
Forte, Jeanie K., Ph.D.....................Washington
Hammontree, Patsy G., M.A..............Tennessee
Papke, Mary E., Ph.D.....................McGill
Riley, Kathryn, Ph.D........................Maryland
Samanjo, Donald, Ph.D..............North Carolina
Smith, Arthur, Ph.D.................Houston
Wallace, Ray, D.A.........................Illinois State
Zomchik, John, Ph.D......................Columbia

The Department of English offers the Master of Arts and the Doctor of Philosophy degrees with a major in English. Thesis and non-thesis options are available for the M.A. as well as a special concentration in writing.

Detailed information about the Master’s and doctoral programs, and about individual graduate courses, may be obtained by writing the Director of Graduate Studies in English, McClung Tower.

THE MASTER'S PROGRAM

Requirements

Coursework: A minimum of 24 semester hours in English beyond the B.A., to include 6 hours at the 600 level; 12 additional hours at the 500-600 level (Only 3 hours of 593 Independent Study may be applied toward the M.A.); and 6 hours for graduate credit at any level, including the 400 level. In this coursework, students must maintain at least 3.0 GPA.

Thesis Option: Written under the direction of a faculty member of the department and approved by a committee of two other faculty members. Six semester hours of credit will be given.

Non-Thesis Option: Six hours of additional courses at the 500-600 level, making a total of 30 hours of required coursework.

Language Requirement: Evidence of proficiency in one foreign language, to be fulfilled in one of the following ways:
1. Completion of the second year of a language at college level with a grade of C or better.
2. Completion of French 302 or German 332 at UTK with a grade of B or better.

THE DOCTORAL PROGRAM

Requirements

A student must successfully complete a program of study, normally 8 full semesters as outlined below, approved by the candidate’s committee or the Director of Graduate Studies in English.

Coursework: At least 57 semester hours beyond the B.A., to include at least 24 semester hours at the 600 level; at least 15 semester hours at the 500 level or above (Only 3 hours of 593 Independent Study may be applied toward the M.A. and 3 after the M.A.); a special course in teaching composition; and 15 additional hours at any level, including the 400 level. Up to 6 of these additional hours may be taken in some cog-nate field such as history, philosophy, French. These courses must be drawn from those approved for graduate credit. All other coursework must be in the English department. In this coursework, students must normally maintain a 3.5 GPA.

Dissertation: Twenty-four semester hours of dissertation. These represent the research for and writing of the dissertation. The research and dissertation will be directed by a faculty member and approved by a doctoral committee of three or four other faculty members.

Language Requirement: A language requirement met in one of the following ways:
1. Two languages approved by the Director of Graduate Studies in English. The requirement for each language may be fulfilled by (a) completion of French 302 or German 332 with a grade of B or better; (b) completion at UTK of any two courses given in the foreign language at the 400 level or above, at least one course to be at the 500 or 600 level. A minimum grade of B must be received in each course.
2. One modern language approved by the Director of Graduate Studies in English. This requirement must be fulfilled by a passing grade on the language examination given by UTK and completion of two courses given in the foreign language at the 400 level or above, at least one course to be at the 500 or 600 level. A minimum grade of B must be received in each course.
3. One modern language approved by the Director of Graduate Studies in English and intensive study of the English language. This requirement must be fulfilled by completion of (a), (b), or (c) in option 1. for one foreign language; and completion at UTK of 6 semester hours in English language courses with grades of B or better, at least three of which must be from English 508 or 509 History of the English Language. For the other 3 hours, the student may either complete the history of the language sequence or choose one other course in language taught in the Department of English at the 500 or 600 level and approved by the Director of Graduate Studies in English. These courses will not count toward the minimum number of courses for the Ph.D. and anyone electing this language option may not take the comprehensive examination in linguistics.

Examinations: (1) A 4-hour qualifying examination taken before the end of the first year of Ph.D. coursework; this examination is given three times a year, with the M.A. written examination. (2) A comprehensive written examination, which must be divided as the department directs; see the English Department graduate brochure. The comprehensive examination is given twice a year, normally in March and September. Before a student may take the comprehensive examination, he must have completed all coursework required. A student must also have met all requirements for the foreign languages before beginning the first part of the examination.

Dissertation Defense: A one-hour examination on the dissertation and other related areas.

Residence Requirement: Two consecutive semesters as a full-time student. For students not on teaching assistants, full-time consists of 9 or more hours of coursework and/or dissertation hours each semester. For students on teaching assistants, full-time consists of 6 hours of courses and/or dissertation hours and 3 hours of teaching each semester.

GRADUATE COURSES

401 Medieval Literature (3) Reading and analysis of selected medieval literary masterpieces in modern English.
402 Chaucer (3) Reading and analysis of Canterbury Tales and Troilus and Criseyde in Middle English.
404 Shakespeare I: Early Plays (3) Shakespeare’s dramatic achievement before 1601. Reading and discussion of selected plays from the early period, including Twelfth Night, English histories, including Henry IV, and early tragedy, including Hamlet.

405 Shakespeare II: Later Plays (3) Shakespeare’s dramatic achievement between 1601 and 1613. Reading and discussion of selected plays from great tragedies, including Othello; problem plays, including Measure for Measure; and tragicomedies, including The Tempest.

406 Renaissance Drama (3) English theatre between 1590 and 1640 through reading of representative plays by Shakespeare’s contemporaries: Marlowe, Webster, Jonson.

409 Spencer and his Contemporaries (3) Principal achievements in prose and poetry of the sixteenth century: authors; Spencer, Wyatt, Marlowe, More, Sidney, and Bacon.

410 Milton, Donne and their Contemporaries (3) Principal achievements in prose and poetry of the first two-thirds of the seventeenth century: poetry of Milton, Donne, Marvell, and prose of Browne, Bacon, Walton.

411 Restoration and Eighteenth-Century Poetry and Prose (3) Dryden, Swift, Pope, Johnson, and their contemporaries; major works: MacFlecknoe, Rape of the Lock, Gulliver’s Travels, and Rasselas.

412 British Drama from 1660 to 1800 (3) Playwrights from Congreve and Wycherley to Goldsmith and Sheridan; formal developments: heroic play, cynical comedy, affective tragedy, and exemplary drama.

413 The Eighteenth-Century British Novel (3) Delos to Austen.

414 Romantic Poetry and Prose I (3) Wordsworth, Coleridge, and Blake; readings from Lamb, De Quincey, and other prose writers.

415 Romantic Poetry and Prose II (3) Keats, Shelley, and Byron; readings from Hazlitt, Peacock, and other prose writers.

416 Victorian Poetry and Prose I (3) Tennyson, Pre-Raphaelites, Carlyle, Newman, and Mill.

419 Victorian Poetry and Prose II (3) Browning, Arnold, Hopkins, Hardy, Ruskin, Darwin, and Wilde.

420 The Nineteenth-Century British Novel (3) Scott to Hardy.

421 Modern British Novel (3) Lawrence, Joyce, and Woolf.

422 Women Writers in England (3) Literary consciousness and works of British women writers in the nineteenth and twentieth centuries. (Same as Women’s Studies 422.)

423 Colonial, Federal, and Early National American Literature (3)

424 American Romanticism and Transcendentalism (3)

425 American Realism and Naturalism (3)

426 Modern American Literature (3) World War I to present.

430 American Novel before 1900 (3) From earliest sentimental novels through Brown and Cooper, and major figures to 1900: Hawthorne, Melville, Stowe, Clemens, and James.


441 Southern Literature (3) Southern writing from colonial period into twentieth century: frontier humorists, local color writers, and Southern literature renaissance.

442 American Humor (3) Early nineteenth century into twentieth century: Mark Twain.

443 Topics in Black Literature (3) Contents vary: particular genres, authors, or themes from 1845 to present: Langston Hughes and Harlem Renaissance, Richard Wright and Gwendolyn Brooks, writing by Black women, international Black literature in English, and Black American autobiography.

451 Modern British and American Poetry (3) From Yeats and Frost to Auden, Stevens, and more recent poets.

452 Modern British and American Drama (3) O’Neill’s works as precursors to modern dramatists: Williams, Miller, Albee, and representatives of Black theatre. Bulins and Baraka.

453 Continental Drama (3) Selection of plays (in English translation) by major European writers through Renaissance to present: twentieth-century achievement.

454 Twentieth-Century International Novel (3) Joyce, Camus, Kafka, Nabokov.

455 Persuasive Writing (3) Persuasive strategies in both student and professional writing. Practice in mastering effective logic and emotional appeals.

456 Professional Writing (3) Principles and practices of writing for publication. Dissertation, theses, articles, and reports in science and technology. Prereq: 459 or consent of instructor.

459 Advanced Technical Writing (2) For students planning careers in industry, education, and government who need technical writing skills. Writing of definitions, process descriptions, sets of instructions, descriptions of mechanisms, recommendation reports, abstracts, proposals, and major reports. Prereq: Junior standing and consent of instructor.

460 Technical Editing (3) Editing technical material for publication. Principles of style, format, graphics, layout, and production management. Prereq: 456 and 459, or consent of instructor.

463 Advanced Poetry Writing (3) Further development of skills acquired in basic writing poetry course. Prereq: 363 or consent of instructor.

464 Advanced Fiction Writing (3) Further development of skills acquired in basic writing fiction course. Prereq: 365 or consent of instructor.

471 Sociolinguistics (3) Study of language in relation to social, cultural, and historical factors. Focuses on large-scale: tribes, nations, social groups. Prereq: 371 or 372 or Linguistics 200 or consent of instructor. (Same as Linguistics 471 and Sociology 471.)

472 American English (3) Phonological, morphological, and syntactic characteristics of major social and regional varieties of American English: origins, functions, and implications for cultural pluralism. Prereq: 371 or 372 or Linguistics 200 or consent of instructor. (Same as Linguistics 472.)

474 Teaching English as a Second or Foreign Language I (3) Grammatical structures of English: particular grammatical problems of non-native learners of English. Basic phonological structures of English. Teaching grammar and phonology to non-native speakers: contrastive analysis and other languages. Prereq: Junior standing and consent of instructor. Second year of a foreign language. (Same as Linguistics 474.)

475 Teaching English as a Second or Foreign Language II (3) Sociolinguistic theory, issues in teaching four language skills to learners of English. Materials and methods of language teaching and testing: preparation of materials. Observation of and team teaching with experienced staff member. Prereq: English 474. (Same as Linguistics 475.)


481 Studies in Folklore (3) Topics vary. May be repeated with different topic. Maximum 6 hrs.

482 Major Authors (3) Content varies. Concentrated study of at least one of most influential writers in British or American literary history: e.g., Donne, Ten- nymeyer, Jane Austen, Whittman, Faulkner, Baldwin or Lawrence.

483 Topics in Literature (3) Topics vary. May be repeated. Maximum 6 hrs.

484 Special Topics in Writing (3) Original writing integrated with reading, usually taught by professional author. Topics vary. May be repeated. Maximum 6 hrs.

485 Special Topics in Language (3) May be repeated. Maximum 6 hrs with consent of department. (Same as Linguistics 485.)

486 Special Topics in Criticism (3) Content varies. Theoretical and practical approaches to British and American literature. May be repeated with consent of department. Maximum 6 hrs.

489 Special Topics in Film (3) Content varies. Particular directors, film genres, national cinema movements, or other coherent topics. May be repeated with consent of department. Maximum 6 hrs.

500 Thesis (1-15) PrNP only. E

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

505 Teaching Freshman Composition (3) Introduction to teaching Freshman English through study of various techniques and philosophies of composition. Required of all first-year teaching associates.

506 Introduction to Literary Research (3) Critical examination of aims of English studies, preparation of English teacher, theory of literature, and methods of research: collected information, evaluation of material, and transmitting of results of scholarship.

507 Applied Criticism: The Rhetoric of Literary Forms (3) Study and application of ways in which major critics have analyzed form in poetry and prose fiction.

508 History of the English Language I (3) Phonological, morphological, and syntactic development of English language: Old and Middle English.

509 History of the English Language II (3) Phonological, morphological, and syntactic development of the English language with concentration on developments after 1500, especially in American English.

513-14 Readings in Medieval Literature (3,3) Reading and analysis of selected masterpieces of Old and Middle English literature and their Continental sources in Modern English.

520-21 Readings and Analysis in Selected Areas of Sixteenth- and Seventeenth-Century Prose, Poetry, and Drama (3,3) Content varies: genre, theme, literary movement, or other coherent emphasis.

530-31 Readings in English Literature of the Restoration and Eighteenth Century (3,3) Topics vary. Genre: poetry, prose, fiction, drama; or period: Restoration, earlier eighteenth century, later eighteenth century.

540-41 Readings in English Literature of the Nine- teenth Century I and II (3,3) Content varies: genre, theme, literary movement, or other coherent emphasis.

550-51 Readings in American Literature from the Colonial Period to the Present (3,3) Content varies: genre, theme, literary movement, or other coherent emphasis.

552 Readings in Black American Literature (3) Content varies: genre, theme, literary movement, or other coherent emphasis.

560-61 Readings in Twentieth-Century Literature (3,3) Content varies: genre, theme, literary movement, or other coherent emphasis.

580 Fiction Writing (3) Advanced fiction projects under supervision of instructor and time for independent study. Prereq: Extensive background in reading and writing fiction.

581 Colloquium in Poetry Writing (3) Major poetic project or continuation of project begun in 453. Individual consultation with instructor supplemented with classroom reading and discussion of contemporary poetry and theory. Prereq: 453 or consent of instructor.

582 Special Topics in Writing (1-3) Topics vary. May be repeated. Maximum 6 hrs. Enrollment by consent of director of graduate studies only.
583 Analysis of Technical Writing (3) Theory and practice of technical writing. Exploration of current theories of scientific, business, technical, academic, and general rhetoric. Analysis of shared elements and practice in producing such writing. Prereq: 459 or consent of instructor.

584 Rhetoric and Composition: History and Theory (3)100 developments in rhetorical theory, their origins in Plato, Aristotle, and others.

590 Topics in Critical Theory (3) Topics vary.

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

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

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

594 Film History, Rhetoric, and Analysis (3) Film as narrative art form: historical development of the film; the 'rhetoric' of film; critical approaches to film study: genre, auteur, formalist, and historical; critical analysis of individual films.

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

610 Studies in Old English Language and Literature (3) Old English grammar with readings in prose and poetry.

611 Studies in Beowulf (3) Translation and critical study of Beowulf. Prereq: English 610 or consent of instructor.

620 Studies in Medieval English Literature (3) Seminar in literature and literary genres of Medieval English literature, read in Old and Middle English. Subject matter varies from year to year.

621 Studies in Chaucer (3) Seminar in text, interpretation, and criticism of Chaucer's writings. Prereq: Previous course in Chaucer.


650 Studies in English Romanticism (3) Seminar content varies: particular literary figure or figures, genres, theme, or other coherent focus.

651-52 Studies in Victorian Literature (3,3) Seminar content varies: particular literary figure or figures, genres, theme, or other coherent focus.

660-61-62 Studies in American Literature (3,3,3) Southern literature before 1830, frontier, regionalism, women's literature, Irving, Cooper, Poe, Emerson, Thoreau, Hawthorne, Melville, Whitman, Dickinson, James, and Twain.

670-71-72 Studies in Twentieth-Century Literature (3,3,3) Seminar content varies: particular literary figure or figures, genres, theme, or other coherent focus.

680 Topics in English Language (3) May be repeated with consent of director of graduate studies. Maximum 9 hrs.

690 Special Topics (3) Content varies. History of ideas, humor, biography, autobiography, extra-literary discipline.

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**Entomology and Plant Pathology**

*College of Agriculture*

**MAJOR**

Entomology and Plant Pathology......... M.S.

Carroll J. Southards, Head

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**Professors:**

Bernard, Ernest C., Ph.D................. Georgia

Berger, Robert D., Ph.D................. New Mexico State

Hilly, James W., Ph.D................. Ohio State

Johnson, Leander F., Ph.D................. Louisiana State

Amsden, Paris L., Ph.D................. VPI

Piess, Charles D., Ph.D................. Clemson

Southards, Carroll J., Ph.D................. NC State

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**Assistant Professors:**

Grant, Jerome F., Ph.D................. Clemson

Gwinn, Kimberly D., Ph.D................. NC State

Reddick, Bradford, Ph.D................. General

Windham, Mark T., Ph.D................. NC State

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**The Department of Entomology and Plant Pathology** offers a graduate program leading to the Master of Science with a concentration in entomology or plant pathology. Students in entomology may specialize in crop entomology, medical and veterinary entomology, insect biology, insect pest management, or biological control. Students in plant pathology may specialize in fungal and stem fungus diseases, soil-borne diseases, plant nematology, or virology. For specific information, contact the department head.

**THE MASTER'S PROGRAM**

**Admission Requirements**

For admission to the M.S. degree program, a student must meet all requirements of The University of Tennessee Graduate School and have completed (1) a general botany or biology, 8 hours; (2) advanced biological sciences, 8 hours; (3) inorganic chemistry, 6-8 hours; (4) organic chemistry, 3 hours. In addition, three completed rating forms and a written statement of career goals and interest in entomology or plant pathology are required.

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**Degree Requirements**

The program requires a written thesis based on original research and the completion of a minimum of 24 hours of coursework for graduate credit, approved by the student's advisory committee. Included in the course requirements are two acceptable seminar presentations for 1 hour each. An oral final exam must be completed to the satisfaction of the advisory committee after the thesis has been completed. A minor is not required but may be selected at the option of the student. The minor will include seminar presentations for 1 hour each of graduate-level credit in the minor department. The student's committee shall include a member of the faculty from the minor department to assist in designating courses required for the minor.

**GRADUATE COURSES**

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

502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. 5/NC only. E

510 Plant Disease Fungi (4) Morphology, taxonomy, biology, and genetics of plant pathogenic fungi. Isolation and identification of plant pathogenic fungi. Prereq: 313 or consent of instructor. 2 hrs and 2 labs. F,A

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**511 Plant Disease Diagnosis (3) Diagnosis of plant diseases, disease symptoms, causal agents and control measures. Prereq: 510 or consent of instructor. 1 hr and 2 labs. Su,A**

**512 Soil-Borne Plant Diseases (3) Causal agents, host-plant-soil environment interactions, epidemiology, and control of soil-borne plant diseases. Prereq: 313. 2 hrs and 1 lab. F,A**

**515 Physiology of Plant Disease (3) Biochemical and physiological events involved in host-pathogen interactions. Mechanisms of disease resistance. Prereq: Introductory plant physiology and pathology, or consent of instructor.**

**520 Plant Parasitic Nematodes (4) Morphology, physiology, taxonomy, ecology, and management of plant parasitic nematodes, host-parasite relationships. Prereq: 6 hrs biological science or consent of instructor. 2 hrs and 2 labs. Sp,A**

**521 Plant Virology (3) Symptomatology, epidemiology, and management of virus infection; structure, morphology, replication, transmission, purification, characterization, and classification of plant viruses; serology; plant pathogenic viroids, mycoplasmas and spongplasmas. Prereq: 313 or consent of instructor. 2 hrs and 1 lab. F,A**

**525 Medical and Veterinary Entomology (3) 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: 321 or 325, or Zoology 380, or consent of instructor. 2 hrs and 1 lab. Sp,A**

**530 Integrated Pest Management (3) Principles and application of biological, cultural, genetic, behavioral, and chemical methods of control to maintain pest populations below economic threshold levels. Prereq: 321, or consent of instructor. (Same as Plant and Soil Sciences 530) 3 hrs. F,A**

**531 Special Problems in Entomology (1-3) Comprehensive individual study of current problems. May be repeated. Maximum 6 hrs. E**

**532 Special Problems in Plant Pathology (1-4) Comprehensive individual study of current problems. May be repeated. Maximum 6 hrs. E**

**533 Concentrated Study in Entomology (1-3) Selected subjects in entomology for advanced students, concentrated in time and subject matter. Prereq: 321 or Intro entomology course. May be repeated. Maximum 6 hrs. F,Sp**

**541 Seminar (1) Review of literature and current research in entomology and plant pathology. May be repeated. Maximum 3 hrs. E**

**Environmental Practice**

*(College of Veterinary Medicine)*

**MAJOR**

DEGREE

Veterinary Medicine.......................... D.V.M.

T. P. McDonald, Acting Head

**Professors:**

Farkas, W. R., Ph.D.......................... Duke

Kitchen, Hyram, D.V.M., Ph.D................. Florida

McDonald, T. P., Ph.D................. Tennessee

Oliver, J. W., D.V.M., Ph.D................. Purdue

**Associate Professors:**

New, J. C., D.V.M.......................... Texas A&M
Schroeder, E. C., D.V.M. ..........Michigan State
Assistant Professors:
Frazier, D., D.V.M., Ph.D.................NC State
Lothrop, C. D., D.V.M., Ph.D..........Tennessee
Morris, P. J., D.V.M. .................California (Davis)
Clinical Associate:
Funk, R. S., D.V.M...........Ohio State
See Veterinary Medicine for program description.

GRADUATE COURSES
500 Thesis (1-15) P/NP only. E
501 Special Topics in Environmental Medicine (1-3) A
Aberant metabolism, pharmacokinetic studies, tox-
ico-kinetic studies, epidemiology and techniques in
molecular biology: atomic absorption, gas chroma-
tography, ultra centrifugation, extractive techniques and
radioimmunocassay. Prereq: Consent of instructor. May be
repeated. Maximum 6 hrs. E
502 Registration for Use of Facilities (3-15) Required
for the student not otherwise registered during any
semester when student uses University facilities and/or
faculty time before degree is completed. May not be
used toward degree requirements. May be repeat-
ed. S/NC only. E
503 In Vitro Evaluation of Toxicity (3) Principles and
techniques of in vitro evaluation of toxicity, mutagen-
esis, carcinogenesis, and teratogenesis. Prereq: Biochemistry
501 and consent of instructor. Sp,A
504 Experimental Animal Surgery (3) Competence in
performing humane surgical modifications of experi-
mental animals. Techniques of anesthesia. Drug
administration and postoperative care. Prereq: Embry-
ology, parasitology, physiology and/or consent of
instructor. 1 hr and 2 labs. F
561 Pharmacology (4) Principles of pharmacokinet-
ic and pharmacodynamics properties of drugs: mode of
action, pharmacologic effects, chemical and physical
properties, metabolism, toxicities, important idiosyn-
crasies and clinical applications. Prereq: Consent
of instructor. F
600 Doctoral Research and Dissertation (3-15) P/NP
only. E
610 Advanced Topics in Environmental Medicine
(1-3) Current and future research methodology, lab-
oratory situation, recent advances in instrumentation in
analytical techniques for environmental medicine. Prereq: Consent of instructor. May be repeated. Maximum
6 hrs. E

Finance
(College of Business Administration)

MAJOR DEGREES
Business Administration..........MBA, Ph.D.
Harold A. Black, Head

Professors:
Black, Harold A., Ph.D..........Ohio State
Dotterweich, William W. (Wm. Voight Prot.), Ph.D........Pennsylvania
Goolsby, G. C., Ph.D........Wisconsin (Milwaukee)
Hilliard, Jimmy E. (Clayton Prof of
Excellence), Ph.D........Tennessee
Philippatos, G. C. (Distinguished Prof.), Ph.D........New York
Shrieve, Ronald E. (Faculty Scholar), Ph.D........UCLA

Associate Professors:
Auxier, A. L., Ph.D........Iowa
Boehm, T. P., Ph.D..........Washington (St. Louis)
Wachowicz, J. M., Jr., CPA, Ph.D........Illinois
Wansley, James, W., Ph.D..........South Carolina

Assistant Professors:
Daves, Phillip R., Ph.D........North Carolina
Ehrhardt, M. C., Ph.D........Georgia Tech
Ketcham, D. C., Ph.D........Penn State
Trimble, J. L., Ph.D........Texas A&M

BUSINESS ADMINISTRATION CONCENTRATIONS
For complete listing of MBA and Ph.D. program requirements, see Business Admin-
istration.

MBA Concentration:
Ph.D. Concentration:

Minimum course requirements are three courses; Finance 521, plus two courses from the following: 511, 512, 522, 531, 532, 581, or 582. A fourth finance course of the stu-
dent's choice is strongly advised. Courses selected must be approved by the Finance
Department MBA advisor.

Graduate courses are finance seminars 641, 642, 651, 652.

GRADUATE COURSES
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or
faculty time before degree is completed. May not be
used toward degree requirements. May be repeat-
ed. S/NC only. E
511 Contemporary Issues in Corporate Finance (3) Selected topics in financial management, recent devel-

521 Investment Analysis (3) Principles and concepts of asset valuation in competitive and efficient financial markets. Basics of investment analysis of various financial

522 Portfolio Analysis and Management (3) Portfolio theory and evidence of behavior of security returns with view to determining rational investment policy. Statistical
531 Financial Markets (3) Interest rate determina-
532 Financial Institutions (3) Analysis of manage-
ment policies of financial institutions: asset, liability and capital management. Legal, economic and regu-
atory environment and institutions for management. Financial institution structure and competition and chang-

551 Financial Management of a New Enterprise (3) Financial issues associated with formation, control, and long-term planning of new enterprise. Acquisi-
tion of venture capital. Prereq: 501.
581 Real Estate Investment Analysis (3) Valuation,
financial analysis, and investment in income-produc-
ing properties. Tax aspects of acquisition, operation, and sale. Syndication and financing methods. Use of
computer models for discounted cash flow and mort-
582 Real Estate Finance and Urban Development
Economic analysis of determination of urban land
and urban development. Prereq: 501.
599 Special Topics in Finance (3) Topics vary. Prereq:
600 Doctoral Research and Dissertation (3-15) P/NP
only. E
641 Seminar in Finance I: Capital Markets (3) Capital
markets, capital market imperfections, and market
dynamics. Interest rate theory and term structure of
interest rates. Utility theory, state preference theory,
mean-variance, capital asset pricing, efficient set the-
ores, interest rate theory, financial market micro
structure.

642 Seminar in Finance II: Theory of the Firm (3) Financial theory of firm and financial decision making
under conditions of uncertainty, equilibrium models of
firm. Option pricing, agency theory, capital struc-
ture, economics of information, and dividend policy.

651 Advanced Seminar in Finance I (3) Recent
theoretical and empirical developments in finance lit-
erature. Intertemporal asset pricing, signaling, arbitrage
pricing theory, international finance.
652 Advanced Seminar in Finance II (3) Recent theo-
retical and empirical developments in finance literature.
Market structure, theory of intermediation, structure of
interest rates.

Food Technology and Science
(College of Agriculture)

MAJOR DEGREES
Food Technology and Science .......M.S., Ph.D.
Hugh O. Jaynes, Head

Professors:
Collins, J. L., Ph.D........Maryland
Johannes, H. O., Ph.D........Michigan State
Melton, S. L., Ph.D........Tennessee
Miles, J. T. (Emeritus), Ph.D........Wisconsin
Overcast, W. W. (Emeritus), Ph.D., Iowa State
Penfield, M. P., Ph.D........Tennessee

Associate Professors:
Davidson, P. M., Ph.D..........Washington State
Draughon, F. A., Ph.D........Georgia
Loveday, H. D., Ph.D........Kansas State
Mount, J. R., Ph.D........Ohio State
Riemann, M. J., Ph.D........Kansas State

Assistant Professors:
Bliswal, R. N., Ph.D........Massachusetts
Christen, G. E., Ph.D........Missouri

The Department of Food Technology and Science offers the Master of Science and
Doctor of Philosophy degrees. Students in
that includes a defense of the dissertation to admission to candidacy. Major professors recommend appropriate courses for admission. Scores on the GRE aptitude test are also required.

2. A dissertation is required for the Ph.D. degree. Each student must develop a detailed written plan for the dissertation research. A minimum of 72 hours beyond the Bachelor's degree, excluding credit for the Master's thesis, is required. Major professors are expected to attend this course and participate in discussions during their Master's program. Completion of 510 or equivalent is also required.

3. An oral examination covering the thesis and coursework is required.

THE DOCTORAL PROGRAM

1. Completion of a Master's degree in the field, or a closely related field, or passing a special qualifying examination is required for admission. Scores on the GRE aptitude test are also required.

2. A dissertation is required for the Ph.D. degree. Each student must develop a detailed written plan for the dissertation research. A minimum of 72 hours beyond the Bachelor's degree, excluding credit for the Master's thesis, is required. Major professors are expected to attend this course and participate in discussions during their Master's program. Completion of 510 or equivalent is also required.

3. An oral examination covering the thesis and coursework is required.

THE DOCTORAL PROGRAM

1. Completion of a Master's degree in the field, or a closely related field, or passing a special qualifying examination is required for admission. Scores on the GRE aptitude test are also required.

2. A dissertation is required for the Ph.D. degree. Each student must develop a detailed written plan for the dissertation research. A minimum of 72 hours beyond the Bachelor's degree, excluding credit for the Master's thesis, is required. Major professors are expected to attend this course and participate in discussions during their Master's program. Completion of 510 or equivalent is also required.

3. An oral examination covering the thesis and coursework is required.

THE DOCTORAL PROGRAM

1. Completion of a Master's degree in the field, or a closely related field, or passing a special qualifying examination is required for admission. Scores on the GRE aptitude test are also required.

2. A dissertation is required for the Ph.D. degree. Each student must develop a detailed written plan for the dissertation research. A minimum of 72 hours beyond the Bachelor's degree, excluding credit for the Master's thesis, is required. Major professors are expected to attend this course and participate in discussions during their Master's program. Completion of 510 or equivalent is also required.

3. An oral examination covering the thesis and coursework is required.
GRADUATE COURSES

421 Forest and Wildland Resource Economics (3) Production functions, supply-demand and market analysis; non-market programs and projects; economic analysis and decision models; investment and financial analysis; managerial economics; taxes; forest products marketing. Prereq: 324 or consent of instructor. F

422 Forest and Wildland Resource Policy (3) Policy formulation; criteria; determinants; national and state and wildland law and regulation; theory of conflict resolution; formal and informal resolution. Prereq: Senior standing. F

423 Forest Recreation Planning and Management (3) Planning processes, master and site planning, site design projects; management strategies, methods of visitor services management; case studies. Weekend field trips. Prereq: 321, 323, Ornamental Horticulture and Landscape Design 280, or consent of instructor. 1 hr and 2 labs. F

431 Solid Wood Processing (3) Production processes or solid wood products; sawmilling, secondary machining, drying and preservation. Prereq: 331 and 332, or consent of instructor. 2 hrs and 1 lab. Sp

433 Wood Composites and Gluing (3) Principles of adhesion; wood adhesives; fundamentals of plywood and composite panel manufacture. Evaluation resin properties; testing bond strength and durability. Prereq: 351 and 352, or consent of instructor. 2 hrs and 1 lab. F

434 Measurement and Marketing of Wood Products (3) Measurement systems used for sale and transfer of wood products. Application of market principles and analysis to wood products markets and economic structure of wood products industry. Prereq: 431, 433 and Forestry, Wildlife and Fisheries 315, or consent of instructor. Sp

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

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

511 Problem Analysis in Forest Resources (3) Problem identification, analysis and solution in forest resources management. Identify, analyze and prepare written report. Topic and report must have approval of graduate committee. Available only to students in non-thesis option for M.S. in Forestry. E

512 Seminar (1) Current developments in forestry. Required of all graduate students in residence fall semester. May be repeated. Maximum 2 hrs. S/NC only. F

520 Advanced Forest Tree Biology (3) Growth, reproduction, and physiology of trees; forest ecology; variability and taxonomy of forest trees. Prereq: Graduate standing in forestry or biological science, or consent of instructor. S,PA

520 Advanced Forest Resource Management (3) Analysis of forest management problems as exemplified in public agencies and private firms. Forest organization and computerized regulation systems; financial and operational planning tools, as applied to forest resource management. Prereq: Senior-level forest management or consent of instructor. S,PA

540 Genetics in Forestry (3) Genetic improvement of forest species, selection of superior phenotypes; field testing for genetic variability; tree breeding, development of seed orchards; hybridization; tree cytology and tissue culture use of DNA fingerprinting techniques; genetic variation; planning and conducting forest genetic research. Prereq: Silvicultural methods and Biology 220 or consent of instructor. S,PA

550 Recreation Planning for Forests and Associated Lands (3) Planning process for recreation development on forests and associated lands; analysis and critique of specific contemporary alternatives. Overnight field trip at a coniferous forest level in forest recreation or consent of instructor. F

555 Forest Recreation Research Methods (3) Evaluation of research methodologies through readings and case studies; techniques of recreation resource monitoring and research investigation; current research trends in wildlife recreation. Prereq: 321 or equivalent and statistics. F

560 Industrial Forestry I (3) Economic structure of forest products industries. Identification and analysis of industry structure and markets, domestic and foreign. Current trends in markets and industrial structure: impact of short term and long range planning. Prereq: Senior-level forest management or consent of instructor. F, S

565 Industrial Forestry II (3) Evaluation of alternative strategies for firms in industry. Role of timber and timber management in integrated forest resource management. Categorization and evaluation of specific strategies. Role of financial and institutional arrangements affecting forest management. Prereq: Senior-level forest management and/or consent of instructor. F, S

570 Management & Policy of Forest Resource Organization (3) Theory and application of management as applied to natural resource organizations: institutional direction and culture, and strategic management. Development of policy as planning tool and as results from conflict resolution. Linkage between policy development and execution, and structure and management of organizations. Prereq: Forest administration and policy or consent of instructor. F

580 Advanced Silviculture (3) Silvicultural characteristics, silvicultural practices and systems applied to commercially important hardwoods and softwoods. In-depth analyses of silvicultural principles involved and tool usage; planting, prescribed fire, pesticides, in regeneration and management; computer modeling of stand dynamics, structure, growth/yield. Prereq: Undergraduate silviculture course or consent of instructor. 2 hrs and 1 lab. Sp

581 Cytogenetics (3) Chromosome structure and behavior during mitotic and meiotic divisions in relation to structural changes, genetic controls, hybridization, speciation, and polyploidy. Laboratory; normal and aberrant meiotic systems and somatic chromosomes from plants and animals. Prereq: Biology 220 and at least 6 additional hrs in biological sciences. (Same as Botany 581) S,PA

585 Advanced Forest Biometry (3) Application of sampling techniques to forest inventory; fixed and variable plot sampling; point sampling; Poisson sampling; regression estimators; multistage and multiphase sampling. Growth and yield prediction for even-aged and uneven-aged forests. Prereq: 325 or consent of instructor. S,PA

593 Independent Study in Forestry (1-4) May be repeated. Maximum 6 hrs. E

Wildlife and Fisheries Science

GRADUATE COURSES

441 Wildlife and Fisheries Techniques (3) Capturing and handling fish and wildlife; population restoration;
enculturation, age and growth, biological assessment, and management of freshwater fisheries: population esti-
443 Fisheries Science (3) Quantification and track and sign identification. Prereq: Forestry, Wildlife and Fisheries 317 or Biology 230. 2 hrs and 1 lab. F
444 Ecology and Management of Wild Mammals (3) Biological and ecological characteristics of game mammals and endangered mammals. Current principles and practices of wild mammal management. Prereq: Forestry, Wildlife and Fisheries 317 or Biology 230. 2 hrs and 1 lab. F
445 Ecology and Management of Wild Birds (3) Biological and ecological characteristics of game birds, endangered birds, and bird pests. Current principles and practices of wild bird management. Prereq: Forestry, Wildlife and Fisheries 317 or Biology 230. 2 hrs and 1 lab. Sp
500 Thesis (1-15) F/NP only. E
502 Registration for Use of Facilities (3-15) Required during residency, 504 and 3 semester hours beyond the completion of a major concentration, to give a broad foundation of the discipline. The program must include 504, 515, 599, and (at each offering during residency) 501. A minimum of 12 hours must be earned in related fields outside the department. Competence in computer and information systems is required. Additional tools, including languages, will be required as appropriate to the student's areas of research specialization.
Examinations required for admission to candidacy include a written examination in two special fields; and an oral examination on the student's program, the special fields, and the dissertation proposal. Also required is a final oral examination on the dissertation and on other aspects of the program as determined by the student's doctoral committee.

ACADEMIC COMMON MARKET
An agreement among southern states for sharing graduate programs allows legal residents of some states to share graduate programs at UTK on an in-state tuition basis. The Ph.D. program in Geography is available to residents of the states of Alabama, Arkansas, Mississippi, South Carolina, Virginia, or West Virginia. The Master's program is also available to residents of Virginia. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.

GRADUATE COURSES
411 Computer Mapping and Geographic Information Systems (3) Concepts, management, and presentation of digital data for spatial analysis: cartographic data structures. Prereq: 310 and knowledge of computer language or consent of instructor. 2 hrs and 1-2 hr lab.
412 Cartography (3) Cartographic techniques applied to design, compilation, and reproduction of maps and other graphics. Prereq: 310 or consent of instructor. 2 hrs and 1-2 hr lab.
413 Remote Sensing: Types and Applications (3) Principles and uses of remote sensing imagery, digital data, and specific geographic interpretation and mapping techniques. Prereq: 310 or consent of instructor.
415 Quantitative Methods in Geography (3) Geographical application of statistical techniques, point pattern analysis, and analysis of areal units. Prereq: 310 or consent of instructor.
421 Geography of Folk Societies (3) Geographical study of folk culture, traditional material culture and rural settlement, examples from eastern North America and selected foreign areas. Prereq: 101-02 or 320 or consent of instructor.
425 Historical Geography of the United States (3) Surveys and changing human geography of the United States during four centuries of settlement and development. Changing population patterns, development of agricultural regions, urban patterns, and industrial development. Prereq: 361 or consent of instructor.
433 The Land-Surface System (3) Nature and regional variations in relationships among surface form, water, vegetation, and surface materials. People as evaluators and agents of change. Prereq: 131-35 or 330 or consent of instructor.
434 Climatology (3) General circulation system leading to world pattern of climates. Climatic change and modification, and interactions of climate and human society. Prereq: 131-35 or 330 or consent of instructor.
441 Urban Geography (3) Concepts and theories concerning the development and significance of systems of cities and internal morphology of cities. Prereq: 101-02 or 141 or 340 or consent of instructor. (Same as Urban Studies 441.)

443 Rural Geography (3) Geographical appraisal of rural areas of the United States: small towns and rural fringes. Problems and potentials of rural America. Prereq: 101-02 or 141 or 340 or consent of instructor. Maximum 6 hrs.

445 Geography of Resources (3) Study of factors related to variations in resource availability from time to time and place to place: energy and metallic resources. Prereq: 101-02 or 141 or 340 or consent of instructor. Maximum 6 hrs.

449 Geography of Transportation (3) Examination of transportation systems, their effects on trade patterns, land use, location problems, and development. Prereq: 141 or 340 or consent of instructor.

450 Process Geomorphology (3) (Same as Geology 450.)

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

501 Colloquium in Geography (1) Discussion of departmental research, current research literature, and general topics. Registration required of resident graduate students whenever offered. May be repeated. Maximum 4 hrs. May be applied toward graduate degree. S/NC only.

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

504 Research Design (3) Geographical research from selection of topic and development of research design through field work and final report.

505 Directed Research (2-6) Research on problems as assigned to individual students. Prereq: Written consent of instructor and department prior to registration. May be repeated with consent of instructor. Maximum 9 hrs. S/NC only.

506 Directed Readings (2-6) Readings on topics of interest as defined by individual students. Prereq: Written consent of instructor and department prior to registration. May be repeated with consent of instructor. Maximum 9 hrs. S/NC only.

509 Topics in Geography (2-3) Topics vary. Prereq: Consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

512 Topics in Cartography (3) Trends, concepts, problems and methods in cartography. Prereq: 411 and 412 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

513 Topics in Remote Sensing (3) Applied research using imagery for interpretation and mapping of geographic data. Prereq: 413 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

515 Topics in Quantitative Geography (3) Multivariate analysis applied to problems in geography; research problems utilizing appropriate computer programs; usefulness to geographic research of techniques developed by other disciplines. Prereq: 415 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

517 Geographic Information Management and Processing (3) Concepts and methods in management of geographic information. Database design, manipulation, sampling and analysis. Prereq: Consent of instructor.

519 Graduate Practicum in Cartography/Remote Sensing (2-6) Prereq: Written consent of department before registration. May be repeated with consent of instructor. Maximum 6 hrs.

521 Topics in Cultural Geography (3) Examination of trends, problems and methods in cultural geography. Prereq: 421 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

524 Topics in Political Geography (3) Geographical consequences of public decisions; understanding how administrative and political processes affect public land management, spatial distribution of public goods, and urban morphology. Prereq: Consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

525 Topics in Historical Geography (3) Examination of trends, concepts, and methods in historical geography. Prereq: 441 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

531 Topics in Physical Geography (3) Examination of trends, problems, and methods in geography of land surface system or in modern climatology. Prereq: 433 or 434 and consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

535 Topics in Biogeography (3) Examination of trends, problems, and methods in biogeography. Prereq: 435 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

541 Topics in Urban Geography (3) Analysis of research on urban systems, internal morphology, urban problems and urban spatial behavior. Prereq: 441 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

549 Topics in the Geography of Transportation (3) Examination of trends, problems, and methods in transportation geography and transportation networks. Prereq: 449 or consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs.

550 Regional Geomorphology (3) (Same as Geology 550.)

577 Biological Conservation (3) Analytical treatment of politics, policies, and norms of biological conservation as practiced in U.S. and abroad. Prereq: Consent of instructor.

591 Foreign Study (1-15) See page 31. Prereq: Written consent of department prior to registration. Maximum 30 semester hours, including:

592 Off-Campus Study (1-15) See page 31. Prereq: Written consent of department prior to registration. Maximum 30 semester hours, including:

593 Independent Study (1-15) See page 31. Prereq: Written consent of department prior to registration. Maximum 30 semester hours, including:

599 Geographic Concept and Method (3) Traditional and modern geographic thought; readings on nature, scope, problems, and methods of geography. Prereq: Consent of instructor.

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

609 Seminar in Geography (3-3) Topics vary. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

625 Seminar in Historical Geography (3) Prereq: 525 or consent of instructor. May be repeated. Maximum 6 hrs.

633 Seminar in Physical Geography (3) Prereq: 533 or consent of instructor. May be repeated. Maximum 6 hrs.

635 Seminar in Biogeography (3) Prereq: 535 or consent of instructor. May be repeated. Maximum 6 hrs.

641 Seminar in Urban Geography (3) Prereq: 541 or consent of instructor. May be repeated. Maximum 6 hrs.

643 Seminar in Rural Geography (3) Prereq: 443 or consent of instructor. May be repeated. Maximum 6 hrs.

649 Seminar in Geography of Transportation (3) Prereq: 549 or consent of instructor. May be repeated. Maximum 6 hrs.

663 Seminar in Geography of the American South (3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

673 Seminar in Geography of Latin American (3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.
1. Six hours of Thesis 500.
2. Registration in 595 during the first two years in the program. This course may be counted toward the 30-hour minimum. This requirement may be waived in unusual circumstances.
3. Sixteen hours of geology courses, with at least 14 hours at the 500 or 600 level, including at least one course from each of the following groups:
   - Group I: 510, 530, 560, 580.
   - Group II: 521, 525, 545, 546, 550, 557, 561.
   - Group III: 570, 571, 576, 577.
4. Eight hours of additional graduate coursework.

**The DOCTORAL PROGRAM**

The prerequisite for the Ph.D. program, in addition to that for the M.S. program, is either a Master's degree in Geology, or a Bachelor's degree plus completion of 9 hours of coursework from the list in #3, above, including one course from each group. These courses may be taken while completing other course requirements. Graduation requires passing a comprehensive examination, taken no later than the end of the second year, completion of all course requirements with a minimum 3.00 GPA, completion of the language requirement, and successful oral defense of the dissertation.

The comprehensive examination includes both written and oral parts in which the candidate will be tested on her/his knowledge of the area concerning the proposed dissertation and of related fields. The candidate is expected to be conversant in a wide field of geological sciences. A minimum of 24 hours of graded coursework is required in addition to the 24 hours of Dissertation 600. The coursework includes the sum of 6 hours of 600-level geology courses, 12 hours of 500-level or higher geology courses, and 6 hours of additional graduate courses. Extra-departmental coursework is encouraged. Registration in 595 is required during the first four years in residence. The student must demonstrate a reading knowledge of a foreign language in which there is a body of geologic literature, as approved by the student's dissertation committee.

**GRADUATE COURSES**

410 Advanced Mineralogy (3) Crystal chemistry of rock-forming minerals. Interaction of electromagnetic radiation and crystalline solids. Optical properties of minerals, visible and infrared spectroscopy, and x-ray diffraction. Laboratory exercises emphasize thin section and x-ray diffraction methods of mineralogy. 2 hrs and 1 lab.

420 Paleocology (4) Principles of ecological analysis as applied to fossils and fossil assemblages: data collection and interpretation. Laboratory designed around presentation of ecological concepts based on thin section and laboratory analysis. Writing emphasis course. 3 hrs and 1 lab.

421 Invertebrate Paleontology (1) Survey of preservational processes and geologically important representatives of Protists, Porifera, Cnidaria, Bryozoa, and Brachiopods. Functional morphology, skeletal structures, ecology, and stratigraphic distribution. Prereq: 321 or consent of instructor. 3 hrs and 1 2-hr lab.

422 Invertebrate Paleontology II (3) Survey of 'higher invertebrates': Annelida and other worms, Mollusca, Arthropoda, Echinodermata, Graptolozoa, Conodonta, Chordata. Functional morphology, skeletal structures, ecology, and stratigraphic distribution. Prereq: 321 or consent of instructor. 3 hrs and 1 2-hr lab.


426 Paleobotany and Palynology (3) Evolutionary history of terrestrial plants. Fossil record of macrobotanical remains, spores, and pollen grains. Origin and diversification of Gymnosperms and Angiosperms; changes in floristic provinces through geologic time. Prereq: 102; Botany 310-20 or consent of instructor. (Same as Botany 426.) 3 hrs and 1 lab.

440 Field Geology (6) Summer field course advanced undergraduate geology majors and first-year gradua- students in geology. Taught off-campus at Geology Field Station and requires full time of student. Field techniques, methods, techniques, and practice of solution of geologic problems. Prereq: Completion of major core courses and consent of instructor.


450 Process Geomorphology (3) Interactive approach to development of Earth's surface based on current hypotheses, maps, remote sensing imagery. Prereq: 101. 02. (Same as Geography 450.) 2 hrs and 1 2-hr lab.

455 Basic Environmental Geology (3) Applications of geoscience technology toward comprehension of effects of geological processes on humans and effects of human activities on earth's environments. Prereq: 12 hrs of geology courses. 2 hrs and 1 3-hr lab field period.


470 Applied Geophysics (3) Basic principles and applications of seismic, gravity, magnetic, and electrical prospecting methods. Recommended prereq: Mathematics 141-42 or 147-48 and Physics 131, 2 hrs and 1 lab.

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

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

510 Clay Mineralogy (3) Origin, chemistry, structures, and properties of clay minerals; application of mineralogical techniques in clay mineral studies. Prereq: 310 and 568 or equivalent. Recommended prereq: 460. 2 hrs and 1 2-hr lab.

515 Tectonics (1-15) P/NP only. E

530 Petrogenesis of Crystalline Rocks (4) Origin and properties of igneous and metamorphic rocks, magmatic and subduction processes and physical processes. Recommended prereq: Laboratory involves petrographic study of crystalline rocks in thin section. Prereq: 410. 3 hrs and 1 lab.

540 Seminar in Local Geology (1) Introduction of geology of Southern Appalachians. 1 hr plus field trips.

545 Sandstone Petrology/Physical Sedimentology (4) Field and microscopic analysis of terrigenous clastic rock types; physical processes of sedimentation, transport of sediment, formation of sedimentary structures. Prereq: 340 or equivalent. 3 hrs and 1 lab.

546 Carbonate Sedimentology (4) Environments of deposition of modern and ancient carbonate sediments and diagenesis of resultant rocks; field and laboratory analysis of sample material and preparation of scientific reports. 3 hrs and 1 lab.

550 Regional Geomorphology (3) Integrative approach to study of natural geomorphological regions stressing links and similarities across boundaries, unique characteristics of major divisions, provinces, sections, and districts. May be repeated with consent of instructor. Maximum 6 hrs. (Same as Botany 555 and Zoology 555.)

556 Quaternary Geology of North America (3) Interpretation of geomorphic, stratigraphic, and sedimentological evidence in order to reconstruct Quaternary landscapes in the major mountain ranges and fluvial regions of North America; correlation of major episodes of North American glaciation with paleoceanographic changes in Atlantic and Pacific Oceans. Prereq: Consent of instructor. May be repeated with consent of instructor. Maximum 6 hrs. (Same as Botany 555 and Zoology 555.)

557 Quaternary Paleogeology (4) Perturbation, process, and pattern within Quaternary ecosystems; climatic change and vegetational responses during last 2.5 million years. Prereq: Consent of instructor.

560 Physical Geochemistry (3) Theory and practice of thermodynamics as applied to geologic situations; phase equilibria, kinetics, geothermometers, isotope geochemistry. 2 hrs and 1 lab. Recommended prereq: 460.

561 Aqueous Geochemistry (4) Introduction to and applications of equilibrium thermodynamics to earth surface environments; geochemistry of natural water, weathering reactions, and early sediment diagenesis. Prereq: Chemistry 120-30. 3 hrs and 1 lab or seminar.


568 Geochemical Analysis (3) Collection and treatment of geochemical data using electron microprobe, x-ray fluorescence, x-ray absorption spectrophotometry techniques. Prereq: 310 or consent of instructor. 2 hrs and 1 lab.

570 Experimental Geochemistry Laboratory (1-3) Independent lab study of problems in geochemistry using experimental and analytical techniques. Prereq: Consent of instructor.

570 Advanced Structural Geology (4) Current topics in structural geology and tectonics of mountain belts; recent literature. Prereq: 460 or equivalent. Consent of instructor. 3 hrs and 1 lab or seminar.

571 Regional Tectonics and Structural Geology (3) Major subdivisions of earth's crust and processes that form them. Comparison of internal structure of mountain chains and how they function in the continental crust. Examples from different parts of world. Prereq: Structural geology or consent of instructor.

575 Plate Tectonics and Orogeny (4) Tectonic development of orogenic belts in context of newest aspects of plate tectonic theory; current literature and ongoing research for both modern and ancient examples. Prereq: 370 or consent of instructor. 3 hrs and 1 seminar.

Geological Sciences
Germanic and Slavic Languages
(College of Liberal Arts)

MAJORS

German .................. M.A.
Modern Foreign Languages.. Ph.D.

Professors:

Falen, James E., Ph.D. .... Pennsylvania
Fiene, Donald M., Ph.D. .... Indiana
Fuller, H. W. (Emeritus), Ph.D. .... Wisconsin
Kratz, Henry, Ph.D. .... Ohio State
Osborne, J. C., Ph.D. .... Northwestern

Associate Professors:

Rice, Martin P., Ph.D. .... Vanderbilt
Rittenhoff, U., Ph.D. .... Connecticut

Hodges, Carolyn R., Ph.D. .... Chicago
Lauckner, Nancy A., Ph.D. .... Wisconsin
Lee, David E., Ph.D. .... Stanford
Melior, C. J., Ph.D. .... Chicago

Assistant Professor:

Kolodziej, J. I., Ph.D. .... Indiana

The Department of Germanic and Slavic Languages offers two advanced degrees: the Master of Arts in German and the Doctor of Philosophy in Modern Foreign Languages. Inquiries should be addressed to the head of the department.

THE MASTER'S PROGRAM

The department requires a minimum of 30 semester hours including 15 hours of coursework above the 500 level and 6 hours of Thesis 500.

THE DOCTORAL PROGRAM

The Ph.D. in Modern Foreign Languages is offered jointly by the Department of Germanic and Slavic Languages and the Department of Romance Languages and requires advanced training in at least two foreign languages.

Admission Requirements

Applicants must have completed a B.A. in either French, German, or Spanish to be accepted into this program. Both graduates of institutions in the United States and those with undergraduate degrees from institutions outside the United States must have a grade point average of at least 3.0. Consideration will also be given to applicants who do not have an undergraduate degree in one of the three foreign languages but do have the equivalent of an undergraduate major in one of them.

Degree Requirements

Candidates must complete a minimum of 63 semester hours of course work beyond the Bachelor's degree in addition to 24 hours of doctoral research and dissertation. The program shall consist of a first concentration, a second concentration, and a cognate field.

1. First Concentration: French, German or Spanish. It will consist of a minimum of 39 semester hours beyond the Bachelor's degree, distributed as follows:
   - A minimum of 21 hours at the 500 level (exclusive of thesis hours) including French 584 (3), German 560 (3), or Spanish 550 (3);
   - French 512 (3), German 512 (3), or Spanish 512 (3); French 515-18 (2,2), or German 520 (3).
   - At least 12 hours at the 600 level (exclusive of dissertation hours).

2. Second Concentration: French, German, Italian, Russian, or Spanish (different from the first concentration). It shall consist of at least 18 hours beyond the Bachelor's degree, at least 12 of which must be at the 500 or 600 level.

3. Cognate Field: 9 hours must be in courses numbered 400 and above in a field outside the department of the first concentration but related to the student's principal area of research. If the cognate field is yet a third foreign language, a reading proficiency exam will be administered after completion of the 6 cognate hours by the language section concerned.

4. Additional Requirements: A student must demonstrate competence in languages of both his/her first and second concentrations by taking a test in each language. The test will include reading, writing, listening, and speaking, and should be completed by the time the student reaches 40 hours of study beyond the Bachelor's degree. Standardized examinations that may be used for this purpose include applicable portions of either the National Teachers Examination, the M.A. Examination for Teachers and Advanced Students, or the proficiency standards of the United States Foreign Service Institute (FSI).

If the student has not chosen a third language as his or her cognate area, basic competence (determined by a reading examination of translation into English administered by the department concerned) in a third language is required. If the student's first and second languages are Romance languages, the third language should be chosen from another language branch.

A comprehensive examination on the language and literature of the first and second concentrations must be passed before the student may be admitted to candidacy. The candidate will be required to defend his/her dissertation in an oral examination. Central emphasis is put on the doctoral dissertation as a final test of the candidate's scholarly qualifications.

Graduate Teaching Assistants in the program should have the opportunity and will be strongly encouraged to instruct in at least two foreign languages, subject to staffing needs.

Doctoral students will be strongly encouraged to reside and study abroad and will be assisted in identifying potential sources of financial support (e.g. Fulbright, McClure, Rotary fellowships).

For additional courses, refer to Romance Languages.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UTK on an in-state tuition basis. The Ph.D. program in Modern Foreign Languages is available to residents of the state of Alabama. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.

German

GRADUATE COURSES

331-332 Elements of German for Upper-Division and Graduate Students (3) Elements of language, elementary and advanced readings and a final 10,000 word translation project. Open to graduate students preparing for language examinations, and upper-division students desiring reading knowledge of the language. No credit for students having completed 101-102 or 107. 332 may be repeated. Maximum 6 hrs. Undergraduate credit only.
551 German Humanism, Reformation and Baroque (3) Content varies. May be repeated. Maximum 6 hrs.

552 German Enlightenment, Rococo and Sturm und Drang (3) Content varies. May be repeated. Maximum 6 hrs.

553 German Classicism and Romanticism (3) Content varies. May be repeated. Maximum 6 hrs.

554 German Realism and Naturalism (3) Content varies. May be repeated. Maximum 6 hrs.

555 Modern German Literature 1890-1945 (3) Content varies. May be repeated. Maximum 6 hrs.

556 Modern German Literature 1945-Present (3) Content varies. May be repeated. Maximum 6 hrs.

560 German Literary Theory and Criticism (3)

561-62 Directed Readings in German Language and Literature (3,3)

571-72 Old Norse Language and Literature (3,3)

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

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

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

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

610 Gothic (3) Phonology, morphology, and syntax of Gothic language. Related to Indo-European languages and other Germanic languages. Readings from Gothic Bible.

611 Old High German (3) Phonology, morphology, and syntax of Old High German. Representative readings.

612 Old Saxony (3) Phonology, morphology, and syntax of Old Saxony. Representative readings.

621-22 Seminar in German Literature (3,3) May be repeated. Maximum 18 hrs.

631-32 Seminar in German and Germanic Philology (3,3)

Russian

GRADUATE COURSES

425 Introduction to Descriptive Linguistics (3) (Same as French 425, German 425, Spanish 425, and Linguistics 425.)

426 Methods of Historical Linguistics (3) (Same as French 426, German 426, Spanish 426, and Linguistics 426.)

435 Structure of the German Language (3) Contrastive English-German segmental and suprasegmental phonemes, contrastive English-German linguistic structures, selected topics in advanced German grammar and syntactic analysis. Prereq: 6 hrs of upper division German language courses (excluding courses in translation or graduate reading courses). (Same as Linguistics 435.)

436 History of the German Language (3) Development of German language from Indo-European through Proto-Germanic, Old High German, Middle High German to New High German. Internal and external linguistic history of German speech. Prereq: 6 hrs of upper division German language courses (excluding courses in translation or graduate reading courses). (Same as Linguistics 436.)

485 Business German (3) Survey of German used in fields of business, government, administration and economics. Prereq: 6 hrs of upper-division German excluding courses in translation and graduate courses.

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

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

510 German Phonetics and Advanced Grammar (3) Advanced work in phonetics, pronunciation, and selected topics in German grammar. For teachers and prospective teachers. Prereq: Consent of instructor.

512 Teaching a Foreign Language (3) Practical application of methods for teaching and evaluating basic language skills and foreign language skills, and cultural aspects through seminars, demonstrations, peer teaching, and observation of foreign language classes. Required of all M.A. and Ph.D. students holding GTA's, except those whose previous training or experience warrants excuse by department.

520 Proseminar (3) Bibliography; methods; illustrative problems; preparation of papers.

550 Studies in Russian Literature (3) Content varies. May be repeated. Maximum 9 hrs.

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

Health, Leisure, and Safety

(College of Education)

MAJORS

Public Health.......................... M.P.H.
Recreation and Leisure Studies............. M.S.
Safety Education and Service............. M.S., Ed.S.
School Health Education .................. M.S.

DEGREES

Health Education........................ Ed.D.
Education.............................. Ph.D.

Charles B. Hamilton, Head

Professors:

Gorski, J., Dr.P.H........................... UCLA
Hamilton, Charles B., Dr.P.H.............Oklahoma
Hayes, Gene E., Ph.D..................... North Texas State
Kirk, Robert H., H.S.D...................Indiana
Wallace, Bill C., Ed.D.................Northern Colorado

Associate Professors:

Kerrick, Ken L., Re.D......................Indiana
McGuire, Joseph L., Ph.D..............Michigan
Neutens, J. J., Ph.D.................... Illinois
Pursley, R. Jack, Ph.D.................... Iowa
Rockett, Ian R., Ph.D.....................Brown
Thompson, A. F., Ph.D....................Michigan State

Lecturer:

Duffy, Mary, M.D........................ Pennsylvania

The Department of Health, Leisure, and Safety offers graduate programs leading to the Master of Science, the Master of Public Health, the Specialist in Education, the Doctor of Education, and the Doctor of Philosophy with a major in Education. Inquiries should be directed to the department head.

Health

Graduate programs are available leading to the Master of Science with a major in School Health Education (thesis and non-thesis options) and to the Doctor of Education with a major in Health Education.

The Master of Science, with thesis and non-thesis options, requires completion of 30 semester hours.

The Doctor of Philosophy with a major in Education offers a concentration in health education and choice of supporting specializations from public health or safety as listed under Education.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UTK on an in-state tuition basis. The Ed.D. program in Health Education is available to residents of the states of Kentucky or West Virginia. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.

GRADUATE COURSES

400 Consumer Health (3) Survey of major consumer health care providers and health care services; selecting, purchasing, evaluating and financing medical and
<table>
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<th>Course Code</th>
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<tr>
<td>500</td>
<td>Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be repeated. Maximum 4 hrs. (Same as Nursing 509, Nutrition and Food Science 509, Public Health Education 509, Social Work 509) S/NC only. F,Sp</td>
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<tr>
<td>502</td>
<td>Graduate Workshop (1-3) Specific health/wellness issues. May be repeated. Maximum 4 hrs. (Same as Nursing 509, Nutrition and Food Science 509, Public Health Education 509, Social Work 509) S/NC only. F,Sp</td>
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**Public Health**

Graduate study with a major in Public Health leads to the Master of Public Health (M.P.H.). Three professional preparation concentrations are available: community health education, health planning/administration, and occupational/environmental health and safety. The M.P.H. program is accredited by the Council on Education for Public Health.

**ADMISSION REQUIREMENTS**

A statement of the applicant's educational and career goals and three rating forms are required. Appropriate forms are available from the department's program in Public Health. Preferential consideration for admission to degree status shall be given to those with a minimum undergraduate grade-point average of 3.0 and an overall GPA of 3.0 prior to placement in the field.

**THE MASTER'S PROGRAM**

The M.P.H. is a non-thesis program requiring completion of 58 semester hours of coursework including 10 weeks of field practice. Field practice provides a full-time introduction to health promotion and wellness of aged. F,Sp

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<tbody>
<tr>
<td>500</td>
<td>Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be repeated. Maximum 4 hrs. (Same as Nursing 509, Nutrition and Food Science 509, Public Health Education 509, Social Work 509) S/NC only. F,Sp</td>
</tr>
<tr>
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<td>Graduate Workshop (1-3) Specific health/wellness issues. May be repeated. Maximum 4 hrs. (Same as Nursing 509, Nutrition and Food Science 509, Public Health Education 509, Social Work 509) S/NC only. F,Sp</td>
</tr>
</tbody>
</table>

**ACADEMIC COMMON MARKET**

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain courses with a minimum overall GPA of 3.0 and an overall GPA of 3.0 prior to placement in the field.
special psychosocial environmental needs. Programs for home health services, comprehensive medical reha-
ilitation, nursing homes, congregate living centers and similar type health programs. Prereq: 521 or con-
sent of instructor. Sp

525 Financial Management of Health Programs (3) Financial management concepts and practices applied to health service delivery systems. Prerequisites are fundamentals of bud-
geting, costing, financing, rate setting, financial reporting and control. Opportunities to apply techniques. Prereq: 520 or consent of instructor. Sp

530 Biostatistics (3) Application of descriptive and inferential statistical methods to health-related prob-
lems and programs. Microcomputer applications, use and interpretation of vital statistics and introductory research methodology preparatory for first course in epidemiology. Prereq: Introductory statistics or con-
sent of instructor. F

540 Research Methods in Epidemiology (3) Basic measurement science of public health. Epidemiologic prin-
ciples of study design and statistical analysis. Elements of planning: formulation and conceptualiza-
tion of problem, plan design, evaluation and interpretation of study, and general attention to calculations and formulation. Professional literature, contemporary perspective of epidemiologic approaches to problem-
solving and policy formulation in public health. Prereq: 529 or consent of instructor. Sp

550 Principles and Practices of Community Health Education (3) Theoretical foundations for community health education: opportunities for skill development in variety of educational processes; and introduction to community health analysis. F

552 Community Health Problem Solving (4) Dynam-
ics of community organization, community needs assessment, educational interventions, and applica-
tion of program planning and evaluation techniques. Opportunity to practice skills in realistic setting. Prereq: 550 or consent of instructor. Sp

555 Health and Society (3) Understanding of social and behavioral factors which influence health status and care in America. Application to behavior in health-related organization. Social and psychological aspects of health care delivery systems, political economy of health and illness, impact of social movements on health, and social consequences of health legislation. Sp

560 Theories and Techniques in Health Planning (4) Overview of health planning concepts and methodol-
gies; systems-oriented planning process. Major elements of health system and planning and implementa-
tion of program, plan design, evaluation and implementation. Health problems of institutions, commu-
cias, and individuals. Introduction to planning techniques, diagnoses, and programs for addressing needs. Sp

562 Group Processes in Health Planning (3) Application of group process techniques used in health planning. Tailoring group processes, leadership roles and tech-
niques of group counseling and creative and health in planning groups. Su

568 Physical Activity and Positive Health (3) (Same as Physical Education 568.)

569 Fitness Testing, Programming, and Leadership for Diverse Populations (1) (Same as Physical Educa-
tion 568.)

580 Special Topics (3) Prereq: Consent of instructor. May be repeated under different topic, maximum 6 hrs.

585 Seminar in Gerontology (1) (Same as Human Ecology 585, Nursing 585, Educational and Counsel-
ing Psychology 585, Physical Education 585, and Social Work 585.)

587-98-98 Internship (3,3,3) Internship in either approved organizational or research setting under supervision of designated preceptor. Prereq: MPH major, one semes-
ter of social notice and consent of major advisor. S/ NC only. E

590 Research Methods in Health (3) (Same as Health 590.)

593 Directed Independent Study (1-3) Prereq: Con-
sent of instructor. May be repeated. Maximum 6 hrs. E

590 Health Aspects of Gerontology (3) (Same as Health 650.)

555 Seminar in Nation's Health (3) (Same as Health 655.)

560 International Health (3) (Same as Health 660.)

Recreation and Leisure Studies

Graduate study with a major in Recreation and Leisure Studies leads to the Master of Science. Professional preparation concen-
trations are available in therapeutic recreation, general recreation, and sport administration/management. The third concen-
tration is an interdisciplinary program with the department of Physical Education and Dance. The M.S., with thesis and non-thesis options, requires completion of 32 semester hours.

GRADUATE COURSES

410 Maintenance and Management of Recreation and Sports Related Facilities (3) Principles for oper-
ating modern facility maintenance systems and management strategies. Cost tracking, inventory systems, specialized maintenance techniques, safety guidelines, maintenance management systems and security. Prereq: 110, 310 or consent of instructor. F

430 Organization and Administration of Leisure Serv-
ices (3) Principles of administration applied to provision of leisure services offered by public, private and/or 
commercial enterprises. Organizational structures, per-
sontal management, evaluation, legal authority, introduction to budgeting and fiscal procedures. Prereq: 310 or consent of instructor. F

440 Dimensions of Private and Commercial Recrea-
tion Businesses (3) Nature and function of recreation in private, commercial, and industrial settings. Survey of development and management of commercial goods and services offered in leisure market. Factors influenc-
ing participation, management considerations, and research in commercial tourism. Prereq: 110, junior standing, or consent of instructor. Sp

450 Specialized Study in Leisure Education (1-6) Special interest leisure activities; developing positive attitudes toward leisure. Demonstrates how leisure contributes to one's mental and physical health. May be repeated. Maximum 6 hrs. E

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

502 Registration for Use of Facilities (3-15) Required of all graduate students. 100 clock hrs during semester with agency for 2 hrs credit. Two major phases: work experience and written paper.

591 Directed Study in Leisure & Recreation (1-6) Detailed study of theme, issue, or concern. Designed to meet needs of individual students. May be repeat-
ed. Maximum 6 hrs. E

592 Special Topics in Recreation & Leisure Studies (1-6) May be repeated. Maximum 6 hrs. E

Safety

Graduate programs are available leading to the Master of Science with a major in Safety Education and Service (thesis and non-thesis options) and to the Specialist in Education with a major in Safety Education and Service. The M.S., with thesis and non-thesis options, requires completion of 30 semester hours.

The Specialist in Education (Ed.S.) requires 30 semester hours beyond the M.S.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal resi-
dents of some states to enroll in certain programs at UTK on an in-state tuition basis. The M.S. and Ed.S. programs in Safety Edu-
cation and Service are available to residents of the states of Alabama, Arkansas, Florida, or South Carolina. Additional information may be obtained from the Residency Assist-
ant in the Office of Graduate Admissions and Records.

GRADUATE COURSES

441 Driver & Traffic Safety Education (3) Preparation of teachers of driver education in schools and col-
leges. Students are required to teach at least one non-driver. Valid driver’s license required. 2 hrs and 2 labs. E

442 Advanced Driver & Traffic Safety Education (3) Development of competence in teaching of driver edu-
cation through use of simulation, multimedia, and multiple-car driving range. Teaching skills and super-
vision. 2 hrs and 2 labs. Sp

443 Sports & Recreational Safety (3) Accident prevention and injury control in sports activities; phil-
osophy of sports safety; human environmental factors and interrelationship in sports injury and control; risk-
taking and decision solution strategies; and contribu-
tions of sports medicine to safety. 3 hrs and 2 labs. Sp
500 Thesis (1-15) P/Non. only. E
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E
532 Behavioral Problems in Safety Education & Accident Prevention (3) Problems of behavior, causes of accidents, and application of principles of psychology in development of safe behavior in all segments of environment. F
533 Problems and Research in Accident Prevention (3) 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. F
534 Organization, Administration and Supervision of Safety Programs (3) National, state and local level programs; administrative, instructional, and supervisory aspects. Implementation of relevant programs. Sp
535 Emergency Management (3) Civil and defense problems: tornados, floods, fires, mass civil disorder, and nuclear and personnel attack by alien countries. Sp
572 Graduate Workshop in Safety (3) Special safety education problems. For advanced graduate students, teachers, supervisors, and administrators. May be repeated. Maximum 12 hrs.
590 Special Topics (1-3) Advanced study in selected disciplinary or professional area of safety education/management. May be repeated. Maximum 12 hrs.
593 Directed Independent Study (1-3) Individual study or project for graduate students. Specific proposal to instructor before registration. May be repeated. Maximum 12 hrs. E
601 Internship/Research in Safety and Health (3-6) Practical experience. Significant problem identified, researched, and reported in acceptable form. May be repeated. Maximum 6 hrs. (Same as Health 601.) E

History
(College of Liberal Arts)

MAJOR DEGREES

History .............................................. M.A., Ph.D.
John Muldowny, Acting Head

Professors:
Bergeron, Paul H., Ph.D.......................... Vanderbilt
Chmielewski, Edward V., Ph.D.............. Harvard
Finger, John R., Ph.D.......................... Washington
Griff, Leroy P. (Emeritus) (Distinguished Prof.), Ph.D.............. Harvard
Haas, Arthur G., Ph.D.......................... Chicago
Hao, Yen-Ping, Ph.D.......................... Harvard
Haskins, Ralph W. (Emeritus), Ph.D.............. California
Jackson, Charles O., Ph.D..................... Emory
Klein, Milton M. (Emeritus) (Distinguished Prof.), Ph.D............... Columbia
McDonough, Michael J., Ph.D.............. Pennsylvania
Wheeler, W. Bruce, Ph.D....................... Virginia

Associate Professors:
Becker, Susan D., Ph.D......................... Case Western

THE DOCTORAL PROGRAM

Admission Requirements
1. Acceptable scores on the Graduate Record Examination (general and subject history).
2. Successful completion of the M.A.

Residence and Coursework
Students are required to complete a minimum of 50 hours in coursework beyond the Bachelor's degree. Students must take 510 or its equivalent. Students transferring from another institution may count up to 24 hours of coursework toward the required 50 hours. All students pursuing the Ph.D. must take a minimum of 6 related hours outside the department. No fewer than 3 semesters of the 6 semesters of residence work (2 of which must be consecutive semesters) shall be under the supervision of the staff of UTK.

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 concentrating in European history will need two languages. The committee may also specify any other research tools, such as statistics, essential for the student's preparation. Upon student petition, the committee may accept in place of a language a B or better performance in an appropriate statistical course and History 526.

The foreign language requirements may be satisfied in one of two ways:
1. By examination. When the student is ready to take a language examination, he/she should consult with an advisor. The appropriate forms and the time of the examination may be obtained from The Graduate School.
2. By coursework. Upon consultation with the advisor, a student may elect to complete an appropriate sequence in a language department or an intermediate sequence in a language in which no appropriate sequence is available. Satisfactory completion requires that a student must have at least a B in the final semester.

Comprehensive Examination
The comprehensive examination will be both written and oral and must be taken after all coursework is completed, language requirements fulfilled, and at least nine months before the degree is expected. This exam should normally be taken before beginning the sixth semester of work toward the doctorate. The candidate must present two fields, one from group I and one from group II.

Group I
- Pre-modern Europe
- Modern Europe
- Early American
- Recent United States

Group II
- Socio-economic
- Military/Foreign Relations
- Regional/Local (U.S.)
- National/Regional (non-U.S.)

Dissertation and Defense
Original research forms the basis for the dissertation. After the dissertation has been
GRADUATE COURSES

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

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

510 Foundations to Graduate Study in History (3) Assumptions and methods of historians. Required of all candidates for advanced degrees. F


532 Topics in Modern Europe (3) Reading seminar: secondary sources on movements and trends that are multinationally focused. Focus varies. May be repeated. Maximum 15 hrs.

533 Topics in European National History (3) Reading seminar: secondary sources on intra-national topics, usually British, Russian, German or French. Focus varies. May be repeated. Maximum 15 hrs.

541 Topics in Early American History (3) Reading seminar: secondary sources on early North American history, Focus varies. May be repeated. Maximum 15 hrs.

542 Topics in 19th- and 20th-Century United States (3) Reading seminar: secondary sources on 19th- and 20th-century United States. Focus varies. May be repeated. Maximum 15 hrs.

551 Topics in the History of Foreign Relations (3) Reading seminar: secondary sources on foreign relations. Focus varies. May be repeated. Maximum 15 hrs.

552 Topics in Military History (3) Reading seminar: secondary sources on military history; military operations, social impact of war and naval strategy in foreign policy. May be repeated. Maximum 15 hrs.

553 Topics in Comparative Social and Economic History (3) Reading seminar: secondary sources on multinational topics, comparatively structured. Focus varies. May be repeated. Maximum 15 hrs.

554 Topics in Comparative Social and Economic History (3) Reading seminar: secondary sources on U.S. social and economic history. Focus varies. May be repeated. Maximum 15 hrs.

555 Topics in United States Social and Economic History (3) Reading seminar: secondary sources on social or economic history of United States. Focus varies. May be repeated. Maximum 15 hrs.

556 Topics in European Social and Economic History (3) Reading seminar: secondary sources on social or economic history of European nations. Focus varies. May be repeated. Maximum 15 hrs.

557 Topics in Cultural and Intellectual History (3) Reading seminar: secondary sources on cultural and intellectual history. Focus varies. May be repeated. Maximum 15 hrs.

558 Topics in United States Regional and Local History (3) Reading seminar: secondary sources on regions, states and cities of the South. Focus varies. May be repeated. Maximum 15 hrs.

561 Topics in Latin American History (3) Reading seminar: secondary sources in Latin America. Focus varies. May be repeated. Maximum 15 hrs.

562 Topics in Asian History (3) Reading seminar: secondary sources on Asian history; East Asia and Middle East. Focus varies. May be repeated. Maximum 15 hrs.

566 Topics in U.S. Religious History (3) (Same as Religious Studies 566).

571 Topics in Applied History (3) Seminar to develop practical skills applicable to museology, historical preservation, material culture, historical agencies, historical editing, and other areas of applied history. Focus varies. May be repeated. Maximum 15 hrs.

580 Topics in History (3) Reading seminar: secondary sources for new topics. Focus varies. May be repeated. Maximum 15 hrs.

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

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

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

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

621 Directed Readings (3) Directed readings to prepare candidate for doctoral comprehensive examination. May be repeated. Maximum 1 per doctoral field. S/NC only.


632 Seminar in Modern European History (3) Research seminar in primary sources culminating in scholarly paper in Modern European history. Focus varies. May be repeated. Maximum 15 hrs.

641 Seminar in Early American History (3) Research seminar in primary sources culminating in scholarly paper in American history. Focus varies. May be repeated. Maximum 15 hrs.


651 Seminar in Military and Foreign Relations History (3) Research seminar in primary sources culminating in scholarly paper in military or foreign relations history. Focus varies. Not restricted by national grouping. May be repeated. Maximum 15 hrs.


658 Seminar in United States Regional and Local History (3) Research seminar in primary sources culminating in scholarly paper in regional and local history. Focus varies. May be repeated. Maximum 15 hrs.


680 Seminar in History (3) Research seminar in primary sources culminating in scholarly paper in aspect of history not covered in another 600-level research seminar. Focus varies. May be repeated. Maximum 15 hrs.

Home Economics

College of Human Ecology

MAJOR DEGREE
Home Economics..........................M.S.

Students pursuing graduate study in home economics education or extension are encouraged to enroll in the multidisciplinary Master's degree in Home Economics. Home Economics Education courses (HEED prefix) may be selected to meet requirements of that program. Graduate coursework in Home Economics Education may also be selected for development of a concentration or minor within other areas of specialization.

ADMISSION REQUIREMENTS

A completed file for review includes a College of Human Ecology application, Graduate Record Examination (GRE) scores for the general section, and completion of three Graduate School Rating Forms by individuals who can attest to the potential for graduate education. Forms may be obtained from the Dean's Office, College of Human Ecology. The M.S. in Home Economics requires an undergraduate degree in Home Economics.

THE MASTER'S PROGRAM

The M.S. in Home Economics is designed to meet graduate study needs of professionals who work in programs encompassing all areas of home economics. Home economics teachers may choose courses within this area for updating or education renewal. Thesis (33 hours) and non-thesis (36 hours) options are offered. The program includes 3-6 hours in research methodology, 6-9 hours in program planning and implementation (agricultural extension, home economics education, other areas of education), 3 hours in the integrative nature of home economics, and 12-15 (thesis) to 15-18 (non-thesis) hours in home economics subject matter. At least one course is to be from each department in the college. The non-thesis option requires a practicum. An oral/written comprehensive examination will be administered at the end of the program.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UTC on an in-state tuition basis. The M.S. program in Home Economics is available to residents of the state of South Carolina. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.

GRADUATE COURSES

510 Curriculum in Home Economics (3) Development of home economics educational materials and instruction. Prereq: 420 or equivalent or consent of instructor. F

515 Evaluation in Home Economics Education (3) Assessment of programs and pupil progress; techniques, methods and purposes. Prereq: 420 or equivalent. F,S,P,A

520 Supervision of Home Economics in the Public Schools (3) Program planning, organization and administration of vocational home economics education. Supervision of pre-service and in-service home economics professionals. Prereq: Classroom teaching experience. S

525 Home Economics Adult Education (3) Development and administration of community-based home economics programs for adults. Prereq: Consent of instructor. S,P,A

530 College Teaching in Home Economics (3) Instructive effectiveness, techniques, organization, and evaluation. Prereq: Consent of instructor. F

563 Family Life Education Programs (3) (Same as Child & Family Studies 563.)
Human Ecology
(College of Human Ecology)

MAJOR DEGREE
Human Ecology Ph.D.

Graduate study leading to the Doctor of Philosophy with a major in Human Ecology is available in the Departments of Child and Family Studies, Nutrition and Food Sciences, and Textiles, Merchandising and Design. Concentrations areas are child development, family studies, food science, nutrition science, and textiles and apparel. A major challenge of the doctoral program in Human Ecology is to draw upon the basic research generated from the natural sciences, social sciences, humanities, and the arts, and to provide a holistic perspective that contributes to the improvement of individual and family well being. For example, the physiological chemist may study metabolic-dietary interrelationships and psychologists may study child behavior. But, it is within human ecology that the nutrient needs of the growing child are considered along with the factors that affect the child's acceptance of different foods. Within the College of Human Ecology, research from one discipline is enhanced by encompassing and utilizing the findings of research from other disciplines.

ADMISSION REQUIREMENTS
A completed file for review includes a College of Human Ecology application, Graduate Record Examination (GRE) scores for the general section, and completion of three Graduate School Rating Forms by individuals who can attest to the potential for graduate education. Forms may be obtained from the Dean's Office, College of Human Ecology.

THE DOCTORAL PROGRAM
The doctorate is a research degree granted only to individuals who demonstrate proficiency in conducting original research. Course requirements for the degree are determined by the student's faculty committee, based upon college and departmental requirements and student needs and interests. The Graduate School sets minimum requirements for the doctoral degree. Additionally, the college has requirements that include:
1. Selection of a concentration and fulfillment of the requirements as directed by the major professor and approved committee;
2. Minimum of 78 semester hours in courses beyond the baccalaureate degree (exclusive of Master's thesis);
3. College Professional Seminar in Human Ecology 610;
4. Minimum of 9 semester hours of 600-level coursework (not including dissertation);
5. Successful completion of written/oral comprehensive examinations as provided by each department's procedures and the student's doctoral committee;
6. Original research project, which culminates in a dissertation; 24 semester hours of credit are required for dissertation;

The doctoral committee shall determine whether a reading knowledge of a foreign language is required.

More specific information about the course of study is given under the individual academic units that administer the Ph.D. concentrations.

ACADEMIC COMMON MARKET
The ACM is an interstate agreement among southern states for sharing academic programs. Residents of one of the participating states who qualify for admission may enroll in certain programs on an in-state tuition basis. Potential doctoral students in Human Ecology who are residents of Alabama, Arkansas, Kentucky, Louisiana, Mississippi, South Carolina, Virginia, or West Virginia are eligible.

GRADUATE COURSES
500 Thesis (1-15) P/NP only. E
501 Microcomputer Research Applications in Human Ecology (3) Advanced microcomputer concepts and applications for research. Overview of statistical analysis software, computer graphics, computer-assisted design and national database searches.
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E
510 Integrative Nature of Home Economics (3) History and philosophy of home economics. Analysis of current programs and future directions in field. Examination of research, integrative framework. F.A
515 Issues and Trends in Human Ecology (1-3) Research and theory related to current issues. Prereq: Consent of Instructor. E
520 Directed Study in Human Ecology (1-3) Integrative topics. Prereq: At least 9 hrs of graduate study in college including courses from at least two departments or consent of instructor. May be repeated. Maximum 6 hrs. E
525 Practicum in Home Economics (1-6) Field based experiences. Prereq: Consent of instructor. E
585 Seminar in Gerontology (1) Scope of gerontology as discipline and as related to other academic and professional disciplines. Speakers both internal and external to UTK. Prereq: Consent of instructor. May be repeated. Maximum 3 hrs. (Same as Educational and Counseling Psychology 585, Nursing 585, Public Health 585, Physical Education 585, and Social Work 585). S/NC only.
610 Professional Seminar in Human Ecology (3) Review of various approaches taken by different disciplines to study of ecology, ecological applications in human ecology; temporal/spatial properties of human ecosystems; model building/systems thinking and futures thinking in human ecology. Sp

Industrial and Organizational Psychology
(College of Business Administration and College of Liberal Arts)

MAJOR DEGREES
Industrial and Organizational Psychology...

Michael Rush, Director

Committee:
Dewhirst, H. Dudley, Management
Dobbins, Gregory H., Management
Fowler, Oscar S., Management
Fowler, Raymond, Psychology
James, Lawrence R., Management
Jenkins, Roger L., Business Administration
Ladd, R. T., Management
Larsen, John M., Jr. (Emeritus), Management
Lounsberry, John W., Psychology
O'Brien, Ralph G. (Emeritus), Statistics
Russell, J. E. A., Management
Schumann, David W., Marketing
Sundstrom, Eric, Psychology

For complete Faculty Listing, see Departments of Management and Psychology.

The Master's and doctoral programs are offered jointly by the Department of Psychology and the Department of Management. They are designed to prepare students for personnel, managerial, and organizational research; for university teaching; and for consulting relationships with industry. The program emphasizes a scientist/practitioner model in applying and conducting research based on accepted theory, organizational behavior, psychology, management, and statistics. The programs are administered by a joint committee of the two departments, appointed by the Vice Provost and Dean of The Graduate School on recommendations from the two department heads.

It is intended that students entering the I/O Program write one application for admission to The Graduate School (for university teaching) and one application for admission to the Industrial and Organizational Psychology program. Deadline: New students are admitted in fall semester only, and applications must be received by the Graduate Admissions and Records Office by March 1.

General Requirements
At least one year of college mathematics and one course in statistics are required. Ordinarily, an undergraduate grade point average of 3.0 or above is required with no evidence of specialization in mathematics and physical science. Test scores on each section of the general portion (verbal and quantitative) of
the Graduate Record Examination (GRE) and the Subject GRE (Psychology-81) are required. Customarily, those students admitted to the program have performed at or above the 69-79th percentile on the general tests. (This corresponds to a raw score of approximately 600 on each of the tests.) The Subject GRE (Psychology-81) score will be used in making admission decisions, although special consideration will be given in the case of non-psychology majors.

THE MASTER'S PROGRAM

A thesis is required with a minimum of 6 semester hours of Management or Psychology 500.

The Master's degree can be completed with a minimum of 33 semester hours in the major as follows:
- Management 567, 568 or Psychology 517-18, Psychology 557; Statistics 537, 538.
- 12 hours of additional coursework to be selected primarily from the following with the approval of the student's advisor: Management 511, 522, 610; Management/Psychology 625, 626, 627, 638; Psychology 500, 517-18, 620, 629, 638.

Electives, as approved for an individual's plan of study, may be selected from graduate courses in psychology, social work, sociology, management, education, planning, etc. Students who wish to pursue special research interests aside from their dissertations may register for Management 525, 526 (Maximum 6 hrs per term; courses may be repeated) or Management/Psychology 690. An internship, practicum, or field experience is recommended. A student is expected to be in residence full time one year (two years recommended).

A Master's candidate must pass a final oral examination.

In addition to course requirements, a Master's student must complete a comprehensive examination in general psychology within no more than two years by attaining a score of 630 (or 85th percentile) on the Subject GRE (Psychology-81). An overall "B" average is required in the course sequence Management 567-68 or Psychology 517-18 to continue in the program beyond the first year.

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. The M.S. and Ph.D. programs in Industrial and Organizational Psychology are available to residents of the states of Alabama, South Carolina, or Virginia. The Ph.D. program is available to residents of Arkansas or Kentucky. Additional information may be obtained from the Office of Graduate Admissions and Records.

THE DOCTORAL PROGRAM

(MAJOR: Industrial Engineering)

John N. Snider, Head

Electives, as approved for an individual's plan of study, may be selected from graduate courses in psychology, social work, sociology, management, education, planning, etc. Students who wish to pursue special research interests aside from their dissertations may register for Management 525, 526 (Maximum 6 hrs per term; courses may be repeated) or Management/Psychology 690. An internship, practicum, or field experience is recommended. A student is expected to be in residence full time one year (two years recommended).

A Doctoral candidate must pass a final oral examination.

In addition to course requirements, a doctoral student must attain a score of 650 (90th percentile) on the Subject GRE (Psychology-81) within two years of entry, successfully complete the qualifying examination covering scientific methodology before or during the third fall semester, and successfully complete the comprehensive examination in the area of the student's major research and professional interests.

An overall B average is required in the course sequence Management 567-68 or Psychology 517-18 to continue in the program beyond the first year.

A graduate program leading to the degree of Master of Science is open to graduates of A.B.E.T.-accredited undergraduate curricula in industrial engineering or to graduates of other technical curricula who take prerequisite coursework depending on their academic background. These courses will be determined by the graduate committee. The thesis program requires 24 hours of coursework and 6 hours of Thesis. A non-thesis option with 30 hours of coursework plus a 3-hour design project is available.

Graduate work in Industrial Engineering provides for concentrations in operations research, engineering management, manufacturing systems, human factors engineering, information systems, reliability and quality control, and traditional industrial engineering. Either one or two minors may be elected in engineering, mathematics, psychology, business, computer science, statistics or economics.

Any 400-level course required in the Bachelor of Science in Industrial Engineering program at The University of Tennessee may not be used for graduate credit in the M.S. graduate program in Industrial Engineering.

Graduate Courses


403 Production Facilities Design and Material Handling (3) Design of production facilities: plant layout, materials and planning for overall moving, packaging and storage of materials. Office layout and service areas. Design of facilities for such diverse groups as hospitals, banking, industry. Prereq 302, 401.

405 Engineering Economy (2) Methods and problems in selection or replacement of equipment. Decisions among engineering alternatives involving capital recov-

513 Facilities Planning and Design (3) Modern materials handling techniques, computer-aided layout tech- niques, application of operation research models, and use of these in design manufacturing facility. Prereq: Production facilities planning or consent of instructor.

514 Information Systems II (3) Systems analysis and systems control concepts applied to systems of infor- mation. Role of IE in office and factory of future. Management support systems, decision support sys- tems, and integrated support systems.


518 Advanced Engineering Economy (3) Financing and investment functions of firm; deterministic analy- sis of alternatives; cash flow projections; separation theo- rem; horizon model and basic horizon models; stochastic analysis of cap- ital budgeting problems; Monte Carlo simulation techniques; multiple attribute decision analysis. Prereq: Statistics.


521 Human Factors Engineering Methodology (3) Background in methodology used by human factors engineering designer and systems analyst. Observa- tional methods, design aiding techniques, computerized methods, human reliability and human error prediction, training evaluation, evalua- tion of man/machine interface. Basic objective techniques, scaling techniques, questionnaire and survey design, critical incident technique, concensus tech- niques (Delphi), accident investigation behavioral instrumentation, performance measurement, statistic- cal techniques in experimental design, and expert systems. Prereq: 520.

522 Optimization Methods in Industrial Engineering (3) Classical optimization theory, unidimensional and N-dimensional search techniques, Lagrangean relax- ation, separable programming, linearization techniques, quadratic programming, and dynamic programming. Prereq: 301 or 537.

523 Linear Programming and Extensions (3) Simp- lex and revised simplex methods, duality, parametric and post-optimality analysis, use of LP software inte- ger programming techniques, brand and bound and cutting planes, network programming. Prereq: 301 or 537.


531 Motivational Theories, Systems and Practices in Various Organizations (3) Theoretical and practical approaches to motivation and work behavior. Implications of work motivation theories for practitioners. Prereq: 530 or 531.

532 Productivity and Quality Engineering (3) Pro- duction and quality engineering concepts and methods and revised product design principles and application, and stress analysis of complex systems. Prereq: 518 or 523.

533 Theory and Practice of Engineering Management I (3) Comparison of classical management principles and theory with environment, needs, and practices of research and development and other scientific engineering organizations. Cases used to illustrate contemporary problems and environments. Techni- cal management function, marketing of technical services and products.


535 Organizational Behavior and Managerial Deci- sion Making (3) Theories and models of group process and their application to managerial decision making processes. Roles of various people categories and managerial decision making and implementation method. Case studies used to identify causes of irrational deci- sion, policies, and organizational behavior and to suggest corrective action.

536 Project Management (3) Management and control of multifaceted engineering and technological projects. Coordination and interactions between client and various service organizations. Selection of project manager and project office, handling problems associated with various phases of life cycle of project. Case studies illustrate theories and con- cepts.

537 Industrial Engineering Analysis and Control Techniques (3) Survey of management analysis and control systems through IE systems. Qualitative and quantitative systems: methods analysis, work mea- surement, incentive systems, wage and salary development, production and inventory control, linear programming, and applied operations research tech- niques. Not for credit for students with undergraduate degrees in industrial engineering.

538 Industrial Development (3) Factors other than mechanical or chemical which enter into successful establishment of manufacturing service enterprise. Organization of the manufacturing firm and evaluation. Cost and location studies and market anal- ysis to determine commercial feasibility of new ventures.

591-92-93 Special Topics in Industrial Engineering (3,3,3) Individual or group research projects. Prereq: Consent of instructor. May be repeated.

601 Operations Research Models in Engineering Econ- omy (3) Mathematical programming techniques applied to capital budgeting; advanced topics in multiple attri- bute decision analysis; Bayesian analysis of sequential decision making; artificial intelligence in complex deci- sion analyses. Prereq: 518, 523.


603 Dynamic Programming (3) Solving single-stage optimization problems as sequence of single-stage optimization problems. Computational and theoreti- cal aspects of dynamic programming. Applications of dynamic programming to various fields. Prereq: 522, 523.

604 Advanced Topics in Optimization (3) Multi-stage optimization theory. State and time dependent dynam- ical optimization theory. Prereq: 603.
Journalism
(College of Communications)

MAJOR
Communications

JAMES A. CROOK, Director

Professors:

Adamson, June N., M.S. Tennessee Ashdown, Paul, Ph.D. Bowling Green Crook, James A., Ph.D. Iowa State Everett, George A., Ph.D. Iowa Leiter, B. Kelly, Ph.D. Southern Illinois Singletary, Michael W. Ph.D. Southern Illinois

Associate Professors:

Bowles, Dorothy, Ph.D. Wisconsin Miller, Mark M., Ph.D. Michigan State Morrow, Jerry L., Ph.D. Toledo Puett, Sammie Lynn, M.S. Tennessee

Assistant Professors:

Caudill, C. Edward, Ph.D. North Carolina Heller, Robert B., M.A. Syracuse

Adjunct Professor:

Haley, Alex

The School of Journalism offers a concentration area for the Master's with a major in Communications. See Communications for additional information.

GRADUATE COURSES

403 International Communications (3) Development and operations of world mass communications channels and agencies. Comparative analysis of media, media practices, and flow of news throughout the world. Print and broadcast systems in terms of relevant social, political, economic, and cultural factors. Relation of communication practices to international affairs and understanding.

422 Opinion Writing (3) Analysis of editorial positions, practices, and pages. Writing of editorials and columns for newspapers, magazines, and company publications. Rhetorical devices and use of logic. Prereq.: Communications 200, or consent of instructor.

414 Magazine Article Writing (3) Techniques of writing in-depth articles of mass circulation and specialized magazines. Preparation of market material, problems in specialized areas: business, science, agriculture, humanities. Prereq.: Communications 200, or consent of instructor.

416 Issues in Journalism (3) Topics vary. Prereq.: Consent of instructor. May be repeated. Maximum 6 hrs.


433 Advanced Editing (3) Sensitivity to language and editing skills. Headline writing, layout, and production. Prereq.: 203.

460 Mass Communications History (3) Development of press and role of mass communications in American history. Newspapers, radio, television, and magazines. F


480 Journalism in the High School (3) Functions and methods of high school publications. Problems related to staff selection, content of publications, copy, layout, photography, printing, advertising, and business. Planning course outlines and curricula for journalism/mass media studies. Su

490 Advanced Photjoournalism (3) Advanced principles and methods of black-and-white photography. Introduction to color photography. News and feature photographs and photo essays. Prereq.: 290 or consent of instructor.

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


525 Public Opinion (3) Role of press in developing and influencing public consensus. Social theories of public opinion and analysis of mass media’s response. F

535 Publications Management (3) Problems in management, planning, communication analysis, and design. Techniques of writing, editing, and presenting comprehensive articles and other material; regional and specialized magazines. Individual editorial projects. Prereq.: 420 or consent of instructor.

540 Seminar in Newspaper Operations (3) On-site study of newspaper management operations. Positioning medium for its target audience and how this affects profitability. Prereq.: 540 or consent of instructor.

550 Writing and Editing Projects (3) Specialized writing or editing interests: agriculture, politics, labor, finance, science; technical, general publications. Prereq.: Consent of instructor. May be repeated. Maximum 6 hrs.

571 Seminar in Public Relations (3) Analysis and management of problems in communication between institutions and organizations and their publics. Measurement and evaluation of effectiveness of communication programs. Prereq.: 470 or consent of instructor.

580 Seminar in Visual Communication (3) Behavioral aspects of communication with images. Theories of psychological effect in color, shape, texture, and other design elements. Prereq.: 203 or Advertising 350 or Broadcasting 430 or equivalent.

590 Communications and International Development (3) Relationship between mass communications and development of nations. Role of communications media of developed nations in Third World regions of globe. Communications as facilitator of international cooperation.

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

598 Internship (3) Professional work in journalism supervised by editor or manager with faculty supervision. No retroactive credit for previous work experience. Prereq.: Completion of core curriculum.
The degree of Doctor of Jurisprudence will be conferred upon candidates who complete, with the required average, six semesters of resident law study and who have earned such credit, including all required courses. The required average is 2.0 and that average must be maintained on the work of all six semesters and also for the combined work of the grading periods in which the last 28 hours of credit were earned. Averages are computed on weighted grades. Grades are on a numerical basis from 0.0 to 4.0. A grade of 0.9 or below is a failure.

Eligible law students may receive credit towards the J.D. for acceptable performance in up to three (3) upper-level courses taken in other departments at The University of Tennessee. Course selection and registration are subject to guidelines approved by the law faculty which include the requirement that any such course be acceptable for credit toward a graduate degree in the department offering the course. Refer to the Law Bulletin for current degree requirements.

**DUAL J.D.-MBA DEGREE PROGRAM**

The College of Business Administration and the College of Law offer a coordinated dual degree program leading to the conferral of both the Doctor of Jurisprudence and the Master of Business Administration degrees. A student pursuing the dual program is required to take fewer hours of coursework than would be required if the two degrees were to be earned separately.

**Admissions**

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 commence studies in the dual program at the beginning of any term subsequent to matriculation in both collegesprovided, however, that dual program students must register for at least 8 hours of coursework in the first semester of their dual degree.

Curriculum

A dual degree candidate must satisfy the graduation requirements of each college. Dual degree students withdrawing from the dual degree program before completion of both degrees will not receive credit toward graduation from either college for courses in the other college, except as such courses qualify for credit without regard to the dual degree program. For students continuing in the dual degree program, the J.D. and MBA degrees will be awarded upon completion of requirements of the dual degree program.

The College of Law will award credit toward the J.D. degree for acceptable performance in a maximum of 8 semester hours of approved graduate-level courses offered by the College of Business Administration. A student shall receive 2 semester hours of credit for each such course successfully completed unless the law faculty specifies otherwise. Two of the 8 semester hours must be earned in Accounting 501, 503, or a more advanced accounting course. If College of Law credit is given for such accounting course, the dual degree student must not receive College of Law credit for Accounting for Lawyers (Law College Course 837).

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

Except while completing the first year courses in the College of Law, students are encouraged to maximize the integrative facets of the dual program by taking courses in both colleges each year.

**Awarding of Grades**

For grade recording purposes in the College of Law for graduate 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 of course standing in the college where such grades are so converted. The College of Law will award a grade of Satisfactory for a graduate business course in which the student has earned a B grade or higher and a No Credit for any lower grade. The College of Business Administration will award a grade of Satisfactory for a College of Law course in which the student has earned a 2.3 grade or higher and a No Credit for any lower grade. Grades earned in courses of either college may be used on a regular graded basis for any appropriate purpose in the college offering the course. The official academic record of the student maintained by the Registrar of the University shall show the actual grade assigned by the instructor without conversion.

**Non-Law Elective Course Credit**

Students enrolled in the J.D.-MBA degree program may not receive credit towards the J.D. degree for courses taken in other departments of the University except for those taken in conjunction with the dual program.

Note: Students are advised to consult The Graduate School's degree requirements as stated in the front section of this catalog as well as the requirements for this college.

**POLICY FOR GRADUATE STUDENTS TAKING LAW COURSES**

Law courses are not available for graduate credit; however, a graduate student may be allowed to take up to 6 semester hours of law courses and receive credit toward a degree upon approval of the College of Law and the major chairperson. The graduate student must register for the law course during regular registration at the College of Law requesting an S/NC grade only. If a 2.0 or above is earned in a law course, an S will be recorded on the transcript. If a student earns below a 2.0, an NC will be recorded and the course cannot be used toward meeting degree requirements. Grades for law courses will not be reflected in the cumulative average.

Different rules apply to the student enrolled in the Dual J.D.-MBA Program. Grades must be earned according to the grading system of the respective college, e.g. numerical grades for law courses, letter grades for graduate courses. Refer to page 18 for the grading scale acceptable toward meeting degree requirements. Cumulative GPA for law courses only will be carried until graduation, at which time both the graduate and the law cumulative will be shown on the permanent record.

**PROFESSIONAL COURSES**

801 Civil Procedure I (3) Binding effect of judgments, selecting proper court (jurisdiction and venue), ascertaining applicable law, and federal and state practice.


803 Contracts I (3) Basic agreement process and legal protections afforded contracts: offer and acceptance, consideration and other bases for enforcing promises; the Statute of Frauds, unconscionability and other controls of promissory liability. Introduction to relevant portions of Article 2 of the Uniform Commercial Code.

804 Contracts II (3) Continuation of Contracts I, Issues arising after contract formation: interpretation, duty of good faith; conditions, impracticability and frustration of purpose; remedies available for breach; assignment and delegation. Considerable coverage of Article 2 of the Uniform Commercial Code with references removed to anticipatory repudiation, impracticability and good faith.

805 Legal Process I (2) Lawyer-like use of cases and statutes in prediction and persuasion. Analysis and synthesis of common law decisions; statutory interpretation; fundamentals of expository legal writing and legal research.

806 Legal Process II (3) Continuation of Legal Process I. Formal legal writing, appellate procedure, and oral advocacy.

807 Torts I (3) Intentional torts, including battery, assault, false imprisonment, infliction of emotional distress, conversion and trespass; privileges and defenses to intentional torts; negligence, including standard of care and proof of negligence; immunity and limitations on duties; cause in fact; and proximate cause.

808 Torts II (3) Defenses, including contributory negligence, assumption of risk, comparative negligence, and statutes of limitations; vicarious liability; strict liability; products liability; settlement; problems of multiple defendants; non-tort alternatives for recovery for personal injury; law reform; defamation, invasion of privacy, and wrongful legal proceedings; misrepresentation, injurious falsehood, misappropriation of commercial values, and interference with contract; constitutional torts.

809 Criminal Law (3) Substantive aspects of criminal law; general principles applicable to all criminal conduct; specific analysis of particular crimes; defenses to crimes.

810 Property (4) Introductory course treating issues of ownership, possession, and title in the areas of landlord-tenant relations; estates in land and future interests; co-ownership and marital property; real estate sales agreements and conveyances; title assurance and recording statutes; servitudes; and selected aspects of nuisance law, eminent domain and zoning.

811 Constitutional Law I (3) Judicial review, limits on judicial power; national legislative power; regulation of commerce; power to tax and spend; other sources of national power; separation of powers; state taxation and regulation of commerce; intergovernmental immunities.

812 Evidence (4) Rules regulating introduction and exclusion of oral, written and demonstrative evidence at trials and other proceedings, including relevance, competence, impeachment, hearsay, privilege, expert testimony, authentication, and judicial notice.
814 Legal Profession (3) Legal, professional and ethical standards applicable to lawyers.

816 Computer-Assisted Legal Research (6) Introduction to computer research methods. Representative cases and practice materials. LEXIS and WESTLAW. Offered periodically. Required of all students.

821 Administrative Law (3) Administrative agency decision-making and judicial review; federal administrative procedures and rule-making; administrative tribunals; administrative liability; the role of the courts in administrative review; federal administrative procedure; federal administrative law in the policy-making process.

824 Local Government (3) Distribution of power between state and local governmental units; sources of authority for local government operations; creation of local government; problems created by urbanization and fragmentation of local government units; financing of local services; influence of federal programs on local government finance and decision-making.

827 Business Associations (4) Legal problems associated with raising of capital by new and growing enterprises; securities transactions by promoters, officers, directors and other insiders; regulation of publically-held corporations; litigation under Rule 10b-5 and other antifraud provisions; and provision of legal and other professional services in connection with securities transactions.

832 Business Planning Seminar (2) Selected problems and professional services in connection with securities transactions. Prereq: 827. May be repeated.

830 Securities Regulation (3) Basic structure of federal securities laws. Legal problems associated with raising of capital by new and growing enterprises; securities transactions by promoters, officers, directors and other insiders; regulation of publically-held corporations; litigation under Rule 10b-5 and other antifraud provisions; and provision of legal and other professional services in connection with securities transactions.

833 Business Planning Seminar (2) Selected problems and professional services in connection with securities transactions. Prereq: 827. May be repeated.

834 Antitrust (3) Federal antitrust laws; monopolization, price-fixing, group boycotts, and anticompetitive conduct as violations of the Sherman Act; competition and consumer interests: judicial and legislative developments; nature of presumptions of antitrust liability; corporate organization and antitrust; administrative remedies for violations of antitrust laws; antitrust liability in commercial financing, and other important issues.

835 Criminal Procedure I (3) Police practices and constitutional rights of persons charged with crimes: arrest; search and seizure; identification; interrogation and confessions; electronic eavesdropping; and right to counsel.

836 Criminal Procedure II (3) Pre- and post-trial procedures in a criminal case: bail; preliminary hearing; grand jury; prosecutorial discretion; discovery; speedy trial; plea negotiations; trial; voir dire; postconviction relief. Federal Rules of Criminal Procedure.

837 Criminal Law Theory (3) Theoretical foundations of criminal law. Prereq: 835.


840 Criminal Law Theory (3) Theoretical foundations of criminal law.

843 Debtor-Creditor Law (3) Enforcement of judgments; bankruptcy and its alternatives for business and consumer debtor; emphasis on Federal Bankruptcy Code.

845 Constitutional Law II (3) First Amendment rights of freedom of religion, expression, association and press; Fourteenth Amendment rights against discrimination as to race, gender, sex, etc.; rights to franchise and apportionment; substantive due process; due process; civil rights under federal laws enforcing post-Civil War Amendments to Constitution.

848 Civil Rights Actions (3) Litigation to vindicate constitutional rights in jury trials; duties of the government and its officials, as well as rights protected by other civil rights legislation: elements of cause of action under 42 U.S.C. sec. 1983, actions against federal government officials under the Bivens doctrine; institutional and individual immunities; relationship between state and federal courts in civil rights actions; and remedies for violations of constitutional and other civil rights.

849 Discrimination and the Law (3) Comparison of race, sex and other invidious discriminatory practices as they affect political participation, education, employment, housing and other social and economic activities; legislative enforcement of post-Civil War Amendments to Constitution.

851 Constitutional Law Seminar (2) Current constitutional law problems.

854 Criminal Procedure I (3) Police practices and constitutional rights of persons charged with crimes: arrest; search and seizure; identification; interrogation and confessions; electronic eavesdropping; and right to counsel.

855 Criminal Procedure II (3) Pre- and post-trial procedures in a criminal case: bail; preliminary hearing; grand jury; prosecutorial discretion; discovery; speedy trial; plea negotiations; trial; voir dire; postconviction relief. Federal Rules of Criminal Procedure.


860 Family Law (3) Survey of laws affecting formal and informal family relationships: premarital dispositions; ante-nuptial contracts; creation of common law and formal marriage; legal effects of marriage; support obligations; questions of parentage; divorce, alimony, and property settlements; child custody and child support; abortion; illegitimacy.

863 Children and the Law (2) Legal relationship between children and their parents and the state; parental prerogatives and children's rights; rights of illegitimates; adoption; temporary and permanent removal of children from their parents by the state: juvenile court procedures.

866 Environmental Law and Policy (3) Study, through methods of public policy analysis, of responses of legal system to environmental problems: environmental litigation; Clean Air Act; Clean Water Act; National Environmental Policy Act; Endangered Species Act; energy issues.

867 Environmental Law Seminar (2) Selected topics in environmental law.

869 Natural Resources Law (3) Nature of interests; conveying; royalties, grants and reservations, leases, and taxation of natural resources.

873 American Legal History (3) Selected topics in American legal history.

875 Empirical Studies of Legal Institutions (3) Social, economic and organizational factors that affect behavior of clients, lawyers, judges and other actors in legal institutions. Empirical studies of subjects: social structure and organization of bar; factors that affect filing, processing and disposition of claims in civil justice system; and factors that affect process of case dispositions in criminal prosecutions: plea bargaining process. Factors that affect "law as they envision" to operate differently than "law on the books."

877 Jurisprudence (3) Critical or comparative examination of legal theories, concepts, and problems: legal positivism; natural law theory; legal realism; idealism; humanism; functionalism; existentialism; Kantianism; sociological jurisprudence; policy science, and critical studies.

879 Law and Economics (3) Relationship between legal and economic thought, use of economics in legal decision making and legal criticism.

881 Law and Literature (3) Systematic study of literature and its applications to legal thought and accurate, fluent, and creative legal composition.

882 Law, Language, and Reality (3) Intermediate level jurisprudence course. Law as the mind's attempt to defend, direct, and administer human activity: exploration, through methods of epistemology, of ethical values underlying formal legal reasoning and legal concepts.

886 Public International Law (3) Law creating processes and doctrines, principles and rules of law that regulate mutual behavior of states and other entities in international system.

887 International Business Transactions (3) Legal status of persons abroad; acquisition and use of property in a foreign country; doing business abroad as a foreign corporation; engaging in business within a foreign country; expropriation or annulment of contracts or concessions.

889 International Law Seminar (2) Current international law problems. Prereq: 886 or 887.

891 Comparative Law (3) Introduction to civil law systems of France and Germany, focusing on legal institutions, methodology, and aspects of law of obligations and commercial law.

895 Labor Relations Law (3) Political, social and economic influences in development of federal labor relations laws; employees rights of self-organization; union and employer unfair labor practices; strikes, lockouts, boycotts, and collective bargaining processes; enforcement of collective agreements; individual rights of employees; federal preemption and state regulation.

896 Employment Law (3) Legal regulation of employment relationship: legal, social and economic influences in employee-employer relationship; employment discrimination; legally prescribed minimum standards of compensation and social security; collective bargaining and regulation of employment; regulation of retirement systems.

898 Arbitration Seminar (2) Arbitration of labor agreements: judicial and legislative developments; nature of process; relationship to collective bargaining; selected arbitration problems on various topics under collective agreements; and role of lawyers and arbitrators. Prereq: 886. 

899 Labor Relations Seminar (2) Selected labor relations law problems. Prereq: 886.

906 Civil Advocacy (6) Supervised fieldwork, requiring students to assume primary responsibility for representing clients with various civil legal problems. Exploration of theory, practice and ethics of interviewing, counseling, planning, investigation and discovery, drafting, negotiation, litigation, and other professional tasks necessary to compete. Preparation for clients. Hearings in state and federal courts, or before state and federal administrative officers or judges. Prereq: 850 and third-year standing.

908 Criminal Advocacy (6) Supervised fieldwork, requiring students to assume primary responsibility for defending clients accused of crime in Knox County. Exploration of theory, practice and ethics of interviewing, counseling, planning, investigation and discovery, drafting, negotiation, litigation, and other professional tasks necessary to compete. Preparation for clients. Hearings in state and federal courts, or before state and federal administrative officers or judges. Prereq: 850 and third-year standing.

915 Conflict of Laws (3) Jurisdiction, foreign judgments, and conflict of laws.
916 Federal Courts (3) Jurisdiction of federal courts; conflicts between federal and state judicial systems.

918 Remedies (4) Judicial remedies: damages, restitution, and equitable relief; availability, limitations and measures of damages; conduct and consequences of contract; tort and property-related remedies.

920 Trial Practice (3) Litigation through simulation, trial problems and preparation: basic trial strategy; process of litigation; contact investigation and witness preparation; discovery and presentation of evidence; selection and instruction of jurors; opening and closing arguments; pleadings, motions, interrogatories or memoranda. Prereq: 813.

921 Pre-Trial Litigation (3) Civil pre-trial procedures. Drafting of actual pre-trial documents in civil cases: complaints, motions for preliminary injunction, class certification papers, and others. Prerequisite for participation: summary judgment, and various discovery papers.

923 Complex Litigation (2) Advanced civil procedure course dealing with special problems that arise in litigation involving multiple claims and multiple parties: permissible and compulsory joinder; intervention; disposition of duplicative or related litigation; class actions; discovery in large cases; judicial control of contempt; res judicata and collateral estoppel problems.

925 Appellate Practice Seminar (2) Federal and Tennessee Rules of Appellate Procedure, local rules of federal circuits; review of complete records of several doctrine cases and preparation of an appellate brief based on record of actual case.

927 Interviewing, Counseling and Negotiation (3) Development of conceptual and practical frameworks for understanding interviewing, counseling and negotiation, and lawyer's role in tasks. Readings of different methods, strategies and perspectives from recent legal literature."
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 about 20 hours each week and thus may extend the period required for the degree. Similar opportunities exist with other libraries and information agencies in the Knoxville area.

Work opportunities in a scientific-technical environment are available through subcontracts with Oak Ridge National Laboratory and the Department of Energy. A limited number of graduate assistantships are available through the school. Assistantships of this type carry a waiver of tuition and fees as well as a stipend and require that recipients work 10 hours per week in the school.

The program is listed in the Academic Common Market of the Southern Regional Education Board. Students residing in Arkansas, Georgia, West Virginia, or Virginia can normally qualify for in-state fee status by applying to the Academic Common Market coordinators in their state capital.

For information on and information about financial aid and other information about the MSLS in Library and Information Science, write to:

Gary R. Purcell, Director
Graduate School of Library and Information Science
University of Tennessee
804 Volunteer Blvd.
Knoxville, TN 37996-4330

ADMISSION REQUIREMENTS

Candidates who have at least a 3.0 average in the junior and senior years will receive first consideration. Applicants are required to take the general test of the Graduate Record Examination. The test should be taken at least one semester in advance of application for admission to The Graduate School.

Foreign applicants are required to take the Test of English as a Foreign Language. A personal data sheet and three recommendations (obtained from the Graduate School of Library and Information Science) should be returned to the director of the school.

MASTER OF SCIENCE IN LIBRARY SCIENCE

The program leading to the Master of Science in Library Science involves a total of 39 semester hours of graduate courses, 18 hours of which form a core curriculum required of all students. Either a thesis or a non-thesis option is available, with 6 hours allowed for thesis credit. At least 30 hours must be taken in the Graduate School of Library and Information Science, allowing up to 9 hours outside the school with a maximum of 6 from outside the University. Upon completion of the program, all students are subject to a final examination. For students who elect the thesis option, the examination will be conducted at the discretion of the advisor. Students who elect the non-thesis option will be given a written comprehensive examination.

4. An understanding of and competence in the selection, acquisition, organization, storage, retrieval, and dissemination of information.

5. An understanding of bibliographic control and knowledge of information sources in various formats and subjects.

6. An understanding of management theory and practice, particularly as these are related to library and information services.

7. A knowledge of research methods sufficient to enable them to engage in effective problem solving.

B. To provide services to the state, region, and nation in association, consulting, and continuing education activities which will promote the development and improvement of information systems and services such that the school's contributions reach beyond its immediate academic programs. The school will provide:

1. Continuing education for information professionals and, on a selective basis, to persons outside the information field.

2. Advisory services to libraries and other types of organizations.

3. Leadership for professional associations.

C. To conduct basic and applied research which promotes the generation of new knowledge, services, and technology. The school will encourage:

1. Research which strengthens its instructional and public service programs.

2. The use of a variety of research methods.

3. Sharing the results of its research.

4. Increased research quality and productivity.

532 Sources and Services in Science and Technology (3) Information sources in engineering, physical and life sciences. Prereq: 530. Sp

533 Sources and Services for the Humanities (3) Information sources in philosophy, religion, fine arts, performing arts, literature, and language, and history. Organization of collections for optimum use. Prereq: 530. Su


540 Research Methods in Library and Information Science (3) Research methods applicable to librarianship and information management. Process and conduct of empirical research. Analysis of published research. Prereq: Admission to program or consent of instructor. E,Su,A

550 Library and Information Agency Management (3) Management and organizational concepts applicable to libraries and other information agencies. Prereq: Admission to program or consent of instructor. E,Su,A

551 School Libraries and Media Centers (3) Planning, implementing and evaluating school library programs. Curricular involvement, role of technology, relationships with district and state services. F,Su

552 Academic Libraries (3) Development and present status, mission and objectives with higher education institutions, trends, problems, recurring issues. F

553 Special Libraries and Information Agencies (2) Development and present status, scope and objectives, administrative and organizational problems and techniques. F

554 The Library in the Community (3) Application of marketing analysis for planning and policy formulation. Public library focus. Sp

560 Development and Management of Collections (3) Philosophy and process of building and maintaining collections in libraries in libraries of various types: environs; community analysis; policy statements; collection evaluation; and preparation of buying lists. Prereq: 550. E,Su,A

561 Contemporary Book Publishing (3) Creation, design, production, marketing, and distribution of materials acquired by libraries; various types of publishers. F

562 Serials (3) Serials collections: selection, acquisition, bibliographic control, storage, maintenance, and public service. Prereq: 560 or consent of instructor. Su

563 Nonbook Materials (3) Selection, acquisition, bibliographic representation, storage, utilization, and programming; microformats, films, video, sound recordings, and as information media. F

564 Records Management and Archives (3) Objectives and functional elements of records management and archives programs within various types of organizations, management of creation, distribution, retention, storage, retrieval, protection, and disposition of organizational records regardless of information medium. Sp

569 Advanced Production of Audiovisual Software (3) (Same as Curriculum and Instruction 569)

571 Resources for Children (3) Critical survey of books and related materials for children, development and archives programs within various types of organizations, management of creation, distribution, retention, storage, retrieval, protection, and disposition of organizational records regardless of information medium. Sp

572 Resources for Young Adults (3) Critical survey of books and materials for young adults; personal, vocational and recreational needs and interests. Evaluation, selection, and utilization for school and public libraries. Sp

573 Services for Children and Young Adults (3) Philosophy and objectives of public and school library services for children and young adults. Reading, listening, and viewing guidance for individuals and groups. Program planning, implementation, and evaluation. Prereq: 571 or 572 or consent of instructor. Su
574 Adult Materials and Services (3) Fiction and subject categories, popular and standard; reading, listening, and viewing guidance to meet adult interests; development of specialized collections; services for adults.

580 Foundations of Information Science (3) Identifies attributes of information; information theory, relevance, use and user studies, bibliometrics, and major components of information retrieval system design. Relates research findings to library and information system practice. Prerequisite: FSPA. 

581 Information in Society (3) Characteristics of an information society, knowledge and information, effect of technological innovation, use and effect of media. F

582 Automation (3) Computer concepts and their applications to basic library and information center operations. ESUA

583 Information Systems Analysis and Design (3) Tools and methodologies in library/information agency systems planning and implementation. Role and training of systems analyst; systems study from planning through implementation and evaluation, and related topics. Sp

584 Bibliographic Database Design (3) Design and construction of bibliographic databases, record and database structure, document representation, indexing, abstracting, thesaurus construction and maintenance, and information retrieval. Sp

585 Information Technologies (3) Computer-based and non-computer related media and methods for information storage, retrieval, and transfer within and external to library/information center environment; existing and prototype systems and interfacing of technologies. Prereq: 582 or consent or instructor. Sp

590 Problems in Library and Information Science (3-6) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

591 Supervised Readings in Library and Information Science (3-6) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

592 Seminar in Library and Information Science (3) Prereq: Consent of instructor. May be repeated with consent of advisor. Maximum 6 hrs. E

593 Independent Study (3) Prereq: Consent of advisor. Maximum 6 hrs.

599 Practicum (3) Opportunity to translate theory into practice under guidance of qualified information professionals. Prereq: Completion of core courses relevant to student's practicum design. Written consent of advisor and approval of practicum coordinator. May be repeated with consent of advisor and practicum coordinator. E

Degree Requirements

The Master's degree requires a minimum of 30 semester hours of study approved by the student's committee, a thesis, and an oral examination. Within the biotechnology program only, a non-thesis M.S. option is available. Students choosing this option are expected to complete (1) two summers' co-op experience in an appropriate industry. An evaluation by supervisor and a written report are required (529, Biotechnology Practicum Cooperative Experience, maximum 4 hrs.); (2) A written report in the form of a scientific paper in an area of specialization chosen by the student and advisor. The minimum requirements for the doctoral degree include at least 6 hours above the 600 level, 24 semester hours of course 600, a pattern of courses approved by the student's committee, a comprehensive examination, a doctoral dissertation, and a defense of dissertation. Individual programs may have additional requirements.

Concentrations

Biotechnology

The biotechnology program will prepare students to participate in the wide variety of opportunities presented by the use of living cells and their components for the production of useful materials. This will be achieved at the M.S. level by a prescribed course of study of the biology and biochemistry of cells and molecules; by formal study of cells and of engineering aspects of biotechnology; and by the development of special expertise in areas such as animal embryo manipulation, automated chemical synthesis of macromolecules, bioprocess engineering, bioproducts and biotransformations, liposomes, micro-nano and image processing, monoclonal antibodies and hybridoma technology, plant tissue culture, recombinant DNA technology and risk assessment, and modeling. The production of a research thesis or an industrial co-op experience plus an area of specialization will also be an important part of the training experience. Required courses are Life Sciences 509, 511, 512, 531, and 532; Biochemistry 410; Microbiology 410; Botany 451; Chemical Engineering 475; and Zoology 507.

Cellular, Molecular and Developmental Biology

The inter-departmental program in cellular, molecular and developmental biology includes research in structural or functional aspects of cells or subcellular components, or the interactions between cells. Required courses are Life Sciences 511, 512, 531, and 532.

Environmental Toxicology

The toxicology program provides intensive training in basic toxicological principles and techniques. Courses and research expose trainees to mechanisms of intended and unintended interactions between living systems and potentially toxic agents from the point of view of biochemistry, physiology, ecology, public health, environmental law and regulation, pest management, pollution control and repair, and testing and residue analysis of toxicants. Required courses are Biochemistry 561, 562, 604; and Life Sciences 510.

Ethology

Ethology is the naturalist study of normally occurring animal and human behavior. The program provides intensive training in basic ethology with specialized studies available in the development, evolution, and physiology of behavior; comparative psychology; human ethology; and behavioral ecology and sociobiology.

Required courses for the Master's are Psychology/Zoology 450, 459; Zoology 524, 583; Statistics 531-32; and Zoology/Psychology 516.

The Ph.D. requirements are the same as for the Master's with the additional requirements of one additional statistics course and six semester hours of courses numbered above 600 approved by student's committee.

Physiology

The inter-departmental program in physiology includes research in the areas of cellular, comparative, developmental, exercise, muscle, neurophysiology, regulatory, or reproductive.

Required courses are Zoology 520, 521, 240, 350, 420; Biochemistry 410; four 600-level seminars; and a statistics sequence.

Plant Physiology and Genetics

This program provides the opportunity for intensive training and research experience in areas transcribing the usual boundaries of botany, biochemistry, and agricultural plant sciences. It devotes itself to seeking solutions of problems concerning the interactions of physiology and genetics in applied and fundamental aspects of plant science.

Required courses are Life Sciences 510; Botany 521, 522; Biochemistry 511, 512; Plant and Soil Science 471 or Zoology 560; Plant and Soil Science 551; Microbiology 410.

Graduate Courses

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

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

509 Biotechnology Seminar (1-2) Topics of importance to biotechnology. May be repeated. Maximum 6 hrs.
510 Special Topics in Life Sciences (1-3) Specializations in biotechnology; cellular, molecular, and developmental biology; environmental toxicology; ethology; plant physiology and genetics; and physiology. May be repeated. Maximum 9 hrs.

511 Advanced Cellular Biology (3) Cell structures and functions at molecular and supramolecular level. Membrane structure, function, and biogenesis; cellular communication; receptors and membrane flow; growth regulation and oncogenes; plant cell structure and function; contractility and motility; mitosis and meiosis; blood and immune cells.

512 Advanced Molecular Biology (4) (Same as Biochemistry 512.)

525 Research Practicum in Life Sciences (1-3) Individual sections for each of biotechnology; cellular, molecular and developmental biology; environmental toxicology; ethology; plant physiology and genetics; and physiology. May be repeated. Maximum 9 hrs.

529 Biotechnology Practicum Co-operative Experience (2) Work experience in commercial organization for students undertaking non-thesis option of biotechnology concentration. Evaluation by supervisor and written report by student. May be repeated. Maximum 4 hrs.

531 Biotechnology Laboratory (3) Growth of microorganisms, analysis of extracellular and intracellular components.

532 Biotechnology Laboratory (3) Pilot scale yeast cultivation, enzyme isolation, purification and characterization. Application of purified enzymes to food production fermentations and fermentation process control.

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

610 Advanced Topics in Life Sciences (1-3) Topics vary. May be repeated. Maximum 6 hrs.

Logistics

See Marketing, Logistics and Transportation

Management

(College of Business Administration)

MAJOR DEGREES

Business Administration . . . MBA, Ph.D.

MBA Concentrations: Management, Forest Industries Management.

MINIMUM COURSE REQUIREMENTS FOR MAJOR:—Three courses from the following:

501, 513, 521, 522, 531, 541, 542, 571, 593. Selection must be approved by the Management Department MBA advisor. For forest industries management — 511, 513; Forestry 560, 565.

501 Management of Organizational Behavior (3) Integration of individual and group differences, organization theory and design, motivation, leadership, human resources planning, and career implications with strategy, planning, and decision making.

505 Operations and Logistics Management (3) Concepts and techniques for managing operations and distribution systems. (Same as Transportation 505.)

511 Organizational Theory: Integrated Structure and Behavior (3) Cases, group projects, discussion; organizational theories, organizational effectiveness; contextual factors of organizations, environment, size, technology, organizational structure configurations, organization design; social influences on organizational effectiveness; motivation, leadership, group behavior, intergroup relations, organization change and development.

513 Strategic Planning (3) Theoretical and applied literature, successful strategic positioning of business in variety of environments. Analysis of industry notes and case histories. Coreq: Business Administration 509.

521 Personnel Administration (3) Personnel functions and human resource management. Community relations, recruiting, selection, training, performance evaluation, wage and salary administration, legal framework as it affects personnel.

522 Labor Relations and Collective Bargaining (3) American labor history, structure and philosophy of bargaining, dispute settlement, and contract administration. (Same as Economics 562.)

Rush, Michael C., Ph.D. . . . . . . . Akron
Russell, J. E. A., Ph.D. . . . . . . . Akron

Assistant Professors:

Bowers, Melissa R., Ph.D. . . . . . . . . . Clemson
Campbell, P. G., M.S. . . . . . . . . . . . . . . Austin Peay
Fox, Dale R., Ph.D. . . . . . . . . . . . . . . Purdue
Fryxell, Gerald E., Ph.D. . . . . . . . . . Indiana
Hudson, Robert A., Ph.D. . . . . . . . Minnaska
Kaplan, Lori A., Ph.D. . . . . . . . . . . . . . . . . . . . Michigan
Miller, Alex, Ph.D. . . . . . . . . . . . . . . . . . . . . . . Washington
Noon, Charles E., Ph.D. . . . . . . . . . . Michigan
Patek, Minnie H., Ph.D. . . . . . . . . . . . . . . . . . . . Georgia Tech

BUSINESS ADMINISTRATION CONCENTRATIONS

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

MBA Concentrations: Management, Forest Industries Management.

MINIMUM COURSE REQUIREMENTS FOR MANAGEMENT—Three courses from the following:

511, 513, 521, 522, 531, 541, 542, 571, 593. Selection must be approved by the Management Department MBA advisor. For forest industries management — 511, 513; Forestry 560, 565.

Ph.D. Concentration: Management.

Minimum course requirements are for operations management — 541 and 542; two semesters of 640 (may be repeated for credit); one additional semester of approved doctoral seminar work. For strategic management — 513, 610, 611, 612.

GRADUATE COURSES

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

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


505 Operations and Logistics Management (3) Concepts and techniques for managing operations and distribution systems. (Same as Transportation 505.)

511 Organizational Theory: Integrated Structure and Behavior (3) Cases, group projects, discussion; organizational theories, organizational effectiveness; contextual factors of organizations: environment, size, technology, organizational structure configurations, organization design; social influences on organizational effectiveness; motivation, leadership, group behavior, intergroup relations, organization change and development.

513 Strategic Planning (3) Theoretical and applied literature, successful strategic positioning of business in variety of environments. Analysis of industry notes and case histories. Coreq: Business Administration 509.

521 Personnel Administration (3) Personnel functions and human resource management. Community relations, recruiting, selection, training, performance evaluation, wage and salary administration, legal framework as it affects personnel.

522 Labor Relations and Collective Bargaining (3) American labor history, structure and philosophy of bargaining, dispute settlement, and contract administration. (Same as Economics 562.)
Management Science

(College of Business Administration and Intercollegiate Program)

MAJORS DEGREES
Management Science..........................M.S., Ph.D.
Business Administration ......................M.B.A.

Kenneth C. Gilbert, Chair

Professor:
Ho, James K., Ph.D..................................Stanford
Associate Professor:
Gilbert, Kenneth C., Ph.D.........................Tennessee
Assistant Professors:
Bowers, Melissa R., Ph.D..........................Clemson
Fox, Dale R., Ph.D..................................Purdue
Kaplan, Lori A., Ph.D...............................Michigan
Noon, Charles E., Ph.D..............................Michigan
Patel, Minnie H., Ph.D..............................Georgia Tech

Additional Committee Members:
Boling, Ronald W., Management
Fowler, Oscar B., Management
Hilliard, Jimmy E., Finance
Leitnaker, Mary G., Statistics
Raitson, Bruce A., Geography
Sullivan, William G., Industrial Engineering

THE MASTER'S PROGRAM

The M.S. program in Management Science is an intercollegiate program and is designed as preparation for a career in the application of quantitative techniques for the solution of complex problems. The program's flexibility also makes it appropriate as preparation for doctoral study in Management Science.

Management Science coursework will expose students to both the theoretical development of quantitative techniques and their application to managerial decision making. In addition to the development of sufficient mathematical maturity for creative use of quantitative skills, the program requires 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.

Admissions Requirements

The Master's program requires three Graduate School Rating Forms and the GRE or GMAT. Applications are encouraged from all majors, but mathematics background equivalent of the completion of at least two years of college calculus and proficiency in a computer language is required. The program is designed to be completed in three semesters by full-time students. However, students may start the program in any semester and may pursue an M.S. degree in Management Science on a part-time basis.

Course Requirements

<table>
<thead>
<tr>
<th>Course Requirements</th>
<th>Hours</th>
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<tbody>
<tr>
<td>Core Requirements</td>
<td>14</td>
</tr>
<tr>
<td>Management Science</td>
<td>531, 532, 533, 534</td>
</tr>
<tr>
<td>Statistics 563</td>
<td></td>
</tr>
<tr>
<td>Applied specialization area</td>
<td>9 (approved by advisor)</td>
</tr>
<tr>
<td>Statistics elective—500 level or above (approved by advisor)</td>
<td>6</td>
</tr>
<tr>
<td>Mathematics—400 level or above (approved by advisor)</td>
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</tr>
<tr>
<td>Electives selected from mathematics, statistics, computer science, and/or management science area</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>38</td>
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</tbody>
</table>

A thesis option is available to qualified students who substitute 6 hours of thesis credit for the following 8 hours of coursework: Management Science 534, 3 hours in the applied area, and 3 hours of electives in any area. The Management Science Committee will work closely with the student in tailoring a program to his/her needs. The committee may approve a tentative overall program during the student's first semester and must approve all courses on a semester-by-semester basis.

Recognizing the diverse backgrounds and needs of Management Science M.S. students, the Management Science Committee is prepared to waive some of the above requirements on an individual basis. For example, an undergraduate mathematics major with a strong background may be allowed to take 6 additional hours of electives in place of the mathematics requirements. On the other hand, a student lacking experience in rigorous senior-level mathematics courses will be asked to take such courses to fulfill the 6-hour mathematics requirement. The total course load will remain 38 hours for all non-thesis students and 36 hours for all thesis students; however, the number of hours of electives can be reasonably expected to vary between 6 and 12 as a function of prior background.

THE DOCTORAL PROGRAM

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

1. to provide, through management science coursework, a thorough knowledge of common Management Science/Operations Research mathematical models and their uses;
2. to provide sufficient advanced study in a supporting area to qualify the graduate for a joint faculty position in the supporting area and management science. The candidate may choose from the business functional areas (accounting, finance, marketing, management, and transportation and logistics) or other disciplines, (e.g., computer science, forestry, ecology, and public administration);
3. to develop in the student, through coursework in mathematics, statistics and computer science, a high degree of mathematical maturity to enhance a potential career in management, research, or teaching.

Admission Requirements

The doctoral program requires three Graduate School Rating Forms and the GRE or GMAT, in addition to The Graduate School's requirements.

Coursework

A minimum of 48 semester hours of coursework taken for graduate credit (exclusive of thesis or dissertation) is required. Some of this may be coursework from a Master's program although a Master's is not a prerequisite for the doctorate. The candidate must complete a minimum of 24 semester hours at The University of Tennessee, Knoxville, at least 6 of which must be at the 600 level. Both of these requirements are also exclusive of theses or dissertation credits. Entering students who have completed graduate studies in applicable fields will be granted course credits for work which is equivalent to required courses in the program.

The program includes approximately 16 to 20 semester hours of coursework in the applied area.

Qualifying Examinations

The student must demonstrate mastery of probability theory and statistical inference, Statistics 563, 564, by passing a written qualifying examination.

Mastery of 12 to 14 semester hours in mathematics coursework must be demonstrated by passing a written qualifying examination. Topics normally included are numerical analysis, either Mathematics 471, 472, 453, and 571, or 571-572, and real analysis, Mathematics 445-446. Other options may be approved. In exceptional circumstances, the faculty will consider waiving the mathematics and/or statistics qualifying examinations. These requirements generally are completed by the end of the first year of the program.

There is no foreign language requirement.

Comprehensive Examination

Prior to admission to candidacy for the degree, and normally after completion of the second year of the program, the student must pass a written comprehensive examination covering the theory of deterministic and stochastic management science models. Topics included in this examination are determined on an individual basis. Students will be expected to demonstrate an integrative ability that goes beyond simple mastery of course content.

Research and Dissertation

The student must complete 24 semester hours of Management Science 600: Doctoral Research and Dissertation, through which he/she is expected to make a significant contribution to the science. A final oral examination is conducted over the dissertation and such other segments of the program that the faculty committee deems appropriate. This effort, which is beyond the minimum 48 hours of coursework, normally is completed in the third year of the program.
ACADEMIC STANDARDS
A graduate student in the College of Business Administration whose grade-point average falls below 3.0 will be placed on probation. A student on probation will be dropped from the program unless his/her cumulative graduate grade-point average is 3.0 or higher at the end of the probationary period. The probationary period is defined as the next semester's coursework as established by the degree program for full-time students and the next two semester's coursework as established by the degree program for part-time students.

PREREQUISITES FOR MANAGEMENT SCIENCE COURSES
The Management Science Program is interdisciplinary and students in other degree programs are encouraged to enroll in management science courses. Course prerequisites are designed to indicate the level at which courses are taught. Interested students whose prior coursework does not match the prerequisites are encouraged to seek the instructor's guidance and consent to enroll.

BUSINESS ADMINISTRATION CONCENTRATION
For complete listing of MBA program requirements, see Business Administration. MBA Concentration: Management Science. Minimum course requirements are 532 and 534. The MBA Core is revised as follows: substitute Management Science 531 for 501, Statistics 553 for 501, and with approval of student's advisor, substitute Statistics 556 for 501.

GRADUATE COURSES
500 Thesis (1-18) P/NP only. E
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E
533 Computational Mathematical Programming (3) Advanced modeling, computational and reporting techniques for mathematical programming. Prereq: 531 and proficiency in PASCAL.
534 Application of Management Science Methods (3) Application of methods from 531 and 532 to real-world problems. Exposure to existing problem in industry or elsewhere.

581 Special Topics in Management Science (3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.
593 Management Science Problems (1-9) Directed study on subject of mutual interest.
600 Doctoral Research and Dissertation (3-15) P/NP only. E
621 Network Flows (3) Treatment of network optimization algorithms, transportation and transshipment models and primal-dual and primal-basis tree methods. Prereq: 531 or equivalent.
631 Integer Programming (3) Theoretical and computational aspects of linear programming with integer variables, branch and bound, cutting plane, and group theoretic algorithms. Prereq: 531 or equivalent.
651 Nonlinear Optimization (3) Solution of constrained and unconstrained nonlinear programming problems. Practical algorithms that perform well in recent practice. Prereq: 531 or equivalent.
681 Special Topics (3) Prereq: 531, 532 and consent of instructor. May be repeated. Maximum 9 hrs.
691-92 Management Science Seminar (1,1) Subjects selected from current literature.

MARKETING, LOGISTICS, AND TRANSPORTATION (College of Business Administration)

MAJOR DEGREES
Business Administration.............. MBA, Ph.D.
David J. Barnaby, Chair

Marketing
Professors:
Barnaby, David J., Ph.D.................... Purdue
Cadotte, E. R., Ph.D.................... Ohio State
Jenkins, Roger L., Ph.D..................... Ohio State
Locander, W. B., Ph.D.................... Illinois
Woodruff, R., BBA, DBA..................... Indiana

Associate Professors:
McMillan, J. R., Ph.D.................... Ohio State
Reizenstein, Richard C., Ph.D.................. Cornell
Rentz, J. O., Ph.D.................... Georgia

Assistant Professors:
Faulds, D. J., Ph.D.................... Iowa
Gardial, S. F., Ph.D.................... Houston
Schumann, D. W., Ph.D.................... Missouri

Speck, P. S., Ph.D.................... Texas Tech

BUSINESS ADMINISTRATION CONCENTRATIONS
For complete listing of MBA and Ph.D. program requirements, see Business Administration.
MBA Concentration: Marketing.
Minimum course requirements are three courses from the following: 503, 504, 505, 506, 550, 593, 599, Transportation 507, Business Administration 534, and Ph.D. Concentration: Marketing.
Minimum course requirements are 12 hours from among the following courses: 601, 602, 603, 604, 605, 606.

GRADUATE COURSES
501 Marketing Management (3) Marketing viewed as total system designed to plan, promote, and distribute goods and services to household consumers and industrial users. Demand analysis as basis for marketing decisions.
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E
503 Buyer Behavior—Analysis for Marketing (3) Consumer behavior concepts and processes developed and applied to market analysis and design, and control of marketing programs. Social psychology and demographic factors that affect consumer product, brand and patronage decisions. Prereq: 501.
504 Analyzing Market Opportunity for Marketing Decisions (3) Major determinants of opportunity in markets, framework for finding markets and analyzing them for opportunity, application of market opportunity analyses to marketing strategy decisions. Prereq: 501.
505 Marketing Research and Information Planning (3) Design of a rigorous marketing study from inception to implementation of results by recognizing key decision points and critically evaluating merit of research project. Prereq: 501.
506 Marketing Strategy (3) Integration of concepts and analytical skills from each component area of marketing to formulate cohesive, well-organized marketing program. Prereq: 501.
550 Market Opportunity Analysis for New Ventures (3) Concepts for understanding coverage of new ventures, MOA, and various information sources and procedures; identify and analyze sales opportunities in markets for new product or service. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.
599 Special Topics Seminar (3) Topics vary: nonbusiness marketing applications, macroenvironmental issues, market segmentation, international marketing, services marketing, marketing channels, and related issues. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.
600 Doctoral Research and Dissertation (3-15) P/NP only. E
601 Marketing Theory (3) Nature and scope of marketing, role of theory development and theory testing important to marketing research.
602 Research Methods (3) Research process: problem formulation, research design, experimental design, measurement and implementation of results. Design: experimental design, survey research, and measurement.
603 Marketing Thought (3) Marketing literature across number of research areas. Evaluate individual works, determine state of research in each area, and identify areas that merit further study.
Logistics and Transportation

Professors:
Davis, F. W., Jr., Ph.D. .......... Michigan State
Dicer, Gary N., DBA ............... Indiana
Frye, J. L. (Emeritus), Ph.D. ....... Florida
Hendrix, F. L. (Emeritus).
Ph.D. ........ North Carolina
Langley, C. J., Jr., Ph.D. ....... Penn State
Mundy, Ray A., Ph.D. ....... Penn State
Patton, E. P., Ph.D. ........ North Carolina

Associate Professor:
Foggin, J. H., DBA ............... Indiana

BUSINESS ADMINISTRATION

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

MBA Concentration: Logistics and Transportation.
Minimum course requirements are 501, 508, and one course from the following: 503, 504, 506, 507, 509, and 599.

Ph.D. Concentration: Logistics and Transportation.
Minimum course requirements are 12 hours to include 601, 602, 603.

GRADUATE COURSES

501 Survey of Logistics and Transportation (3) U.S. logistics and transportation: physical, economic, social, and political environment; financing, managing, maintaining, and enhancing U.S. transport infrastructure.

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

503 Logistics and Transportation Economics and Policy (3) Economics and legal principles which shape transportation and administration of logistics and transportation policy in U.S.

504 Freight Carrier Systems and Management (3) Analysis of freight carrier management's efforts to provide services demanded by consumers in logistics and transportation marketplace.

505 Operations and Logistics Management (3) Same as Management 505.

506 Logistics Systems Management (3) Development of strategy for management of logistics systems. Executive level integration of logistics operations with marketing, production, and other decision areas. Practical applications through case approach and simulation game.

507 International Logistics and Transportation (3) Logistics strategy in the multi-national firm: materials management, international sources and distribution, and importing/exporting. Issues: international carrier management and operations and comparative national transport systems analysis.

508 Executive-In-Residence Seminar in Logistics and Transportation Strategy (3) Capstone, integrative case course in logistics and transportation strategy; participation in Executive-In-Residence program that provides student interaction with top-level logistics and transportation executives.

593 Independent Study (3-6) Directed research and study. Prereq: Consent of instructor. May be repeated.

599 Special Topics in Logistics and Transportation (3-6) Seminar designed to study specific current problem areas in logistics and transportation. Topic announced prior to offering. Prereq: Consent of instructor. May be repeated.

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

601 Seminar in Logistics and Transportation Models (3) Analysis of contemporary models and methodologies in logistics and transportation research, topical coverage at discretion of instructor.

602 Seminar in Macrotransportation Systems (3) Contemporary national logistics and transportation systems, governmental policies in logistics and transportation sector, and current literature and research in field.

603 Research Methodology in Logistics and Transportation (3) Fundamental research process in areas of logistics and transportation, history and development of body of knowledge, and contemporary research methodology to develop student dissertation topics.

Materials Science and Engineering

(College of Engineering)

MAJORS
Metallurgical Engineering .......... M.S., Ph.D.
Polymer Engineering .......... M.S., Ph.D.

Joseph E. Spruiell, Head

Professors:
Ashbee, K. H. G., Ph.D. .......... Birmingham
Bogue, Donald C., Ph.D. .......... Delaware
Borie, Bernard S., Ph.D. .......... MIT
Brooks, C. R., Ph.D. .......... Tennessee
Buchanan, Raymond A., Ph.D. .......... Vanderbilt
Clark, Edward S., Ph.D. .......... California
Canonico, D. A., Ph.D. .......... Lehigh
Fellers, J. F., Ph.D. .......... Akron
Lih, J. S., Ph.D. .......... Kansas
Lowndes, Douglas H., Ph.D. .......... Colorado
Lundin, Carl D., Ph.D. .......... Rensselaer
McHargue, C. J., Ph.D. .......... Kentucky
Oliver, Ben F., Ph.D. .......... Penn State
Phillips, Paul J., Ph.D. .......... Liverpool
Spruiell, Joseph E., Ph.D. .......... Tennessee
Stansbury, E. E. (Emeritus), Ph.D. .......... Cincinnati

Associate Professors:
Becker, William T., Ph.D. .......... Illinois
Liu, C. T., Ph.D. .......... Brown
Meek, Thomas T., Ph.D. .......... Ohio State
Pedraza, A. J., Ph.D. .......... National

Assistant Professor:
Benson, R. S., Ph.D. .......... Florida State

Graduate programs are offered leading to the degrees of Master of Science and Doctor of Philosophy in Metallurgical Engineering or Polymer Engineering. Both the metallurgical and polymer programs are flexible and interdisciplinary in nature. Students may be admitted from a wide range of disciplines; these include physics, chemistry, chemical engineering, mechanical engineering, electrical engineering, materials engineering, and engineering science programs. Prospective students should consult materials science and engineering faculty concerning development of individual concentrations or special programs compatible with their backgrounds and goals.

Areas of concentration within the metallurgical engineering program include physical metallurgy; materials processing; welding metallurgy and materials joining; corrosion behavior; failure analysis; and mechanical and physical behavior of materials. Specializations in electronic and ceramic materials are available.

Areas of concentration within the polymer engineering program include rheology and polymer processing; polymer morphology; mechanical, physical and chemical behavior of polymers; and composite materials.

THE MASTER'S PROGRAM

Thesis Option
Departmental requirements include the satisfactory completion of:
1. A major consisting of 12 to 18 semester hours of graduate courses in metallurgical engineering or polymer engineering. The Polymer Engineering major must include 540, 541, 543, 546 and 572.

2. One or two minors or cognate work, 6 to 12 hours total in engineering, chemistry, mathematics, physics, or other related fields.


4. Active participation in graduate seminars in the department. Resident students must register for the appropriate 503 or 504 every semester offered.

Non-Thesis Option
Under certain conditions, a candidate may apply for a non-thesis option. To be eligible, the candidate must show evidence of significant professional experience after the baccalaureate degree; at least five years of industrial experience or research publications would be examples of such evidence. A departmental faculty meeting will consider each application individually. Upon acceptance, a supervisory committee of three will be appointed, at least two being from the Department of Materials Science and Engineering. The requirements for completion of the non-thesis option are as follows:

1. A total of at least 33 hours in graduate courses in metallurgical engineering, polymer engineering and related areas. The minimum requirements are 21 hours in the Department of Materials Science and Engineering and up to 12 hours in other engineering or science courses. The candidate's degree program must be approved by the faculty committee.
2. Satisfactory completion of a critical review of the literature in an area related to metallurgical, polymer or materials engineering (580).
3. Satisfactory performance in an oral examination to be conducted by the faculty committee and covering the review paper and other areas of metallurgical or polymer engineering.

THE DOCTORAL PROGRAM

Students applying for entrance into the doctoral program must display concrete evidence of ability to perform and report independent research to the satisfaction of the department. The Master's thesis may be offered as such evidence. Department requirements consist of the satisfactory completion of:

1. Graduate courses in mathematics, physics, chemistry, and engineering amounting to approximately 24 semester hours, at least 8 of which must be in 600 series courses.
2. Supporting courses in related scientific and engineering fields amounting to approximately 24 semester hours, subject to approval by the student's faculty committee. These related fields will normally include chemistry, mathematics, physics, and engineering.
3. The comprehensive examination, usually given in two parts, and covering such topics as materials science and engineering, metallurgical or polymer engineering operations and processes, thermodynamics, technology, mathematics, physics, chemistry, and other related fields.
4. Active participation in graduate seminars conducted by the department. Resident students must register for the appropriate 503 or 504 every semester offered.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UTK on an in-state tuition basis. The Ph.D. program in Metallurgical Engineering is available to residents of the state of Virginia; the M.S. and Ph.D. programs in Polymer Engineering are available to residents of Arkansas, Louisiana, and Kentucky for Virginia. Additional information may be obtained from the Resident Advisor in the Office of Graduate Admissions and Records.

GRADUATE COURSES

400 Microanalytical Techniques (3) X-ray diffraction principles and concept of reciprocal lattice. Kinematic theory of electron scattering; diffraction contrast imaging, geometrically induced contrast, crystal defect contrast, convergent beam microscopy. Preparation techniques for electron microscopy. Operating principles of electron microscopic techniques: TEM, SEM, STEM, and EELS. Interaction of electrons and x-rays with matter; secondary electrons, backscattered electrons, Auger electrons, photoelectrons, and x-ray emission. Applications to chemical analysis. Advanced imaging techniques. Prereq: 304. 3 hrs or 2 hrs and 1 lab. F


423 Metallurgical Fabrication (3) Principles and processes of working and powder metallurgy; solidification, segregation, heat flow, microstructure, residual stresses; thermal treatments, sintering; non-destructive testing. Prereq: 361, 320. 3 hrs or 2 hrs and 1 lab. F

424 Metallurgical Process Design (3) Property control through composition, thermal and mechanical processing; material and property selection; steels and non-ferrous alloys. Prereq: Materials Science and Engineering 201 or equivalent. F

425 Metallurgical Applications in Manufacturing and Processing (3) Fabrication methods, standards and specifications, principles of thermomechanical processing for finished and semi-finished products; casting, forming, joining, heat treatment, powder metallurgy, corrosion control. Prereq: 201.


443 Polymer Processing (3) Rheological measurements; flow through tubular and slits, and effects and extrudate swell; selected application, screw extrusion, injection molding; symbolic models, forming and analysis of selected processing methods, structure development, properties.

444 Plastics Fabrication and Design (3) Lectures, laboratories and field trips; unit operations of plastics fabrication; plastics classification; design and selection criteria; processing techniques; characterization laboratory. Sp

470 Corrosion Science and Engineering (3) Mechanisms and control of corrosion and degradation processes; thermodynamics and electrode kinetics of corrosion reactions; electrochemical measurement techniques; applications to design. Prereq: 201 or equivalent.

471 Semiconductor Materials (3) Theory, properties and processing of semiconductors; applications to solid-state devices; basic physics of semiconductor materials; crystal growth, films, doping, annealing, etching; property and performance evaluation. Prereq. 310. F

472 Fundamental Principles of Composite Materials (3) Establishment of physical principles basic to design, manufacture and application of fiber reinforced polymers, metals and ceramics. Prereq: 302 or equivalent.

474 Biomaterials (3) Metals, polymers and ceramics used in cardiovascular, orthopedic and dental surgical implant devices; corrosion and degradation problems; material properties of primary importance; tissue response to synthetic materials. Prereq: 201. Recommended for engineering science and mechanics majors.

475 Fracture-Safe Design (3) (Same as Engineering Science and Mechanics 423.)

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

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

503 Graduate Seminar in Metallurgical Engineering (1) Prereq: Admission to graduate program. May be repeated. S/NC only. E

504 Graduate Seminar in Polymer Engineering (1) Prereq: Admission to graduate program. May be repeated. S/NC only. E

505 Engineering Analysis (3) (Same as Chemical Engineering 505)

522 Defects in Crystals (3) Analytical and experimental analysis of defect interactions in solids. Prereq: 421 or consent of instructor.

523 Plastic Deformation of Metals (3) Geometry and mechanisms of single crystal plastic deformation; slip, twinning, dislocation annihilation and climb. Prereq: 301, 320 or consent of instructor.

524 Metallurgical Thermodynamics (3) Applications of chemical thermodynamics to metallurgical problems: refining, oxidation, surface treatments, alloy systems. Prereq: 570 or equivalent.

525-26 Welding Metallurgy (3) Welding processes; physical metallurgy of welding; phase transformations; heat flow; residual stresses; theories of hot cracking, cold cracking and porosity formation; applications to process utilization.

529 Diffusion in Solids (3) Phenomenology and atomic mechanisms of diffusion in solid state. Solution and applications of diffusion equations; random walk problems and mechanisms of diffusion; diffusion in dilute and concentrated alloys; Kirkendall effect; high diffusivity paths.

530 Phase Transformations in Metallic Materials (3) Thermodynamics of phase equilibrium, theory of nucleation in solids; kinetics and morphology of diffusion controlled growth; kinetics of interface controlled phase transformations; crystallography and kinetics of martensitic transformations.

531 Advanced Corrosion (3) Analyses of corrosion processes in terms of polarization measurements and Pourbaix diagrams. Influence of environmental and mechanical factors contributing to pitting, crevice, fretting, wear, fatigue and stress corrosion. Prereq: 470 or consent of instructor.


540 Basic Polymer Chemistry (3) Synthesis, reactions and degradation of polymers. Molecular characterizations, solution methods and solid-state spectroscopy. Prereq: Semester of organic chemistry and thermodynamics or equivalent.

541 Fluid Mechanics and Polymer Processing (3) Navier-Stokes equations and illustrative problems; applications in chemical engineering and polymer engineering; packed and fluidized beds, multiphase systems. Basic concepts in rheology; applications in polymer processing; screw extrusion, fiber spinning, injection molding. (Same as Chemical Engineering 541.)

542 Further Topics in Polymer Processing (3) Description and analysis of selected polymer operations. Prereq: 541.


544 Polymer Solution Thermodynamics and Characterization (3) Theories of solutions, statistical thermodynamics. Characterization, treatment of chromatography, viscosity, light scattering and osmotic pressure. Prereq: Undergraduate physical chemistry.

545 Physical Characterization of Polymers (3) Diffraction theory; small angle x-ray and light scattering; spectroscopy; fibrous and floculent structures; introduction to electron microscopy.

546 Mechanical Properties of Solids (3) Types of mechanical behavior; Hookean and rubber elasticity; plastic deformation; fracture; linear viscoelasticity; dynamic mechanical analysis and testing; loss tangent; experimental methods. Introduction to mechanical properties of polymeric composites.

550-26 Welding Metallurgy (3) Welding processes; physical metallurgy of welding; phase transformations; heat flow; residual stresses; theories of hot cracking, cold cracking and porosity formation; applications to process utilization.

559 Diffusion in Solids (3) Phenomenology and atomic mechanisms of diffusion in solid state. Solution and applications of diffusion equations; random walk problems and mechanisms of diffusion; diffusion in dilute and concentrated alloys; Kirkendall effect; high diffusivity paths.

560 Phase Transformations in Metallic Materials (3) Thermodynamics of phase equilibrium, theory of nucleation in solids; kinetics and morphology of diffusion controlled growth; kinetics of interface controlled phase transformations; crystallography and kinetics of martensitic transformations.

561 Advanced Corrosion (3) Analyses of corrosion processes in terms of polarization measurements and Pourbaix diagrams. Influence of environmental and mechanical factors contributing to pitting, crevice, fretting, wear, fatigue and stress corrosion. Prereq: 470 or consent of instructor.


563 Basic Polymer Chemistry (3) Synthesis, reactions and degradation of polymers. Molecular characterizations, solution methods and solid-state spectroscopy. Prereq: Semester of organic chemistry and thermodynamics or equivalent.

564 Polymer Solution Thermodynamics and Characterization (3) Theories of solutions, statistical thermodynamics. Characterization, treatment of chromatography, viscosity, light scattering and osmotic pressure. Prereq: Undergraduate physical chemistry.

565 Physical Characterization of Polymers (3) Diffraction theory; small angle x-ray and light scattering; spectroscopy; fibrous and floculent structures; introduction to electron microscopy.

566 Mechanical Properties of Solids (3) Types of mechanical behavior; Hookean and rubber elasticity; plastic deformation; fracture; linear viscoelasticity; dynamic mechanical analysis and testing; loss tangent; experimental methods. Introduction to mechanical properties of polymeric composites.
549-550 Laboratory Methods in Polymer Engineering (1,1) Basic experimental techniques and instrumentation associated with characterization, x-ray and light scattering, calorimetry, rheometry, mechanical properties of solid and liquid polymer systems. Coreq: 540 or consent of instructor.

560 Principles of Ceramic Processing (3) Treatment of ceramic processing; raw materials preparation and characterization; powder consolidation; drying, firing, sintering techniques, mechanisms, and kinetics. Prereq: 360 or equivalent.

561 Inorganic Glass Forming Systems (3) Physical and chemical nature of inorganic glasses; structural theories of glass formation; major glass forming systems: silica, other oxide glasses, nitrile glasses, water glasses, and chalcedony glasses. Prereq: 360, Chemistry 371.

570 Chemical Thermodynamics (3) Enthropy and entropy of mixing; Gibbs function and chemical potential; methods of measuring activity; solution theories; phase rule; heat capacity of gases, liquids, and solids; calculation of phase diagrams. Prereq: 363 or equivalent.

571 Electron Microscopy (3) Operation of electron microscope; kinematical and dynamical diffraction theories; structure determination; analysis of lattice defects. Coreq: 364 or equivalent.

572 X-Ray Diffraction (3) Symmetry of crystals, space group theory, reciprocal lattice and application to definition of structures; powder and single crystal x-ray techniques; introduction to crystal structure determination; characterization of orientation; application to inorganic, metallic, and polymer structures.

573 Biomaterials Analysis and Development (3) Physical-property limitations of current surgical implant materials and methods of improvement; resistance to corrosion and mechanical damage; detrimental effects of specific metal ions; development of new biomaterials and new materials processing techniques. Prereq: 470, 474 or consent of instructor.

574 Formability of Materials (3) Modeling and analysis of thin plastic strain with application to primary and secondary forming operations; crystallography and noncubic materials; localization of instability; predictive testing. Prereq: Consent of instructor.

575-77 Special Topics in Materials Science and Engineering (3,3) Topics of current significance and interest. Prereq: Consent of instructor. May be repeated.


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

621-22 Theoretical Metallurgy (3,3) Topics in solid state physics as applied to metallurgy; introduction to quantum theory, specific heats, electron theory of solids, electrical and thermal conductivity, magnetic properties, theories of alloy formation. Prereq: Consent of instructor.

623-24 Solidification and Crystal Growth (3,3) Theories of solidification, fluid flow effects, magnetohydrodynamics of incompressible fluids, growth stability theory, thermodynamic applications, rapid solidification theory, metastability. Prereq: Consent of instructor.

641 Advanced Rheology and Viscoelastic Theory (3) Continuum mechanics, formulation of viscoelastic theories for describing deformation and flow of polymeric materials. Application to polymer processing problems. Recommended for MS candidates working in rheological areas. Prereq: 541.

642 Advanced Topics in Polymer Processing (3) Application of theories of rheological behavior and of structure development to analysis of polymer processing operations. Prereq: 541.

643 Phase Transformations in Polymers (3) Glass transition and glassy state; annealing of polymeric glasses; crystallization of polymers; nucleation, growth and morphology; secondary nucleation theory; solidification of copolymers; crystallization under stress. Prereq: 543.

671 Quantitative Microscopy (3) Principal acoustic, optical, x-ray, neutron, electron and field-ion techniques for examination of microstructures of materials. Prereq: 400.


676-77 Advanced Topics in Materials Science and Engineering (3,3) Latest developments and/or advanced special topics. Prereq: Consent of instructor. May be repeated.

678-79 Seminar in Recent Advances in Materials Science and Engineering (3,3) Directed and independent study. Prereq: Consent of instructor. May be repeated.

Mathematics (College of Liberal Arts)

MAJOR DEGREES

Mathematics .................................................. M.M., M.S., Ph.D.

John S. Bradley, Head

Professors:

Albert, G. E. (Emeritus), Ph.D. ............ Wisconsin
Anderson, D. F., Ph.D. ....................... Chicago
Baker, G. A., Ph.D. ......................... Cornell
Bradley, John S., Ph.D. ..................... Iowa
Carruth, J. H., Ph.D. ....................... Louisiana State
Clark, C. E., Ph.D. ......................... Louisiana State
Daverman, Robert J., Ph.D. ............. Wisconsin
Dessart, Donald J., Ph.D. ............... Maryland
Dobbs, D. E., Ph.D. ....................... Cornell
Eaves, E. D. (Emeritus), Ph.D. .......... Texas
Fransen, Henry, Ph.D. ................... Illinois
Hallam, T. G., Ph.D. ....................... Missouri
Hinton, D. B., Ph.D. ....................... Tennessee
Householder, A. S. (Emeritus), Ph.D. .... Chicago
Husch, L. S., Ph.D. ....................... Florida State
Johannson, K., Ph.D. ..................... Bielefeld
Jordan, G. Samuel, Ph.D. ............... Wisconsin
Kupperschmidt, B. A. (UTSI), Ph.D. .... MIT
McConnel, R. M., Ph.D. ................. Duke
Mathews, H. T., Ph.D. ................. Tulane
Miller, D. D. (Emeritus), Ph.D. ........ Michigan
Rajput, B. S., Ph.D. ....................... Illinois
Reddy, K. C. (UTSI), Ph.D. ........... Indian IT
Schafer, P. W., Ph.D. ................... Maryland
Serbin, Steve, Ph.D. ............... Cornell
Soni, K., Ph.D. ....................... Oregon State
Stallman, F. W. (Emeritus), Ph.D. ... Giessen
Stephenson, K. R., Ph.D. ............. Wisconsin
Vachions, E. P., Ph.D. ........... Rensselear
Wade, W. R., Ph.D. ..................... California (Riverside)
Wagner, C. G., Ph.D. .............. Duke

Associate Professors:

Alexiades, V., Ph.D. ................. Delaware
Alikakos, N., Ph.D. .............. Brown
Dyak, J., Ph.D. ....................... Cornell
Gross, L. J., Ph.D. ....................... Cornell
Karakashian, O., Ph.D. ............ Harvard
Kimbrel, K. R., Ph.D. ........ Ohio State
Kuo, Y., Ph.D. ....................... Cincinnati
Lenthart, S., Ph.D. .............. Kentucky
Mulay, S., Ph.D. ....................... Purdue
Roshinski, J., Ph.D. .............. Wroclaw
Row, W. H., Jr., Ph.D. .......... Wisconsin
Simpson, H., Ph.D. .............. Cal Tech
Sipos, J., Ph.D. ....................... Oregon State
Son, R. P., Ph.D. ...................... Wisconsin
Sundberg, C., Ph.D. ..................... Wisconsin
Thistlethwaite, R. B., Ph.D. ........ Manchester

Assistant Professors:

Bailes, L., Ph.D. ....................... Johns Hopkins
Haeffner, J., Ph.D. ....................... Wisconsin
Kot, M., Ph.D. ................................ Arizona
Richter, Stefan, Ph.D. ..........., Michigan
Sivarsky, R., Ph.D. ............ Johns Hopkins

The Mathematics Department has three graduate degrees: (1) the Master of Mathematics degree, intended primarily for teachers of high school mathematics, (2) the Master of Science degree, designed to prepare students for industrial employment and for teaching at the high school and junior college level, and (3) the Doctor of Philosophy degree, designed to prepare students for industrial employment and for college and university teaching and research. Contact the department office for additional information.

A student offering mathematics as a minor for the Master's degree is required to obtain at least 6 hours of resident graduate credit in courses numbered above 400 and approved by both the major department and the Department of Mathematics.

THE MASTER OF MATHEMATICS PROGRAM

Before admission to the Master of Mathematics program, the applicant must have either (a) certification for teaching secondary mathematics in at least one state, or (b) three years of elementary or secondary school teaching experience. Applicants must have successfully completed one year of calculus (141-42 or equivalent) and a course in matrix algebra (251 or equivalent).

The following requirements must be met:

1. Complete 30 hours of coursework of which 21 must be at the 500 level. The coursework must include 504, 505, 506, 507, and 6 hours in 509. At most, 6 hours may be taken outside the Department of Mathematics (selected in consultation with the advisor).

2. Pass a final examination upon completion of all coursework.

In exceptional circumstances, part of admission requirement (b) might be satisfied concurrently with coursework. Normally, Master of Mathematics degree students will start the program by taking 504 during the summer.

THE MASTER OF SCIENCE PROGRAM

The department offers two options for the Master of Science degree. The first option requires a thesis for which 6 hours must be earned along with 24 additional hours of work in acceptable courses numbered above 400. Of the additional hours, 6 may be in an area outside the department and 15 must be in courses in mathematics numbered above 500.

After one semester of graduate study, a student whose advisory committee gives its approval may choose the non-thesis option, for which 30 hours in courses numbered...
above 400 are required. Of these, 21 hours
may be transferred from another program.
Students may not count examinations
in both d. and e., in f. and g., nor in i.
and j. toward the required three passes.
At least one exam must be chosen from a.
through e.
Students may take as many 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 advis-
ory committee.
2. At most, 4 minus n exams may be
taken at any one time, where n denotes
the number of exams previously passed by
the student.
3. Students may take a collection of writ-
ten examinations a maximum of four times,
but no one failing five exams, counting pos-
sible repetitions, will be permitted to take
another round of exams.
Mathematical Ecology Concentration
Students must pass examinations in two
areas:
1. Three subjects in mathematics. One
must be mathematical ecology and two must
be from the list under the standard program.
Students may not count passes on examina-
tions in both d. and e., in f. and g., nor in i.
and j. toward the required three passes.
At least one exam must be chosen from a.
through e.

GRADUATE COURSES
400 History of Mathematics (3) Survey of development
of mathematics from ancient to modern times. Does not
carry major requirements for B.S. or M.S. in
mathematics. Term paper required. Prereq: 1 yr cal-
culus, 141-42, or equivalent.
401 Mathematics and Microcomputers (3) Primarily
for students seeking courses in the use of micro-
compilers at secondary level. Use of microcomputers to
study concepts and problems in mathematics. Does not
carry major requirements for B.S. or M.S. in
mathematics. Prereq: 141 plus 1 semester of dis-
crete mathematics, 221 or 584.
404 Applied Vector Calculus (3) Topics from
multivector and vector calculus; line and surface integ-
als, and divergence, curl, and theorems of Gauss and
405 Models in Biology (3) Difference and differential
equation models of biological systems. Prereq: 141-
42 or 151-52.
411 Mathematical Modeling (3) Construction and anal-
ysis of mathematical models used in science and
421 Combinatorics (3) Introduction to problems of
construction and enumeration for discrete structures;
sequences, partitions, graphs, finite fields and geom-
eties, or experimental designs. Prereq: 323 or consent
of instructor.
423 Probability II (3) Law of large numbers and cen-
tral limit theorems for discrete and continuous random
variables; Poisson processes; discrete and continu-
ous parameter Markov chains and their applications,
Kolmogorov differential equations; Brownian motion
process as limit of random walks. Prereq: 323.
425 Statistics (3) Derivation of standard statistical
distributions; t, F, and X²: independence of sample
mean and variance; basic limit theorems, point and
interval estimation, Bayesian estimates; statistical hypoth-
eses, Neyman-Pearson theorems; likelihood ratio and
other parametric and non-parametric tests; sufficient
statistics. Prereq: 323.
431 Differential Equations II (3) Second course in
ordinary differential equations. Linear systems of differen-
tial equations, Frobenius method, Sturm-Liouville
eigenvalue problems, phase plane analysis. Prereq:
200 or 251, and 231.
435 Partial Differential Equations (3) Separation of
variables, Fourier series, solution of Laplace, wave,
443 Complex Variables I (3) Theory of functions of
complex variable: residue theory and contour inte-
grals. Prereq: 241. Recommended prereq: 300-
or 400-level mathematics course.
444 Complex Variables II (3) Applications of complex
variables to steady-state temperatures, electrostat-
ics, and fluid flow. Prereq: 443.
445-46 Advanced Calculus I,11 (3,3) Theory of sequences,
series, differentiation, and Riemann integ-
ration of functions of one variable. Prereq: 341
or consent of instructor.
447-48 Honors: Advanced Calculus I,11 (3,3) Honors
version of 445-46. Prereq: 341 or consent of instruc-
tor.
451 Topics in Algebra (5) Number theory and theory of
polynomial equations such as quadratic reciprocity
law and Sturm separation. Prereq: 351.
453 Matrix Algebra II (3) Matrix theory including Jordan
455-56 Abstract Algebra I,11 (3,3) Algebraic struc-
tures: groups, rings, fields, vector spaces and linear
transformations. Prereq: 351 or consent of instructor.
457-58 Honors: Abstract Algebra I,11 (3,3) Honors
version of 455-56. Prereq: 341 or consent of instruc-
tor.
460 Geometry (3) Axiomatic and historical development
of neutral, Euclidean, and hyperbolic geometry stress-
ing proof technique and critical reasoning. Models of
Non-Euclidean geometries. Term paper. Prereq: 141-
42 and 221, or consent of instructor.
461 Topology (3) Topology of line and plane, separa-
tion properties, compactness, connectivity,
continuous functions, homeomorphisms, and topological
invariants. Prereq: 341 or consent of instruc-
tor.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>541-42</td>
<td>Real Analysis (3,3)</td>
<td>Measure theory, Lebesgue integration, functions of several variables, and abstract measure theory.</td>
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</tr>
<tr>
<td>543-44</td>
<td>Complex Analysis (3,3)</td>
<td>Theory of functions, Cauchy's theorem, Laurent series, and applications.</td>
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<tr>
<td>547-48</td>
<td>Applied Linear Algebra (3,3)</td>
<td>Banach and Hilbert spaces, linear operators and spectral theory.</td>
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<tr>
<td>549</td>
<td>Seminar in Analysis (1-3)</td>
<td>May be repeated. Maximum 12 hrs.</td>
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<tr>
<td>550</td>
<td>Matrix Algebra (3)</td>
<td>Advanced topics in matrix theory: decomposition theories and applications to matrices with special structure.</td>
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</tr>
<tr>
<td>551-52</td>
<td>Modern Algebra (3,3)</td>
<td>Groups, rings, modules, and linear algebra; fields and Galois theory.</td>
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<tr>
<td>553</td>
<td>Linear Programming (3)</td>
<td>Theory and applications.</td>
<td></td>
</tr>
<tr>
<td>554</td>
<td>Nonlinear Programming (3)</td>
<td>Theory and applications.</td>
<td></td>
</tr>
<tr>
<td>555</td>
<td>Number Theory (3,3)</td>
<td>Introduction to algebraic number theory.</td>
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</tr>
<tr>
<td>561-82</td>
<td>Topology (3,3)</td>
<td>Topological spaces; metrization; homeomorphic invariants of point sets.</td>
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<tr>
<td>569</td>
<td>Seminar in Algebra (1-3)</td>
<td>Consent of instructor. May be repeated. Maximum 12 hrs.</td>
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</tr>
<tr>
<td>571-72</td>
<td>Numerical Mathematics (3,3)</td>
<td>Analysis of direct and iterative methods for linear algebraic systems; singular value decomposition and linear least squares problem.</td>
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<tr>
<td>575</td>
<td>Finite Difference Methods for Partial Differential Equations (3)</td>
<td>Finite difference techniques for solution of elliptic, parabolic, and hyperbolic equations.</td>
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<tr>
<td>579</td>
<td>Seminar in Numerical Mathematics (1-3)</td>
<td>May be repeated. Maximum 12 hrs.</td>
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</tr>
<tr>
<td>581-82</td>
<td>Mathematical Ecology (3,3)</td>
<td>Deterministic and stochastic models of populations, communities, and ecosystems.</td>
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</tr>
<tr>
<td>583</td>
<td>Mathematical Evolutionary Theory (3)</td>
<td>Population genetics and evolutionary ecology.</td>
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</tr>
<tr>
<td>584</td>
<td>Mathematical Systems Theory (3)</td>
<td>Analytic approach to discrete and continuous dynamical control systems; optimal control and applications to ecology.</td>
<td></td>
</tr>
<tr>
<td>585</td>
<td>Optimal Control Theory (3)</td>
<td>Deterministic optimal control, Examples involving calculus of variations, optimal trajectories, and engineering control problems.</td>
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<tr>
<td>594</td>
<td>Computational Fluid Dynamics (3)</td>
<td>Introduction to computational fluid dynamics.</td>
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<tr>
<td>593</td>
<td>Independent Study (1-15)</td>
<td>May be repeated. Maximum 12 hrs.</td>
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</tr>
<tr>
<td>594</td>
<td>Graduate Reading in Mathematics (1-3)</td>
<td>Independent study with faculty guidance.</td>
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<tr>
<td>600</td>
<td>Doctoral Research and Dissertation (3-15)</td>
<td>P/NP only.</td>
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</tr>
<tr>
<td>617-18</td>
<td>Lie Algebras in Mechanics and Physics (3,3)</td>
<td>Analytical tools of mechanics and physics arising from differential manifolds, Lie groups, Lie algebras, applications to Hamiltonian mechanics, adiabatic and barotropic fluids and plasmas, numerical methods in continuum mechanics.</td>
<td></td>
</tr>
</tbody>
</table>
Mechanical and Aerospace Engineering
(College of Engineering)

MAJORS
Aerospace Engineering............. M.S., Ph.D.
Mechanical Engineering............. M.S., Ph.D.

Donald R. Pitts, Head
Associate Head

Professors:

Arimilli, R. V., Ph.D. ............ VPI Bailey, Joel F. (Emeritus), PE, Ph.D. .... Lehigh Braun, G. W. (Emeritus) (UTSI),

Associate Professors:


Assistant Professors:

Dubey, R. V., Ph.D. ............... Clemson Jing, S. M. (UTSI), Ph.D. .......... Penn State Keyhani, M., Ph.D. .............. Ohio State Nguyen, K., Ph.D. ............... Colorado

Graduate programs in Mechanical Engineering or Aerospace Engineering are available that lead to the Master of Science and Doctor of Philosophy with concentrations in energy conversion and utilization, propulsion, heat transfer and fluid mechanics, and thermodynamics. In addition, Mechanical Engineering offers concentrations in gasdynamics, machine design and dynamics, power generation, and stress analysis; Aerospace Engineering offers structures and stress analysis, aerodynamics and gasdynamics, flight mechanics, and aeroacoustics. Each student must satisfactorily complete a program of study that has been approved by the student's committee. Specific program requirements are given below.

THE MASTER'S PROGRAM

Entrance into the Master of Science program is available to qualified graduates of recognized undergraduate curricula in mechanical or aerospace engineering and to qualified graduates of other curricula who satisfy the necessary prerequisites. Three program options are available.

 Thesis Option

The requirements of this option are that the student must satisfactorily complete a program of study that includes:

1. A minimum of 24 semester hours of coursework that includes at least 12 semester hours of graduate (500-level or above) courses in mechanical and/or aerospace engineering and normally 6 semester hours of coursework (400-level or above) in mathematics.

2. A minimum of 6 semester hours of thesis.

3. Participation in the departmental seminar programs.

4. Submission and defense of a written thesis that demonstrates the ability to conduct and report on an independent investigation.

5. Passing a final examination on all work submitted for the degree.

 Course Option

This option is restricted to those students who have had the equivalent of a thesis experience. The evaluation of the work experience and the final selection of the student's program of study are left to the student's committee. The requirements of this option are that the student must satisfactorily complete a program of study that includes:

1. A minimum of 30 semester hours of coursework that includes at least 18 semester hours of graduate (500-level or above) courses in mechanical and/or aerospace engineering and normally 6 semester hours of coursework (400-level or above) in mathematics. No more than 3 semester hours of engineering coursework may be below the 500 level.

2. Participation in the departmental seminar program.

3. Passing a comprehensive written and oral final examination on coursework submitted for the degree. The student's committee will be of sufficient size to include all of the study areas reflected in the course program.

 Problems Option

The requirements of this option are that the student must satisfactorily complete a program of study that includes:
1. A minimum of 24 semester hours of coursework that includes at least 12 semester hours of graduate (500-level or above) courses in mechanical and/or aerospace engineering and normally 6 semester hours of coursework (400-level or above) in mathematics.

2. A minimum of 6 semester hours in 590 Selected Engineering Problems. A written report must be presented for each problem investigated.

3. Participation in the departmental seminar program.

4. Passing a comprehensive written final examination on all coursework submitted for the degree and an oral examination on all work (including problems).

THE DOCTORAL PROGRAM

Admission into the doctoral program will be granted to those applicants who have demonstrated superior achievement in their engineering backgrounds.

The student must satisfactorily complete an approved program of study that includes a minimum of 72 semester hours credit beyond the Bachelor's degree, exclusive of credit for the M.S. thesis or problem, including:

1. A minimum of 24 semester hours in doctoral dissertation.

2. A minimum of 12 semester hours in mathematics courses numbered 400 or above.

3. A minimum of 24 semester hours in mechanical and aerospace engineering courses numbered 500 and above, with at least 9 semester hours of 600-level courses. These are exclusive of thesis, problems, or dissertation credit.

4. Participation in the departmental seminar program.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UTK on an in-state tuition basis. The Ph.D. program in Aerospace Engineering is available to residents of the states of Arkansas, Kentucky, or South Carolina. The M.S. in Aerospace Engineering is also available to residents of Kentucky. Additional information may be obtained from the Residency Advisor in the Office of Graduate Admissions and Records.

GRADUATE CREDIT FOR UNDERGRADUATE COURSES

Senior (400-level) mechanical and aerospace engineering courses may be taken for graduate credit by non-mechanical or non-aerospace engineering majors, if approved by the student's major department. Mechanical or aerospace engineering majors may not normally use more than one 400-level engineering course to meet their advanced degree requirements. Non-mechanical or non-aerospace engineering graduate students should consult with instructors regarding prerequisites for undergraduate courses.

MECHANICAL ENGINEERING

GRADUATE COURSES


416 Turbo-Machinery (3) Basic principles of turbo-machinery; systematic methods of analysis, design, performance evaluation. Prereq: Aerospace Engineering 351.

422 Environmental Noise (3) Basic principles of acoustics; measurements and control of noise in industrial and community environments. Prereq: Senior standing in engineering or consent of instructor.

445 Lubrication (3) Hydrodynamic theory of lubrication of sliding bearings; application of Navier-Stokes equations to infinite and finite bearings; analytical and numerical solutions; applications to design. Prereq: 344. Aerospace Engineering 351.


455 Introduction to Design (2) Engineering economy, optimization, design for automation, reliability, patents and product liability; design of mechanical engineering solid mechanics system. Participation in team design effort; design report. Prereq: 383 and 451. F

456 Introduction to Thermal Design (2) Engineering economy, optimization, design for automation, reliability, patents and product liability; design of mechanical engineering thermal-fluid system. Participation in team design effort; design report. Prereq: 332, 344. F


462 Tool Design (3) Principles underlying tool and die design; design for production; work holding fixtures; comparison of material removal methods; selection of tool material; plastics production. Prereq: 366 or Concurrent enrollment 404, Engineering Science and Mechanics 321.


468 Machine Design I (3) Design of complete machine; documentation, component specifications, design calculations, working drawings, and cost analysis. Written and oral report. Prereq: 455, 466. Sp

471 Refrigeration and Air Conditioning (3) Vapor compression and absorption cycles; heat pump systems; psychrometric processes; air washers; cooling towers; solar radiation; building heat transmission. Prereq: 332, 344.

474 Solar Energy Utilization (3) Nature and availability of solar radiation; review of selected heat transfer topics pertinent to solar energy systems; system design analysis of solar energy collectors and method of storage; selected applications. Prereq: 332, 344, or consent of instructor.

475 Thermal Engineering (3) Thermal systems, thermomechanics, heat exchangers, combustion and system analysis and design of internal and external combustion engines using ideal and real fluids. Prereq: 332, 344.

479 Thermal Engineering Design (4) Design of complete thermal-fluid system, economic, technical and optimization aspects. Participation in team design effort, formal presentations and design report. Prereq: 456, 475. Sp

481 Internal Combustion Engines (3) Thermal chemical phenomena in combustion and propulsion engines. Combustion, detonation, equilibrium, dissociation. Analysis of internal combustion engine interchanges.

494-95 Selected Topics in Mechanical Engineering (1-4,1-4) Problems and topics related to developments and practice in mechanical engineering. Prereq: Consent of instructor. E

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

502 Registration for Use of Facilities (3-15) Required for the Ph.D. student. The student must use University facilities and/or faculty time before degree is completed. May not be repeated beyond degree requirements. May be repeated. S/NC only. E

511 Conduction Heat Transfer (3) Analysis of steady-state and time dependent heat conduction by analytical and numerical methods. Modeling of thermal systems. Prereq: 344.

512 Convection Heat Transfer (3) Analysis of laminar and turbulent convective heat transfer in internal and external flows, effects of variable surface temperature or heat flux and variable fluid properties. Prereq: 531.


514 Phase Change Heat Transfer (3) Mechanisms and modeling of nuclear, transition and film boiling processes; critical heat flux; forced convection boiling and post dry-out heat transfer; condensation processes; heterogeneous nucleation; dropwise and filmwise condensation; flow condensation; liquid-solid phase change processes; moving phase fronts; mathematical modeling. Prereq: 344, 511.

521-22 Thermodynamics I and II (3,3) Macroscopic thermodynamics, conservation laws, thermodynamic processes; heterogeneous nucleation; dropwise and filmwise condensation; flow condensation; liquid-solid phase change processes; moving phase fronts; mathematical modeling. Prereq: 344, 511.

523 Special Topics in Thermodynamics (3) Application of thermodynamics to topics of current interest in mechanical engineering. Prereq: Consent of instructor.

531 Fluid Mechanics (3) Derivation of equations governing flow of viscous fluid (conservation of mass, Newton's second law of motion, and conservation of energy); vector and Cartesian tensor notation. Equations of state and constitutive relations. Specialization of governing equations to those for Newtonian fluids. Approximate initial and boundary conditions. Exact solutions. Introduction to boundary layer flows, potential flows, and low Reynolds number flows. Prereq: 341, Aerospace Engineering 351.

Aerospace Engineering

GRADUATE COURSES

422 Aerodynamics (3) Theory and design of aerodynamic bodies for desired characteristics. Potential flow theory, viscous effects, compressibility effects. Subsonic, transonic, and supersonic airfoils. Prereq: 370. F

423 Viscous Flow (3) Boundary layer theory; laminar and turbulent flow; compressibility effects; numerical solution methods. Prereq: 351. Mechanical Engineering 391. Sp

425 Propulsion (3) Principles of propulsion devices; turbojet, ramjet and rocket engines. Prereq: 351. F


429 Aerospace System Design (4) Synthesis and design of complete aerospace system, economic and technical aspects. Participation in team design effort, formal presentations and design report. Prereq: 425, 426. Sp

449 Aerospace Engineering Laboratory (3) Designing, conducting, and reporting results of experimental testing standards and specifications. Analysis of data and formation of conclusions. Prereq: 345, 351. 3 labs. F

494-95 Selected Topics in Aerospace Science (1-4) Current problems and topics in aerospace science. Prereq: Consent of instructor.

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

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

511 Inviscid Flow (3) Kinematics and dynamics of inviscid fluids; potential flow about body, conformal mapping. Prereq: 422 or Mechanical Engineering 551. Mathematics 425 or equivalent.

515-16 Air Vehicle Aerodynamics and Performance (3,3) Application of aerodynamic principles to air vehicles to provide estimates of performance, stability, and control characteristics; subsonic to hypersonic flow. Relations among thrust, drag, lift, and attitude; vehicle performance characteristics, and trajectory optimization. Prereq: 422, 515 for 516.

521-22 Aerodynamics of Compressible Fluids (3,3) One-dimensional internal and external flow; waves; small perturbation theory; slender body theory; similarity rules; method of characteristics. Prereq: 422 for 521; 521 for 522.

525 Hypersonic Flow (3) slender body flow; similarity solutions; thermodynamic properties of gas plasmas; governing equations and applications. Prereq: 422 and Mathematics 471.

527-28 Aerospace Ground Test Facilities (3,3) Atmospheric models and similarity considerations; aerodynamic test facilities; subsonic and transonic wind tunnels and ballistic ranges; propulsion test facilities or air breathing and rocket engines; space environment and space vehicle test facilities. Prereq: 512 and 521, Mechanical Engineering 513 and 522.

531 Magnetohydrodynamics (3) Electromagnetic field theory; chemical kinetics; thermodynamic and thermophysical properties of gas plasmas; governing equations and applications. Prereq: 422 and Mathemat- ics 471.

532 Introduction to Turbulence (3) Microscopic effects, analogous, statistical treatment, correlation functions, turbulence; engine analysis; ignition of turbulent jets and pipe flow. Prereq: 511-12.

534 Atmospheric Entry (3) Reentry trajectories; lift and drag during reentry; vehicle motion and stability during reentry; aerodynamic heating and heat protection systems. Prereq: 522. Recommended prereq: 512.

544 Transonic Flow (3) Nature of flow at transonic speeds; small disturbance theory; shock wave properties; shock-free flows; strong shock interaction phenomena; solution techniques. Prereq: 522.

Uniqueness and existence of solutions. Applications
coupled systems. Motion with free and fixed control surfaces. Automatic control systems. Prereq: 423, 551.

556 Vertical or Short Take Off and Landing Aircraft (3) Performance, stability, control of rotary wing, vectored lift and jet vertical riser type aircraft. Vertical and transition flight modes. High lift airfoils. Automatic control simulation facility and flight testing. Prereq: 555.


561 Fundamentals of Aerodynamics (3) Generation, propagation and absorption of sound in static and moving media. Prereq: Consent of instructor.

588 Measurement Science I (3) (Same as Nuclear Engineering 588, Chemical Engineering 588, Civil Engineering 588, Electrical and Computer Engineering 588, Engineering Science and Mechanics 588, and Mechanical Engineering 583.)

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

590 Selected Engineering Problems (2-8) Enrollment limited to students in problems program. Prereq: Consent of advisor.

595 Seminar (1) All phases of aerospace engineering reports on current research at UT. May be repeated. S/NC only.

599 Special Topics in Aerospace Engineering (1-3) May be repeated. Maximum 6 hrs.

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

631 Magnetohydrodynamics I (3) Electromagnetic field phenomena, motion of single charged particle, statistical description of plasma, Boltzmann equation, conduction and diffusion in ionized gasses, continuum magnetohydrodynamic equations. Prereq or coreq: 512. Prereq: Mathematics 561 or equivalent.

632 Magnetohydrodynamics II (3) Alfvén and shock waves, exact solution for magnetohydrodynamic channel flow, one-dimensional model of channel flow, engineering applications of magnetohydrodynamics, propulsion and power generation. Prereq: 631 and Mathematics 562.

641-42 Physical Gas Dynamics (3,3) High speed, high temperature gas flow from molecular point of view. Kinetic theory, statistical mechanics, equilibrium flow, vibrational and chemical rate processes, non-equilibrium vibrational and chemical flow, non-equilibrium kinetic theory, flow with translational non-equilibrium. Prereq: 522, Mechanical Engineering 522.

645 Theory of Turbulence (3) (Same as Engineering Science and Mechanics 645.)


680 Advanced Topics in Aerospace Engineering (3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

Medical Biology

(College of Medicine-Knoxville Unit)

Carmen B. Lozzio, Acting Chair

Professors:

Chen, J. P., Ph.D. ................................ Penn State
Farkas, W., Ph.D. ................................ Duke
Fuhr, J. E., Ph.D. ................................ St. John's

Associate Professors:


Wust, E. R., Ph.D. .......... Indiana

554 Principles of Oncology (3) Lectures, classroom discussion, and case reports reviewing major topics in oncology. Prereq: Biology 220-30 or consent of instructor.

562 Special Topics in Cancer (1-3) Prereq: 551 and consent of instructor. May be repeated. Maximum 9 hrs. F,Sp

531 Principles of Hematology (3) Pathophysiology of blood and blood forming systems. Lectures, class discussions and demonstrations. Prereq: Upper division histology and/or cell biology. Zoology 410 and 420.

532 Special Topics in Hematology (1-3) Prereq: 551 and consent of instructor. May be repeated. Maximum 9 hrs. F,Sp


541 Molecular Basis for Metabolic Disease (4) Metabolic defects of humans and animals. Molecular mechanisms in inborn errors of metabolism, toxic reactions and deficiency states. Clinical and pathogenic consequences. Prereq: Biochemistry 410-19 or equivalent. S,Sp,A

542 Special Topics in Metabolic Disease (1-3) Biochemical and physiological basis of selected diseases of humans and animals. Clinical-pathological correlations. Prereq: 541 and consent of instructor. May be repeated. Maximum 9 hrs. F,Sp

543 Metabolism of Drugs (1) Drug mechanisms of action: membrane transport, enzyme reactions, ionization, stereochemistry and metabolic pathways. For students interested in biochemical pharmacology. Prereq: Biochemistry 310. Sp

545 Clinical Genetics (3) Human genetic disorders: new developments in cytogenetics, molecular genetics, clinical diagnoses and prevention. Prereq: Biology and genetics background or consent of instructor.

600 P/NC

610 Medical Biology Seminar (1) Invited speakers. Topics posted in advance. May be repeated. P/NC only. E

611 Advanced Topics in Medical Biology (1-3) New developments in biological research applicable to clinical medicine. Prereq: 541 and consent of instructor. May be repeated. Maximum 9 hrs. F,Sp

652 Special Topics in Pathology (1-3) Pathologic anatomy, biochemical pathology, and related areas. Primarily for doctoral candidates in Comparative and Experimental Medicine. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. F,Sp

Metallurgical Engineering

See Materials Science and Engineering

Microbiology

(College of Liberal Arts and College of Veterinary Medicine)

MAJOR DEGREES

Microbiology .................................. M.S., Ph.D.
Veterinary Medicine ......................... D.V.M.
THE MASTER'S PROGRAM

The program leading to the M.S. is designed to provide the student with broad basic knowledge, to permit the acquisition of technical competence in the fundamentals of research, and to foster creative and independent thinking. Two to three calendar years are usually needed for the course of study that has the following requirements: (1) 30 hours including thesis credits; (2) a 3.0 GPA in all courses taken for graduate credit after 12 hours of credit have been earned in courses graded on the A-F system; (3) a 3.0 GPA in courses taken in the department; (4) a complete course sequence in biochemistry; (5) coursework in at least five of the subdisciplines recognized by the department: microbial physiology, pathogenic bacteriology, virology, mycology, immunology, microbial genetics, microbial ecology, molecular biology, and applied microbiology; and (6) presentation of a research proposal and its oral defense.

THE DOCTORAL PROGRAM

The program leading to the Ph.D. is designed to develop the student's ability to pursue independent and original research in microbiology and allied fields, to teach both oral and written communication of the results of research to the scientific community, and to train effective teachers. Students may enter the program after receiving either a Bachelor's or Master's degree. Students who enter with a Bachelor's degree usually receive the Ph.D. after four or five years; those with the Master's degree usually take three or four years to complete the degree. Departmental requirements are: (1) a 3.0 GPA in all courses taken for graduate credit after 12 hours of credit have been earned in courses graded on the A-F scale; (2) a 3.0 GPA in courses taken in the department; (3) satisfactory performance in at least one semester as a teaching assistant; (4) one semester of physical chemistry; (5) one year of calculus; (6) two years of chemistry; (7) one year of physics, and (8) an introductory course in microbiology. In many cases, deficiencies in requirements may be removed by taking appropriate courses during the first year of graduate study. The department also requires the general portion of the Graduate Record Examination. A satisfactory score on each part is 550 or higher with rare exceptions. Three letters of recommendation should be submitted by current or former faculty members.

Each new graduate student meets with an advisory committee chaired by the departmental Director of Graduate Studies to plan a program of study for the first one or two semesters until a research advisor is selected. All first-year students participate in a laboratory rotation program during the first semester of study. This program allows the student to adjust smoothly to the research programs of the department, to develop a background of research procedures and concepts, and to facilitate the selection of a research professor. Usually the student selects a research professor toward the end of the laboratory rotation period. The major professor assists in the selection of and carrying out of a suitable research program and in the naming of a thesis or dissertation committee.

ADMISSION REQUIREMENTS

Students are expected to have completed an undergraduate program with a 3.0 or better GPA on a 4.0 system. Included in the undergraduate course credits should be (1) a full year of general biological science, (2) one year of calculus, (3) two years of chemistry, including one year of organic, (4) one year of physics, and (5) an introductory course in microbiology. In many cases, deficiencies in requirements may be removed by taking appropriate courses during the first year of graduate study. The department also requires the general portion of the Graduate Record Examination. A satisfactory score on each part is 550 or higher with rare exceptions. Three letters of recommendation should be submitted by current or former faculty members.

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THE MASTER'S PROGRAM

The program leading to the M.S. is designed to provide the student with broad basic knowledge, to permit the acquisition of technical competence in the fundamentals of research, and to foster creative and independent thinking. Two to three calendar years are usually needed for the course of study that has the following requirements: (1) 30 hours including thesis credits; (2) a 3.0 GPA in all courses taken for graduate credit after 12 hours of credit have been earned in courses graded on the A-F system; (3) a 3.0 GPA in courses taken in the department; (4) a complete course sequence in biochemistry; (5) coursework in at least five of the subdisciplines recognized by the department: microbial physiology, pathogenic bacteriology, virology, mycology, immunology, microbial genetics, microbial ecology, molecular biology, and applied microbiology; and (6) presentation of a research proposal and its oral defense.

THE DOCTORAL PROGRAM

The program leading to the Ph.D. is designed to develop the student's ability to pursue independent and original research in microbiology and allied fields, to teach both oral and written communication of the results of research to the scientific community, and to train effective teachers. Students may enter the program after receiving either a Bachelor's or Master's degree. Students who enter with a Bachelor's degree usually receive the Ph.D. after four or five years; those with the Master's degree usually take three or four years to complete the degree. Departmental requirements are: (1) a 3.0 GPA in all courses taken for graduate credit after 12 hours of credit have been earned in courses graded on the A-F scale; (2) a 3.0 GPA in courses taken in the department; (3) satisfactory performance in at least one semester as a teaching assistant; (4) one semester of physical chemistry; (5) one year of calculus; (6) two years of chemistry; (7) one year of physics, and (8) an introductory course in microbiology. In many cases, deficiencies in requirements may be removed by taking appropriate courses during the first year of graduate study. The department also requires the general portion of the Graduate Record Examination. A satisfactory score on each part is 550 or higher with rare exceptions. Three letters of recommendation should be submitted by current or former faculty members.

Each new graduate student meets with an advisory committee chaired by the departmental Director of Graduate Studies to plan a program of study for the first one or two semesters until a research advisor is selected. All first-year students participate in a laboratory rotation program during the first semester of study. This program allows the student to adjust smoothly to the research programs of the department, to develop a background of research procedures and concepts, and to facilitate the selection of a research professor. Usually the student selects a research professor toward the end of the laboratory rotation period. The major professor assists in the selection of and carrying out of a suitable research program and in the naming of a thesis or dissertation committee.
Microbiology - Veterinary Medicine

See Veterinary Medicine for program description.

Music

(College of Liberal Arts)

MAJOR DEGREES

Music.............................................. M.M., M.A.

John J. Meacham, Head

Professors:

Bitzas, George C., M.M...........................Converse
Broock, John P., M.M. ............................Alabama
Carter, W. J. (Emeritus), D.M.A. ..................Eastman
Coker, J., M.A. .................................Sam Houston
Combs, F. M., M.A. ..............................Missouri
DeVine, George F. ...............................Florida
Dubberly, T. S., M.M.A. .......................Yale
Fraley, M., B.M. .................................Oberlin
Hough, Don, M.M. ..............................Pennsylvania
Huber, Calvin R., Ph.D. ........................North Carolina
Lennon, J. A., D.M.A. ............................Michigan
Meacham, John J., M.M. ........................Northwestern
Northington, D. B., D.M.A. .....................Iowa
Pederson, D. M., Ph.D. ............................ Iowa
Sperl, G. M., M.M. ............................Indiana
Schurz, H., M.M. .................................Northwestern
Young, S. E., Ph.D. .............................North Carolina

Associate Professors:

Adams, Faye, M.M. .................................Tennessee
Bommelje, W., M.M. ..............................Tulsa
Carter, P. S., M.M. .................................Colorado
Fraleys, M., B.M. .................................Oberlin
Horodyskyj, P. M., M.M. ............................Manhattan
Hough, Don, M.M. ..............................Pennsylvania
Hough, Don, M.M. ..............................Pennsylvania
Jacobs, K. A., D.M.A. .............................Texas
Johnson, A. E., D.M.A. ............................Stanford
MacMorrow, W. S., M.M. ............................Wisconsin
Mcclelland, D. K., M.A. ............................Columbia
Michalopoulos, L. W., M.A. ..........................Columbia
Scarlett, William P., M.M. ..........................Louisiana State
Searle, S. R., M.M. .................................Tennessee
Teachey, J. C., D.M.A. ............................Florida State
Tyler, C. L., M.M. .................................New Mexico

The Department of Music offers the Master of Music with concentrations in accompanying, choral conducting, composition, instruction, instrumental pedagogy, jazz, and theory. Applicants who plan to pursue a concentration in performance are required to audition before the appropriate area faculty committee. Applicants for admission to the program in composition must submit scores and tape recordings of representative works. Applicants for the concentration in music theory and music history/literature. These examinations are given by the Department of Music at the beginning of each semester. All concentrations require a written and oral final examination.

THE MASTER OF MUSIC PROGRAM

A minimum of 30-33 semester hours of coursework is required for the Master of Music degree. These hours are specifically distributed according to the area of concentration. All concentrations require coursework in music history/literature and music theory and allow for elective courses. Specific curricula are available from the Department of Music.

The graduate recital is given in lieu of thesis by Master of Music degree students with concentrations in performance, pedagogy, jazz, and accompanying. A performance project is given in lieu of thesis by students with concentrations in choral conducting, instrumental conducting, and sacred music. A thesis is required of students in composition and theory.

THE MASTER OF ARTS PROGRAM

A minimum of 33 semester hours, including 18 hours of coursework above the 500 level and 6 hours of thesis, is required for the Master of Arts. Specific curricula are available from the Department of Music. A reading knowledge of French or German must be demonstrated by applicants before being admitted to candidacy.

Music General

GRADUATE COURSES

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

501 Graduate Recital (2)

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

511 Lecture Recital (2)

521 Special Topics in Performance (1-3) Prereq: Consent of department head.

561 Church Music Performance Project(1-3) May be repeated. Maximum 3 hrs.

Music History

GRADUATE COURSES

410 Music History Genre (3) Topics vary. May be repeated. Maximum 6 hrs.

420 History of Opera (3) Dramatic, vocal, and orchestral elements in opera of Italian, French, and German schools, 1600-present.

430 Symphonic Literature (3) Literature for orchestra from Baroque to present, evolution of symphony.

440 Music of North America (3) Folk and art music of U.S. and Canada from colonial times to present.

450 Composer Seminar (3) Life and works of single composer. Subjects vary.

460 Music Aesthetics (3) Nature of music and musical experience, sense perception and emotions, music, and role of artist in society. Aesthetic viewpoint of individuals and historical eras through selected writings.


490 Church Music Methods and Administration (3)
Music Instrumental

GRADUATE COURSES

410 Band Arranging (3) Study and application of techniques employed in scoring for marching and concert bands. Prereq: Music Theory 320.

490 Instrumental Conducting (3) Development of knowledge and skills in instrumental conducting; study of various periods and composers and relationship of different styles to conductor's art; musical analysis and practice in conducting. Prereq: Music Education 320 or equivalent.

570 Advanced Suzuki Pedagogy (2) Study of psychology, procedures and literature utilized by Shinichi Suzuki in Japan. Prereq: 495 or consent of instructor. May be repeated. Maximum 4 hrs.

580 Band Literature (3) Band literature and origins of band, its important expanded cultivation during past century in United States and Europe.

582 Instrumental Conducting Performance (1) Jury performance; conducting band or orchestra in public.

583 Practicum for Instrumental Conductors (1) Intern experience in choral music. S/NC only.

584 Practicum for Instrumental Conductors (1) Intern experience in field other than area of major interest. S/NC only.

585 Instrumental Conducting Seminar (3) Rehearsal and performance problems and techniques allied to score reading and preparation. Particular attention to individual problems. Prereq: 490 or equivalent.

Music Jazz

GRADUATE COURSES

410 Advanced Improvisation (3) Further development of individual skills and solving individual problems in jazz improvisation. Prereq: 210 and 220.

420 Jazz Pedagogy (1) Methods and materials relating to teaching of jazz, designing and administering jazz programs, and rehearsal techniques for jazz ensembles. Prereq: Studio music and jazz major or consent of instructor.

520 Seminar in Jazz (3) Topic varies.

Music Keyboard

GRADUATE COURSES

410 Early Keyboard Literature (2) Keyboard music through baroque period, music for harpsichord. Prereq: Music History 210-220.

420-30 Piano Literature I, II (2, 2) 420—From 1750 to middle 19th century; 430—Middle 19th century to present.

460-70 The Organ and Its Literature I, II (3, 3) Development of organ and organ literature from Middle Ages to present; problems of style and interpretation; pedagogical literature and methods; organ design. Prereq or coreq: Music History 220 and consent of instructor.

520 Piano Literature Seminar (2) Topics vary. May be repeated. Maximum 6 hrs.

531-41 Recital Project (2, 2) Preparation and accompaniment of full recital for accompanying concentrations only. 531—Vocal recital, 541—Instrumental recital. Prereq: Consent of instructor.

540-50 Advanced Piano Pedagogy I, II (2, 2) 540—Evaluation and study of methods and materials for teaching piano at all levels. Supervised laboratory teaching. Prereq: 440, 450, or consent of instructor. 550—Introduction and principles of Kodaly, Orff, Suzuki, Dalcroze Eurhythmics, and class piano teaching. Prereq: 440, 450 or consent of instructor.

560 Organ Literature Seminar (3) Topics vary. May be repeated. Maximum 6 hrs.

Music Theory

GRADUATE COURSES


510 Musical Styles (3) Elements of design and their role in definition of musical styles. Prereq: Consent of instructor.

520 Analytical Techniques (3) Analytical techniques, contemporary approaches. Tonal and neotonal music. Prereq: Consent of instructor.

530 Music Theory Pedagogy (3) Techniques, methods, and materials involved in college-level theory programs. Prereq: Consent of instructor.

540 Computer Projects (1-3) Programming languages, design and implementation of projects in computer-managed instruction. Prereq: Consent of instructor.


Music Voice

GRADUATE COURSES

430 Styles in Opera Acting (2) Study and practice of styles in opera acting based on historical and national characteristics. Prereq: 230.

440 Projects in Opera Theatre (1-3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

510 Vocal Literature Seminar (3) Topics vary. May be repeated. Maximum 6 hrs.

530 Opera Performance (2) Prereq: Consent of instructor. May be repeated. Maximum 4 hrs.

540 Opera Production (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

550-60 Advanced Vocal Pedagogy I, II (2, 2) 550—Study of vocal production, examination of different methods. 560—Study of teaching materials, observation of studio teaching, analysis of vocal problems in selected students, and supervised teaching.

570 Vocal Chamber Music Performance (2) Prereq: Consent of instructor.

580-85 Choral Literature I, II (2, 2) Choral music from middle ages to present with consideration of historical development of major choral genres.

590 Advanced Choral Conducting (3) Expansions and continued refinement of conducting technique; development of choral rehearsal skills. Prereq: Consent of instructor.

594 Project in Choral Conducting Performance (1-3) Public performance, critical document, recording project. Prereq: Consent of instructor. May be repeated.

595 Choral Conducting Seminar (3) Score reading and preparation; problems of interpretation, performance practices, and conducting techniques. Prereq: 590 or consent of instructor. May be repeated.

Music Performance

GRADUATE COURSES

All performance courses require an audition and consent of instructor. May be repeated. Maximum 8 hrs toward M.M. degree.

403 Flute (1-4)

405 Oboe (1-4)

410 Bassoon (1-4)

415 Clarinet (1-4)

420 Saxophone (1-4)

425 Horn (1-4)

430 Trumpet (1-4)

435 Trombone (1-4)

440 Baritone (1-4)

445 Tuba (1-4)

450 Percussion (1-4)

455 Voice (1-4)

460 Violin (1-4)

465 Viola (1-4)

470 Cello (1-4)

475 String Bass (1-4)

476 Electric Bass (1-4)

479 Guitar (1-4)

480 Piano (1-4)

485 Harpsichord (1-4)

490 Organ (1-4)

494 Composition (1-3)

495 Composition with Electronic Media (1-3)

496 Composition for Media (2)

499 Improvisation (1-2) May not be used toward applied music requirement.

503 Flute (1-4)

505 Oboe (1-4)

510 Bassoon (1-4)

515 Clarinet (1-4)
## Nuclear Engineering

### College of Engineering

**MAJOR**

**DEGREES**

Nuclear Engineering ..................... M.S., Ph.D.

Thomas W. Kerlin, Head

**Professors:**

- Dodds, H. L., Ph.D. Tennessee
- Fussell, J. B., Ph.D. Georgia Tech
- Kerlin, T. W., Ph.D. Tennessee
- Mihalcez, J. T., Ph.D. Tennessee
- Pasquier, F. (Emeritus), PE, Ph.D. Northwestern
- Perez, R. B., Ph.D. Ohio State
- Roland, H. C., Ph.D. Tennessee
- Stevens, P. N., Ph.D. Northwestern
- Uckan, N., Ph.D. Michigan
- Uhrig, R. E. (Distinguished Prof.), PE, Ph.D. Iowa

**Associate Professors:**

- Katz, E. M., Ph.D. Tennessee
- Miller, L., Ph.D. Texas A&M
- Scott, T. H., Ph.D. Florida
- Upadhyaya, B. R., Ph.D. California

### NUCLEAR ENGINEERING PROGRAMS

#### MAJOR

- Nuclear Engineering (M.S., Ph.D.)

#### DEGREES

- M.S.: 30 semester hours, including 12 hours beyond the Bachelor's degree, exclusive of research and all graduate coursework.
- Ph.D.: 81 semester hours of coursework approved by the student's advisory committee that includes the necessary prerequisite courses before he/she enters the program.

### THE MASTER'S PROGRAM

A graduate program leading to the Master of Science is available to graduates of recognized undergraduate curricula in engineering and physics. Each applicant will be advised as to the necessary prerequisite courses before he/she enters the program. The student must complete 24 semester hours of coursework approved by the student's advisory committee that includes the following:

1. A minimum of 6 semester hours in courses numbered 500 or above from a recognized university, with a major in mathematics, statistics or computer science.
2. A minor of 9 semester hours of elective courses in mathematics, statistics or computer science.
3. Six semester hours in either nuclear engineering or a related field.
4. A minimum of 12 semester hours of core courses numbered 500 or above.

### THE DOCTORAL PROGRAM

Students in the field of nuclear engineering desiring to study for the Doctor of Philosophy must have a Bachelor of Science or Master of Science from a recognized university, with a major in engineering or physics. All candidates will be required to demonstrate general competence in a comprehensive examination in the areas of engineering science, mathematics, physics, and nuclear engineering.

Specific course requirements for the Ph.D. in Nuclear Engineering include:

1. A minimum of 48 semester hours beyond the Bachelor's degree, exclusive of credit for the M.S. thesis or Nuclear Engineering Practice.
2. A minimum of 24 semester hours in doctoral research.
3. A minimum of 30 semester hours in nuclear engineering courses numbered 500 and above (or the equivalent), with at least 9 semester hours of 500-level courses. These are exclusive of thesis or dissertation credit.
4. A minimum of 12 semester hours in mathematics, computer science, or statistics courses beyond nuclear engineering undergraduate requirements numbered 400 or above.
5. A minimum of 6 semester hours in courses numbered 500 or above from a recognized university, with a major in mathematics, statistics or computer science.
safety standards; overview of experiments, computational methods, and applications. Prereq: Introduction to nuclear engineering and nuclear reactor theory.

463 Introduction to Fusion Energy I (3) (Same as Electrical and Computer Engineering 463.)

464 Introduction to Fusion Energy II (3) (Same as Electrical and Computer Engineering 464.)

494 Special Topics in Nuclear Engineering (3) Problems related to recent developments and practice. Prereq: Senior standing and consent of instructor. May be repeated. Maximum 6 hrs.

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

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

511-12 Transport Processes in Nuclear Engineering (3,3) Rheometry of nonnewtonian fluids; integral and system conservation equations for single and multi-component fluids; in-depth development of differential conservation equations for mass, energy, and momentum; exact and approximate solutions of equations of motion; boundary layer analysis; numerical analysis of fluid flow and heat transfer. S/NC only. E

521 Nuclear Systems Dynamics and Control (3) Introduction to control and analysis and application of these methods to nuclear plant dynamics, simulation and control problems.


541 Reactor Fuel Management (3) Topics relative to in-core fuel management. Applicable topics in reactor physics, fuel depletion, isotopic inventories, reactivity control and numerical methods. Prereq: 401.


543 Selected Topics in Nuclear Criticality Safety (3) Criticality safety computational and experimental methods for criticality safety in nuclear reactor design, nuclear power plant, and other processes. Analysis, survey of safety issues and applications. Prereq: 406 or equivalent.

550 Nuclear Instrumentation (3) Physics and electronics associated with radiation detection, methods of data analysis, applicability of particular instrument measurement and fundamentals of nuclear instrumentation operation.

551 Radiation Protection (3) Interactions of photons, neutrons, beta particles, and heavy charged particles with matter and mechanisms of energy loss; methods of radiation detection, internal and external radiation dosimetry; chemical and biological effects of radiation; regulations and standards. Prereq: Introduction to Nuclear Engineering or equivalent.

552 Radiation Monitoring and Dose Assessment (3) Methods for work-area and environmental monitoring; dose assessment; pathways analysis; risk projections and regulations. Prereq: 551.

561 Plasma Diagnostics I (3) (Same as Electrical and Computer Engineering 561.)

562 Plasma Diagnostics II (3) (Same as Electrical and Computer Engineering 562.)

563 Plasma Engineering (3) Integration of plasma physics models, fusion engineering design criteria, and fusion technology into design of future plasma experiments and reactors. Particle, momentum, and energy balance equations. Simulation of various fusion reactor plasmas. Prereq: 464 or consent of instructor. (Same as Electrical and Computer Engineering 563.)

564 Fusion Technology (3) Engineering problems associated with fusion reactor design. Fluid mechanics of fusion systems; materials and irradiation; plasma heating, fueling and impurity control; review of major design studies. Prereq: 561. (Same as Electrical and Computer Engineering 564.)


572 Reactor Theory and Design (3) Analytical and numerical techniques for neutronics modeling of nuclear systems. Multigroup cross section theory for homogeneous and heterogeneous systems. Selected topics from literature. Class project: solution of nuclear design problem. Prereq: 571 or equivalent.


582 Monte Carlo (3) Analysis of radiation transport problems in radiation shielding by Monte Carlo method, description of MORSE code. Random sampling, evaluation of integrals, analog particle transport, techniques of variance reduction, forward and adjoint modes of analysis, importance function biasing, splitting/weighting techniques, module survival biasing and contribution theory. Prereq: 581.

585 Process System Reliability and Safety (3) Qualitative and quantitative techniques for assessing and improving process systems reliability and safety. Fault tree analysis and associated dependent failure analysis. (Same as Chemical Engineering 585.)

588 Measurement Science I (3) Principles of measurement, introduction to measuring devices. Prereq: Consent of instructor. (Same as Chemical Engineering 588, Civil Engineering 588, Electrical and Computer Engineering 588, Engineering Science and Mechanics 588, Mechanical Engineering 588 and Aerospace Engineering 588.)

589 Measurement Science II (3) Modern industrial measurement systems, advanced topics in measurement. Prereq: 588. (Same as Chemical Engineering 589, Civil Engineering 589, Electrical and Computer Engineering 589, Engineering Science and Mechanics 589, Mechanical Engineering 589 and Aerospace Engineering 589.)

597 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 instructor.

598 Nuclear Engineering Practice (2-9) Experience in solving and reporting on engineering problems. Prereq: Approval of department. May be repeated enrollment limited to alternative plan students. S/NC only.

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

611-12 Selected Topics in Reactor Theory (3,3) Transport theory, control rod theory, stochastic methods. Selected topics from literature. Prereq: 572.

615 Plasma Engineering II (3) Detailed modeling of plasma breakdown, start up, burn dynamics. Prereq: 564.

652 Special Topics in Fusion Engineering (3) Selected advanced topics in plasma engineering and fusion reactor engineering and technology. Prereq: 651.

Nursing
(College of Nursing)

MAJOR
Nursing........................................ M.S.N., Ph.D.

Sylvia E. Hart, Dean
Mildred M. Fenske, Associate Dean and
Director of M.S.N. Program
Maureen E. Groor, Director of Ph.D. Program

Professors:
Brown, Barbara E., Ed.D................. Temple
Goodfellow, Dale H., Ph.D.............. Peabody
Groer, Maureen E., Ph.D.............. Illinois
Hart, Sylvia E., Ph.D................. New York
Mozingo, Johnis N., Ph.D............. Walden
Reid, Barbara M., Ph.D.............. Texas

Associate Professors:
Davis, Mitzi M., Ph.D................. Tennessee
Droppleman, Patricia G., Ph.D........ Tennessee
Fenske, Mildred M., Ph.D.............. Vanderbilt
Foster, Miriam, Ph.D................. Texas
Jolly, Mary Lue, Ed.D.............. Kentucky
Jowers, Laurie, Ph.D.............. Texas
Jozwik, John, Ph.D................. Texas
Sharp, Theresa G., Ed.D.............. Tennessee
Shoffner, Dava, M.S.N.............. Tennessee

Assistant Professors:
Smith, Patricia, Ed.D................. Tennessee
Thomas, Sandra P., Ph.D.............. Tennessee

Instructor:
Bowen, Sheila, Ph.D................. Tennessee

THE MASTER'S PROGRAM

The College of Nursing offers the Master of Science in Nursing degree with concentrations in adult health nursing, parent-child nursing, mental health nursing, and primary care nursing.

Admission Requirements
1. Meet requirements for admission to The Graduate School.
2. Hold a Bachelor's degree in Nursing or complete the equivalent of an upper division undergraduate major in nursing in addition to meeting all M.S.N. degree requirements.
3. Have an undergraduate GPA of 3.0 or higher or a GPA of 3.0 for courses in the undergraduate major.
4. Complete the General portion of the Graduate Record Examination. NOTE: A strong performance on this examination may compensate for a GPA lower than 3.0.
5. Complete Graduate Program Data Forms.
6. Submit three Graduate School Rating Forms from individuals familiar with the applicant's current work performance or academic aptitude.

Special Requirements
1. Each student must hold personal professional liability insurance.
2. Registered nurses must be licensed to practice nursing in Tennessee.
3. Each student must present proof of a physical examination and rubella immunization or sufficient titer completed within six months of registering for clinical courses.
4. Each student must present evidence of current CPR certification.
5. Non-registered nurses must have completed 8 semester hours of chemistry or biology, a nutrition and microbiology course, and 12 semester hours of behavioral science courses.

Thesis and Non-Thesis Options
The thesis option is available for interested students and is especially encouraged for those who are considering pursuit of doctoral degrees sometime in the future. Students who choose the non-thesis option must complete a research-oriented project while registered for 580 Nursing Project.

Program Requirements
All students must complete a minimum of 40 semester hours distributed as follows:

Core (12 credits)
503-4 Holistic Nursing I,II 8
510 Theoretical Foundations of Nursing 2
520 Nursing Research Management 2

Research (9-12 credits)
- Graduate level statistics course 3

501 Nursing Research: Methods, Design, and Analysis 3
500 Thesis 6
or
580 Nursing Project 3

Clinical Concentration (11 credits)—choose one
530-31 Adult Health Nursing I,II 11
540-41 Family Nurse Practitioner I,II 11
550-51 Parent-Child Nursing I,II 11
560-61 Mental Health Nursing I,II 11

Role Preparation (5 credits)—choose one
- Specialty Field Work and Seminar 5
563 Teaching Strategies and Practicum (Not an option for non-nurse students) or
564 Nursing Management: Strategies and Practicum (Not an option for non-nurse students) 5

Elective (3 credits)—waived for those who choose thesis option 3

Students who are not nurses must complete the following undergraduate nursing courses in addition to meeting the requirements listed above:

301 Pharmacology 3
302 Introduction to Professional Nursing 9
304 Nursing Assessment and Health Promotion 4
311 Acute Care Nursing 10
313 Nursing Research 3
406 Nursing Leadership 3
414 Community Mental Health Nursing 6
415 Family/Community Health Nursing 6

Registered nurses whose undergraduate degrees are not in nursing must complete 304, 305, 313, 315 Clinical Nursing Practice, and 403. They must also complete or successfully challenge the following:
301 Pharmacology 3
312 Acute Care Nursing Theory 6
402 Family Health Nursing Theory 3
412 Psychosocial Long Term Nursing Theory 3

Students whose science backgrounds are deficient may also need to take 214 Integrated Biomedical and Health Sciences and/or 450 Physiological Principles.

Final Examination Requirements
All students must successfully complete a final examination as required by The Graduate School. For thesis students, the examination will consist of an oral defense of the thesis as well as other written or oral questions designed to measure student mastery of the entire program of study. For non-thesis students, the written examination will cover the entire program of study and may, at the discretion of the student's committee, be followed by an oral examination.

Special Policies
1. Students must maintain a 3.0 GPA throughout the program. If the GPA for all graduate level courses is less than 3.0 after 20 credit hours are completed, the student will be required to withdraw from the program.
2. If the clinical performance of any student for any course is found to be unsatisfactory, the student will receive a grade of 'F' for the course.
3. If a student achieves a final grade of 'D' or 'F' for any required undergraduate nursing course, he or she will not be permitted to repeat the course and will be required to withdraw from the program.
4. If the clinical performance of any student is characterized by unethical, unprofessional or unsafe behavior, or behavior that places the client in jeopardy, the student will be required to withdraw from the program.

REQUIREMENTS FOR SECOND MASTER'S DEGREE

1. Those who already hold a Master's or doctoral degree may apply up to 9 semester hours from that degree to meeting MSN program requirements. In order to apply these hours to the MSN degree, the following criteria must be met:
   a. The courses utilized must be relevant to the MSN.
   b. The credits must have been earned within the time limits established for the MSN.
   c. The utilization of these courses must be approved by the student's committee, by the Dean of the College, and by the Dean of The Graduate School.
2. Regardless of the specific courses transferred in order to reduce degree requirements, the following distribution of required nursing courses must be completed:
   - Core 12
   - Clinical Concentration 11
   - Role Preparation 5
   - Research 3

THE DOCTORAL PROGRAM

The College of Nursing offers a doctoral program leading to the Doctor of Philosophy degree with a major in Nursing. This is a...
cooperative program offered jointly with The University of Tennessee, Memphis College of Nursing. Students may complete all or part of the program at either site. The dissertation must be completed in its entirety at one site.

The doctoral program prepares nursing scholars capable of integrating research, theory, and practice into their roles as researchers, educators, and/or administrators. Specifically, the graduate of this program should be able to:
1. Analyze, test, refine, extend, and expand the theoretical basis of nursing practice.
2. Conduct nursing research that generates and advances nursing as a discipline.
3. Provide leadership as nurse researchers, educators, and/or administrators in current and emerging health care settings.
4. Collaborate with members of other disciplines in health-related research of mutual concern.
5. Analyze, develop, and recommend health care policy at various levels.

Admission Requirements
1. Meet requirements for admission to The Graduate School.
2. Hold a Master's degree in nursing from a program accredited by the National League for Nursing.
3. Have a minimum cumulative grade point average of 3.3 on a 4.0 scale.
4. Have a cumulative score of at least 1000 on the verbal and quantitative sections of the Graduate Record Examination.
5. Have successfully completed a basic statistics course.
6. Complete Graduate Program Data Form, College of Nursing.
7. Submit Graduate School Rating Forms from three college level instructors and/or nurses and administrators who have supervised applicant's professional work.
8. Have a personal interview with the College of Nursing Graduate Student Admissions Committee.
9. Submit entire application (Graduate Application for Admission, 3 Graduate School Rating forms, Graduate Program Data form, academic transcripts, and GRE scores) and schedule personal interview by March 1st of the year preceding Fall admission.

Program Requirements
The following courses are required for all students:
601-2 Theory Construction and Analysis I, II 6
603-4 Advanced Nursing Research I, II 6
605-6 Nursing Research Seminar 4
611 Advanced Nursing Seminar 2
614 Nursing Preceptorship 3
616 Statistics 6
617 Computer Science 5
620 Electives 12
600 Dissertation 24
TOTAL 66

The electives should constitute a cogitate area. All 12 hours should be selected from a specific area of concentration. Appropriate cogitate areas are anthropology, child and family studies, clinical psychology, educational administration, educational psychology, management, medical ethics, public health, and social work.

Doctoral Committee
The student and major professor identify a committee composed of at least five faculty members who hold the rank of assistant professor or above. Four of whom, including the chair, must be approved by the Graduate Council to direct doctoral research. Two of the faculty members must be from an academic unit other than nursing. The committee should be formed during the student's first year of doctoral study.

GRADUATE COURSES

500 Thesis (1-15) F/NP only. E
501 Nursing Research: Methods, Design, and Analysis (3) Methodology, design, and data analysis issues and their interrelationships in planning, implementation, and evaluation of nursing and health-related research. Investigation of computer applications to data analysis. Prereq: Undergraduate research course.
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester in which student is a University facility and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E
503 Holistic Nursing I (3) Examination of philosophy of holistic nursing and new paradigms for nursing assessment, diagnosis, and intervention. Exploration and application of principles of health promotion, education, and innovative strategies for achievement of wellness. Prereq: Courses in nursing assessment and health promotion and acute care nursing or acute care nursing and physiological principles or consent of instructor. F,Sp
504 Holistic Nursing II (5) Continuation of 503. Holistic nursing modalities utilized to provide nursing care to clients, families, and community groups. Clinical practice experience with clients experiencing deviations from wellness. Prereq: 503. 4 hrs and 1 lab. Sp
505 Advanced Clinical Pharmacology (3) Pharmacologic agents utilized to treat common, recurrent health problems; indications, contraindications, side and interactive effects of commonly prescribed drugs. Prereq: 301 or equivalent or consent of instructor. F
506 Advanced Statistics (3) Statistics for research to analyze research findings. Prereq or coreq: Graduate level statistics course. F,Sp
507 Computer Applications in Nursing (3) Computers in nursing education and practice. Prereq or coreq: Consent of instructor. F
508 Graduate Seminar in Public Health (1) (Same as Public Health 509, Social Work 509, Physical Education 509, Nutrition and Food Sciences 509.) Independent study for students in public health. Prereq or coreq: 501 or equivalent or consent of instructor or department. F,Sp
509 Clinical Practice in Public Health (1) Examines the role of nurses in the health care delivery system. Prereq or coreq: Consent of instructor. F,Sp
510 Theoretical Foundations of Nursing (2) Historical evolution of nursing science; examination and critical analysis of nursing's paradigmatic and selected conceptual models, philosophies, and theories; contemporary ethical theories and application to nursing practice dilemmas. Prereq: MSN student or consent of instructor. F,Sp
520 Nursing Resource Management (2) Selected organizational, conflict management, decision-making, leadership, professional, technological, and other theories, principles, and concepts applicable to advanced clinical nursing practice. Prereq or coreq: 550. F,Sp
521 Adult Health Nursing I (6) Exploration and application of selected advanced nursing students, teaching practice in collegiate nursing program. Prereq or coreq: 531, 541, 551, or 561. 3 hrs and 2 labs. Sp
530 Adult Health Nursing I (6) Exploration and application of selected advanced nursing students, teaching practice in collegiate nursing program. Prereq or coreq: 531, 541, 551, or 561. 3 hrs and 2 labs. Sp
536 Adult Health Nursing II (6) Exploration and application of selected advanced nursing students, teaching practice in collegiate nursing program. Prereq or coreq: 531, 541, 551, or 561. 3 hrs and 2 labs. Sp
531 Adult Health Nursing II (6) Exploration and application of selected advanced nursing students, teaching practice in collegiate nursing program. Prereq or coreq: 531, 541, 551, 561. 3 hrs and 2 labs. Sp
532 Adult Health Nursing Field Work and Seminar (5) Seminar and intensive clinical practicum designed to facilitate further development of specialized knowledge and skills utilized for advanced clinical practice as family nurse practitioner. Prereq or coreq: 541. 1 hr and 4 labs. Sp
540 Family Nurse Practitioner I (6) Exploration and application of selected advanced nursing students, teaching practice in collegiate nursing program. Prereq or coreq: 541. 1 hr and 4 labs. Sp
541 Family Nurse Practitioner II (5) Continuation of 540. Management of chronic health problems; clinical experiences in variety of settings. Prereq: 540. 2 hrs and 3 labs. Sp
542 Family Nurse Practitioner Field Work and Seminar (5) Seminar and intensive clinical practicum designed to facilitate further development of specialized knowledge and skills utilized for advanced clinical practice as family nurse practitioner. Prereq or coreq: 541. 1 hr and 4 labs. Sp
550 Parent Child Nursing I (6) Exploration and application of selected advanced nursing students, teaching practice in collegiate nursing program. Prereq or coreq: Consent of instructor. F,Sp
551 Parent Child Nursing II (6) Exploration and application of selected advanced nursing students, teaching practice in collegiate nursing program. Prereq or coreq: 551. 1 hr and 4 labs. Sp
560 Mental Health Nursing (6) Exploration and application of selected advanced nursing students, teaching practice in collegiate nursing program. Prereq or coreq: Consent of instructor. F,Sp
561 Mental Health Nursing II (5) Exploration and application of selected advanced nursing students, teaching practice in collegiate nursing program. Prereq or coreq: Consent of instructor. F,Sp
562 Mental Health Nursing Field Work and Seminar (5) Seminar and intensive clinical practicum designed to facilitate further development of specialized knowledge and skills utilized for advanced clinical practice as family nurse practitioner. Prereq or coreq: Consent of instructor. F,Sp
563 Teaching Strategies and Practicum (5) Exploration, analysis, and application of selected educational, curriculum, teaching-learning, measurement, and evaluation principles and theories to instruction of under graduate nursing students; teaching practicum in selected advanced clinical nursing program. Prereq or coreq: 531, 541, 551, or 561. 3 hrs and 2 labs. Sp
564 Nursing Management: Strategies and Practicum (5) Exploration, analysis, and application of selected advanced management, supervisory, organizational, leadership, and other theories and concepts to administration of nursing services; management of selected advanced clinical practice facility. Prereq or coreq: Consent of instructor. F,Sp
577 Special Topics (3) Topic is determined by faculty and student interest. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. F,Sp
580 Nursing Project (3) Research-oriented, student-initiated endeavor that culminates in a scholarly paper.
suitable for publication and/or presentation; project may take form of development of innovative nursing intervention program, comprehensive literature review that reflects synthesis or comprehensive analysis, or other formats approved by nursing faculty member. Required for all MSN candidates who select non-thesis option. Prereq: 503, 510. May be repeated. Maximum 6 hrs. F,Sp

585 Seminar in Gerontology (1) (Same as Human Ecology 585.)

593 Independent Study (1-3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. F,Sp

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

601-02 Theory Construction and Analysis I, II (3,3) Nursing theory development; analysis of existing health and nursing theories; theory building from existing knowledge. Prereq: 503, 510, or consent of instructor. F,Sp

603 Advanced Nursing Research I (3) Advanced concepts in research methodology and data analysis and interpretation. Quantitative nursing research. Prereq: 601, 6 hrs of graduate-level statistics. F

604 Advanced Nursing Research II (3) Continuation of 603. Qualitative nursing research. Prereq: 603. Sp

605-06 Nursing Research Seminar (2,2) Selected research topics. Required of all doctoral students. Prereq: 604. F,Sp

611 Advanced Nursing Seminar (2) Current health and nursing issues: analysis and critique of current research on nursing and health care delivery system. Prereq: 620. Sp

612 Health and Nursing Policy/Planning (3) Policies affecting nursing education and practice; health policy and political processes; interactions between health professionals, consumer groups, and government in health policy development and health planning activities. Prereq: 611. F


614 Nursing Preceptorship (3) Individually designed practicum, field, or internship experiences in variety of administrative, educational, research, or clinical practice settings. Prereq: 612. Prereq or coreq: 613. Sp

Nutrition and Food Sciences
(College of Human Ecology)

MAJORS DEGREES
Food Science.................................M.S.
Nutrition......................................M.S.
Food Systems Administration..............M.S.
Human Ecology.........................Ph.D.

William C. Morris, Acting Head

Professors:
Beauchene, Roy E., Ph.D..............Kansas State
Carruth, Betty Ruth, Ph.D..............Missouri
Quinton, H. W., Ed.D......................Duke
Sachan, Dileep S., Ph.D...............Illinois
Smith, John T., Ph.D......................Missouri
Smith, M. A. (Memphis), Ph.D........Tennessee

Associate Professors:
Andrews, Frances E., Ph.D...........Ohio State
Morris, William C., Ph.D..............Iowa

Skinner, Jean D., Ph.D..............Oregon State

Assistant Professors:
Bailey, James W., Ph.D..............Iowa State
Bittle, J. B. (Memphis), Ph.D........Tennessee
Brooks, M. D. (Memphis), M.S........Alabama
Costello, Carol, Ph.D..............Tennessee
Haughton, B., Ed.D.................Columbia
Hentges, Dawn L., Ph.D..............Purdue
Snedd, J. P., Ph.D......................Ohio State

Instructors:
Jones, K., MBA......................East Texas State
McGrath, M., M.S..............Purdue

Master of Science programs are available in Nutrition, Food Science, and Food Systems Administration. Within the Nutrition program, a student may choose a concentration in nutrition science or public health nutrition. A graduate degree combined with an approved pre-professional practice experience beyond the baccalaureate degree completes the requirement for eligibility as a member of The American Dietetic Association and qualifies the graduate to apply to the Registration Examination to become a Registered Dietitian (R.D.). Students may receive more information from the department about R.D. requirements.

ADMISSION REQUIREMENTS
A completed file for review includes a College of Human Ecology application, Graduate Record Examination (GRE) scores for the general section, and completion of three Graduate School Rating Forms by individuals who can attest to the potential for graduate education. Forms may be obtained from the Dean's Office, College of Human Ecology. Admission into any of the graduate programs in the department is dependent on completion of undergraduate courses that give the necessary background for success in the graduate program. For all programs in Nutrition Science and Food Science, courses in general and organic chemistry, physiological chemistry, food and clinical analysis, microbiology, mathematics, physiology, economics, science of food, and nutrition are essential. For the Master's program in food systems administration, students must take 511, 514 and 2 hours from 548, which are designed as courses in which the student will integrate knowledge from coursework and write a major paper upon completion of an individual project.

NUTRITION
In Nutrition, students may choose a thesis or non-thesis option. Students emphasizing public health nutrition may choose the non-thesis option. Nutrition students who choose the non-thesis option must take 515 and 2 hours from 542-544, which are designed as courses in which the student will integrate knowledge from coursework and write a major paper upon completion of an individual project.

THE MASTER'S PROGRAM
Nutrition
In Nutrition, students may choose a thesis or non-thesis option. Students emphasizing public health nutrition may choose the non-thesis option. Nutrition students who choose the non-thesis option must take 515 and 2 hours from 542-544, which are designed as courses in which the student will integrate knowledge from coursework and write a major paper upon completion of an individual project. An oral comprehensive examination is required upon completion of the thesis.

Non-Thesis Option: The program consists of a minimum of 36 hours with at least 20 hours of coursework in the department. NFS 503 or 504, 511, 512, 540, 541 and 2 hours from 542-544 are required. Students in public health nutrition must take 513, 514 and 515. Six hours in one area outside the department are required. A minimum of 24 hours at the 500 and 600 level is required. A written comprehensive examination is given at the end of the program.

Food Science
In Food Science, students may choose a thesis or non-thesis option. Food Science students who choose the non-thesis option must take 541 and 544 or 545, which are designed as courses in which the student will integrate knowledge from coursework and write a major paper upon completion of an individual project.

Thesis Option: The program consists of a minimum of 33 hours with at least 16 hours of coursework in the department. NFS 503, 504, 511, 512, 540, 541 and 544 are required. Six hours of thesis 500 are required and may be applied toward the 33 hours. Six hours outside the department are recommended. A minimum of 22 hours at the 500 and 600 level is required. An oral comprehensive examination is required upon completion of the thesis.

Non-Thesis Option: The program consists of a minimum of 36 hours with at least 20 hours of coursework in the department. NFS 537, 541, 546, and 3 hours from 548 (non-thesis research project) are required. Six hours in one area outside the department are required. A minimum of 24 hours at the 500 and 600 level is required. A written comprehensive examination is given at the end of the program.

Food Systems Administration
In Food Systems Administration, students may choose a thesis or non-thesis option. Food Systems Administration students who choose the non-thesis option must take 541, 546 and 3 hours from 548, which are designed as courses in which the student will integrate knowledge from coursework and write a major paper upon completion of an individual project.

Thesis Option: The program consists of a minimum of 33 hours with at least 16 hours of coursework in the department. NFS 503, 504, 511, 512, 540, 541 and 2 hours from 542-544 are required. Students in public health nutrition must take 513, 514 and 515. Six hours in one area outside the department are required. A minimum of 24 hours at the 500 and 600 level is required. A written comprehensive examination is given at the end of the program.
A written comprehensive examination is given at the end of the program.

ACADEMIC COMMON MARKET

The ACM is an interstate agreement among southern states for sharing academic programs. Residents of one of the participating states who qualify for admission may enroll in certain programs on an in-state tuition basis. Students planning to enter the Master's program in Food Systems Administration who are residents of Arkansas, Kentucky, South Carolina, or North Carolina; students planning to enter Food Science who are residents of Kentucky or South Carolina; and students planning to enter Nutrition who are residents of Alabama, Arkansas, Georgia, Kentucky, South Carolina, or Virginia are eligible.

THE Ph.D. CONCENTRATION

Students enrolled in the food science concentration specialize in either the physical-chemical or socio-cultural aspects of food. In either concentration, students may be expected to acquire advanced training in food science, chemistry, biology, and other related subjects. The doctoral program emphasizes human nutrition, experimental nutrition (small animals), and intermediary metabolism.

Requirements for both concentrations:
1. Sixteen hours with a concentration in food science or nutrition including 9 hours at the 600 level (exclusive of dissertation);
2. NFS 511, and 512, 503 or 504 (nutrition science concentration) or 503 and 504 (food science concentration);
3. Minimum 4 hours of NFS 540;
4. Minimum 9 hours of statistics, computer science and research methods;
5. Minimum 2 hours in a cognate area;
6. Students without college teaching experience are required to take the fall semester seminar for GTAs and NFS 548 for a faculty-supervised problem in college teaching.

GRADUATE COURSES

413 Experimental Food Science (3) Individual and group laboratory experimentation in food science; microcomputer applications. Prereq: 312, Plant and Soil Science 471, 1 hr and 2 labs.

414 Nutrient-Drug Interactions (2) Nutrient effects on efficacy and toxicity of drugs; drug effects on absorption and metabolism of nutrients. Prereq: 300 or equivalent. Sp,A

423 Foodservice Systems Design and Equipment (3) Physical facility design, production and delivery system analysis; equipment selection and purchase. Prereq: Quantity Food Procurement, Production and Service with lab or consent of instructor. A

500 Thesis (1-19) P/NP only. E

502 Registration for Use of Facilities (3-19) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree completion. May not be used toward degree requirements. May be repeated. S/JNC on approval.

503 Physicochemical Properties of Foods I (3) Proteins and lipids: physical and chemical characteristics; behavior in foods. Prereq: 201 or equivalent. 413. F,A

504 Physicochemical Properties of Foods II (3) Sugars, starches, non-starch polysaccharides, hydrocolloids, and other factors: physical and chemical characteristics; behavior in foods. Prereq: 201 or equivalent. 413. F,A

505 Food Texture (2) Classification of foods according to textual parameters; instrumental and sensory methods in evaluation of texture. Prereq. 413 or Food Technology and Science 411, statistics or consent of instructor. 1 hr and 1 lab.

506 Sensory Analysis (3) Principles and methodology for sensory evaluation of food; application to laboratory and industrial settings of data. Prereq: 413 or consent of instructor. 2 hrs and 1 lab.

508 Culture, Food, and Nutrition (3) Food-related behavior of individuals and groups in United States. Sociocultural, economic, and technological influences on nutrition and food surveys, public policy. Prereq: 301 or 313 or consent of instructor. F,A

509 Graduate Seminar in Public Health (1) (Same as Public Health 509. Physical Education 509 and Social Work 509.)

511 Advanced Physiological Chemistry (4) Bioenergetics, flux control and hormonal interrelationships. Prereq: 313 or equivalent. F

512 Human Nutrition (3) Advances in carbohydrates, proteins, fats, fibers, nutritional requirements of humans. Prereq: 313 and 511. Sp

513 Community Nutrition (3) Orientation to community; assessment of nutrition problems, needs, and resources; functional roles of public health nutritionist. Concurrent field experiences. Prereq: 313 or consent of instructor. F

514 Community Nutrition (3) Planning, implementation, and evaluation of public health nutrition programs. Concurrent field experiences. Prereq: 513 or consent of instructor. Sp

515 Field Study in Community Nutrition (1-12) Personal participation in and evaluation of state or regional community nutrition program. Location of in-depth study to be selected in consultation with instructor. Prereq: 514 and consent of instructor. Su

516 Maternal and Child Nutrition (3) Nutrition principles related to growth and development during pregnancy, infancy, and childhood to age 5. High risk conditions. Prereq: 313 or consent of instructor. F

517 Childhood and Adolescent Nutrition (3) Application of nutrition principles to school age children; effects of diseases on growth and health maintenance; nutritional assessment and counseling. Prereq: 313 or consent of instructor. Sp

518 Nutrition and Aging (3) Nutritional problems of adults; nutritional requirements, dietary intakes; affects of nutrition on health and aging. Prereq: 313 or consent of instructor. Su

519 International Nutrition (3) World food supply. Demographic, socio-cultural, economic, and technological factors related to food and nutrition; international intervention and assistance programs. Prereq. Consent of instructor. F,A

520 Nutritional Ecology (2) Examination of issues in natural, political, physical, and social environments that impact availability of food and nutrients in U.S. food supply. F,A

521 Physiological Basis for Diet and Disease (2) Altered nutrient needs as result of metabolic changes that occur in selected disease states. Prereq: 411 or consent of instructor. Sp

522 Nutrition Counseling (2) Individual eating habits and disorders, evaluation strategies for effectiveness of helping process. Prereq: 313 or consent of instructor. F,A

523 Nutrition and Behavior (2) Influence of nutrients on intracellular metabolic processes, electro-physiological indicators of brain function and behavior. Prereq: 503 or equivalent. F,A

524 Nutrition Education: Principles, Implementation, and Evaluation (3) Conceptual models, principles, application, and evaluation models in nutrition education research. Prereq: 508 or consent of instructor. Su,A

525 Mental Retardation or Other Developmental Disorders of Childhood (3) Multidisciplinary core course required of all full-time students in training at Child Development Center, UT, Memphis. Supervised project in related area. Prereq. Consent of department head. E

527 Nutrition in Mental Retardation and Developmental Disabilities (1-9) Interdisciplinary diagnosis and treatment of developmentally handicapped child; role of nutritionist; clinical experiences and lectures at Child Development Center, UT, Memphis. Consent of department head. E

529 Management in Nutritional Care (2) Administrative roles and management functions of dietitians; clinical settings: program development, planning, and evaluation. Prereq: 220, 422, or consent of instructor. Sp

530 Computer-Assisted Foodservice Systems Management (3) Application of computer technology to foodservice industry; inventory, food cost accounting, production, and nutrient analysis. Prereq: 320 or consent of instructor. Su,A

531 Financial and Marketing Administration in Foodservice (3) Marketing and financial techniques used in foodservice administration; developing foodservice marketing plan, budgeting, foodservice accounting and information services. Prereq: 326 or consent of instructor. Sp

532 Human Resource Management in Foodservice (3) Identifying labor needs; development and maintenance of work force. Prereq: 422 or consent of instructor. F

533 Advanced Food Production and Delivery System Management (3) Analysis of food production and delivery systems; application of quantitative methods and models to optimize decisions. Prereq: 320 or consent of instructor. F

534 Special Topics in Foodservice Systems Administration (1-3) Nutritional, psychological, and sociocultural factors related to contemporary developments and trends in industry. Prereq: Consent of instructor. May be repeated. E

535 Directed Study in Foodservice Systems Administration (1-3) Problems selected for study by student with guidance of faculty member. Prereq. Consent of instructor. May be repeated. Maximum 6 hrs. E

537 Seminar in Foodservice Systems Administration (1) May be repeated. S/JNC only. Sp

540 Seminar in Nutrition and Food Sciences (1) May be repeated. S/JNC only. Sp

541 Research Methods (1) Basic principles of planning, conducting, and interpreting nutrition, food science, and foodservice systems administration research. Prereq: 5 graduate hrs in nutrition and food sciences and statistics. Sp

542 Advanced Experimental Nutrition (2) Application of research principles to individual project using experimental animals. Prereq: or consr. 541. Sp

543 Human Metabolic Research Methods (2) Application of research principles to conducting and interpreting metabolic studies. Prereq. or consr. 541. Sp
Ornamental Horticulture and Landscape Design

(College of Agriculture)

MAJOR

Ornamental Horticulture and Landscape Design ........................................ M.S.

G. Douglas Crater, Head

Professors:

Callahan, L. M., Ph.D. ......................... Rutgers University
Crater, G. Douglas, Ph.D. ..................... Ohio State University
Graham, E. T., Ph.D. ......................... Penn State University
Greeshoff, Peter M. (Rachelle Chair of Excellence), Ph.D. ............. Australian National University
McDaniel, G. L., Ph.D. ....................... Iowa State University
Williams, Don B., Ph.D. ....................... Penn State University

Associate Professors:

Day, J. W., Ph.D. ......................... Mississippi State University
Witte, Willard T., Ph.D. ....................... Maryland University

Assistant Professors:

Auge, Robert M., Ph.D. ................. Washington State University
Rogers, S. M., M.L.A. ......................... Georgia Tech
Trigiano, R., Ph.D. ......................... North Carolina State University

The Department of Ornamental Horticulture and Landscape Design offers the

Master of Science with concentrations in:

- Floricultural science and technology, nursery science, and horticulture
- Turfgrass science and technology

Various interests may be emphasized in any of these commodity areas, including micropropagation, innovative production and maintenance systems, computer-aided management systems, and the molecular biology, genetics, hortology, and stress physiology of ornamentals.

For admission, the student must have a B.S. in ornamental horticulture, horticulture, plant science, or a related agricultural or basic science discipline. Undergraduate transcripts must be evaluated by the department for prerequisite requirements, if any. Graduate research assistantships are available on a competitive basis. For further information, contact the department head.

THE MASTER'S PROGRAM

Thesis Option

1. A thesis is required. A Master's committee of no fewer than 3 faculty members will be selected. Prior to research for the thesis, a proposal must be approved by the Master's committee. Registration for a minimum of 6 hours of Thesis 500 is required.

2. In addition to the thesis requirement, a minimum of 24 hours of graduate credit is required. Not more than 10 hours of the minimum 30 hours can be below the 500 level. The academic program must be approved by the Master's committee which may require additional coursework if the student's progress or background indicates such need.

3. All students are required to include 510 Research Methods and 590 Seminar in their program and are expected to attend this course and participate in discussions each semester enrolled.

4. Twelve hours of coursework in the department must be at the 500 level or above exclusive of Thesis 500.

5. An oral examination covering the thesis and coursework is required.

Non-Thesis Option

1. A Master's committee of no fewer than 3 faculty members will be selected.

2. Thirty-four hours of graduate coursework are required, of which 22 must be at the 500 level or above.

3. All students are required to include 2 hours of Seminar in their program and are expected to attend this course and participate in discussions each semester enrolled.

4. Twelve hours of coursework in the department must be at the 500 level or above.

5. Final comprehensive written and oral examinations shall be taken upon completion of no fewer than 32 hours of approved graduate work.

GRADUATE COURSES

410 Nursery Management and Production (3) Modern management methods as applied to retail and wholesale nurseries and landscape contracting firms. Methods of producing liners, container and field-grown woody ornamental plants. Prereq: 220, 330, and Plant and Soil Science 210, or consent of instructor. 2 hrs and 1 lab. Sp

440 Advanced Turfgrass Management (4) Principles and scientific basis of turfgrass culture: adaptation, ecology, physiology, soil fertility, and grass nutrition, climatic influences on grass culture; physiology of clipping and watering; production, design, construction, and management of golf courses; and physiological influences of pest infestation and control measures. Prereq: 349 or consent of instructor. 3 hrs and 1 lab. Sp

460 Professional Practices in Landscape Construction and Management (2) Professionalism, salesmanship, proposals, bidding, estimating, specification, and contract management in landscape services industry. Interaction with industry representatives through special presentations. Prereq: 350 or consent of instructor. F

480 Advanced Landscape Design (4) Comprehensive application of landscape design skills. Design applications involving site layout, landscape grading, applied landscape construction, planting design. Analysis, programming, design, detailing, estimating, and specifying applicable to variety of landscape projects. Prereq: 280, 350, and 380, or consent of instructor. 1 hr and 2-3 hr labs. Sp

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

501 Special Topics in Ornamental Horticulture and Landscape Design (1-3) Topics to be assigned. May be repeated. Maximum 6 hrs. Prereq: Consent of instructor. E

502 Registration for Use of Facilities (3-15) Required of all students in thesis option. Prereq: Plant and Soil Science 471. F


550 Microtechniques (3) Methods of investigating histostructure, histochemistry, ploidy, and physiological structures in ornamental and crop plants, light microscopy. Prereq: 8 hrs biological science, 8 hrs chemistry, and consent of instructor. 1 hr and 2 labs. Su/A

570 Physiology and Development of Ornamental Plants (3) Basic and applied physiology of ornamental plants related to growth and development in production and utilization. Critical review of literature and discussion of juvenile and phase change, flowering, photoperiodism, thermoperiodism, vernalization, cold acclimation, hardness, dormancy, growth regulators, environmental stress, and post-harvest consideration. Prereq: Botany 321 and consent of instructor. Sp/A

580 Ornamental Plant Nutrition (3) Applications of nutrition principles and analysis in production of ornamental crops. Comprehensive study of functional roles of nutrients essential to plant growth, critical evaluation of recent developments in nutrient sources and formulations, foliar fertilization and analysis, nutrient uptake and water relations of ornamental plants grown in containers and in the field. Prereq: Botany 321, Plant and Soil Science 311 and consent of instructor. Sp/A

590 Seminar (1) Current literature and developments. May be repeated. Maximum 3 hrs. E

593 Problems in Ornamental Horticulture and Landscape Design (1-3) Independent study. Current topic related to technology and science. May be repeated. Maximum 6 hrs. E
Pathobiology

(College of Veterinary Medicine)

MAJOR DEGREE
Veterinary Medicine..........................D.V.M.

R. L. Michel, Head

Professors:
McGavin, M. D., Ph.D.................Michigan State
Michel, R. L., V.M.D., Ph.D...........Michigan State
Potgieter, L. N., Ph.D.................Iowa State
Schuller, H. M., D.V.M., Ph.D........Hannover

Associate Professors:
Edwards, D. F., D.V.M................. Georgia
Emmett, Kathleen A., Ph.D...........Ohio State
Fenech, Anthony J., Ph.D.............Iowa State
Shull, R. M., D.V.M.................Austria

Asst. Professors:
Breider, M. A., D.V.M., Ph.D........Texas A&M
Maddux, J., D.V.M., Ph.D..............Kansas State
Reinemeyer, C. R., D.V.M., Ph.D.....Ohio State
Wilkinson, J. E., D.V.M., Ph.D.......Cornell

Instructor:
Petersen, M. G., D.V.M............Colorado State

Graduate Descriptions

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

501 Special Topics in Pathobiology (1-2) May be repeated. Maximum 6 hrs. E

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

503 Comparative Pathology (3) Pathogenic mechanisms. Comparative aspects. Study of gross, microscopic and ultrastructural lesions. Prereq:Histology. 2 hrs and 1 lab. Sp,A

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

601 Advanced Topics in Pathobiology (1-3) Necropsy, histopathology, clinical pathology, clinical parasitology, clinical immunology, clinical bacteriology and mycology, and clinical virology. May be repeated. Maximum 12 hrs. E

602 Veterinary Biopsy (1-2) Examination of biopsy specimens and interpretation of observations. Preparation of specimens for sectioning. Prereq: Consent of instructor. May be repeated. Maximum 3 hrs. E

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

604 Veterinary Pathology Seminar (1) Microscopic slides and transparencies of lesions from cases examined by pathologists, residents, and graduate students. Interpretation of observations. Prereq: Consent of instructor. May be repeated. Maximum 4 hrs. E

605 Pathobiology Seminar (1) Subjects of current interest in biomedical science. Students present one seminar per term enrolled. Prereq: Consent of instructor. May be repeated. Maximum 4 hrs. Class meets once monthly. E

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

607 Diagnosis and Pathogenesis of Virus Diseases of Domestic Animals (3) Advanced study of virus diseases important to domestic animals: virus biology, pathogenesis, pathology and diagnosis. Technical training in virus diseases diagnosis. Prereq: Cellular and Comparative Biochemistry, and Advanced Topics in Biochemistry, Virology and Virology Lab, or Microbiology-Veterinary Medicine 811-812. 2 hrs and 1 lab. Sp,A

608 Techniques in Pathology (2) Fixation, processing and staining of tissue specimens; specialized gross dissection techniques; photography of gross specimens and photomicroscopy. Prereq: Consent of instructor. Sp,A

609 Principles of Pathology (1) Advanced topics in pathobiology and mechanisms of disease: pathophysiology, cellular degeneration, immunology, immunopathology, hemostasis. Principal biochemical and morphologic responses of various cells, tissues and organs to injury and other metabolic derangements. Participants present seminars on selected topics from current literature and textbooks. Prereq: Consent of instructor. F,A

Philosophy

(College of Liberal Arts)

MAJOR DEGREES
Philosophy.............................M.A., Ph.D.

George G. Brankert, Head

Professors:
Aquilla, Richard E., Ph.D............Northwestern
Brankert, George G., Ph.D............Nebraska
Cebik, L. B., Ph.D.................Michigan
Davis, John W., Ph.D................Emory
Edwards, Rem B., Ph.D..............Emory
Graber, Glenn C., Ph.D............. Michigan
Postow, Betsy C., Ph.D.............Yale
Van de Vate, Dwight, Jr., Ph.D.............Yale

Associate Professors:
Bennett, James O., Ph.D............Tulane
Cohen, Sheldon M., Ph.D............Northwestern
Emmett, Kathleen A., Ph.D...........Ohio State
Nolt, John E., Ph.D.................Ohio State
Osborne, Martha Lee, Ph.D...........Tennessee

Graduate Descriptions

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

501 Special Topics in Pathobiology (1-2) May be repeated. Maximum 6 hrs. E

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

503 Comparative Pathology (3) Pathogenic mechanisms. Comparative aspects. Study of gross, microscopic and ultrastructural lesions. Prereq: Histology. 2 hrs and 1 lab. Sp,A

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

601 Advanced Topics in Pathobiology (1-3) Necropsy, histopathology, clinical pathology, clinical parasitology, clinical immunology, clinical bacteriology and mycology, and clinical virology. May be repeated. Maximum 12 hrs. E

602 Veterinary Biopsy (1-2) Examination of biopsy specimens and interpretation of observations. Preparation of specimens for sectioning. Prereq: Consent of instructor. May be repeated. Maximum 3 hrs. E

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

604 Veterinary Pathology Seminar (1) Microscopic slides and transparencies of lesions from cases examined by pathologists, residents, and graduate students. Interpretation of observations. Prereq: Consent of instructor. May be repeated. Maximum 4 hrs. E

605 Pathobiology Seminar (1) Subjects of current interest in biomedical science. Students present one seminar per term enrolled. Prereq: Consent of instructor. May be repeated. Maximum 4 hrs. Class meets once monthly. E

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

607 Diagnosis and Pathogenesis of Virus Diseases of Domestic Animals (3) Advanced study of virus diseases important to domestic animals: virus biology, pathogenesis, pathology and diagnosis. Technical training in virus diseases diagnosis. Prereq: Cellular and Comparative Biochemistry, and Advanced Topics in Biochemistry, Virology and Virology Lab, or Microbiology-Veterinary Medicine 811-812. 2 hrs and 1 lab. Sp,A

608 Techniques in Pathology (2) Fixation, processing and staining of tissue specimens; specialized gross dissection techniques; photography of gross specimens and photomicroscopy. Prereq: Consent of instructor. Sp,A

609 Principles of Pathology (1) Advanced topics in pathobiology and mechanisms of disease: pathophysiology, cellular degeneration, immunology, immunopathology, hemostasis. Principal biochemical and morphologic responses of various cells, tissues and organs to injury and other metabolic derangements. Participants present seminars on selected topics from current literature and textbooks. Prereq: Consent of instructor. F,A
The M.A. and Ph.D. programs in Philosophy are available to residents of the states of Alabama, Maryland, Texas, Virginia, or West Virginia; the M.A. and Ph.D. with a concentration in Medical Ethics to residents of Kentucky; and the Ph.D. program to residents of Arkansas or Louisiana. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.

GRADUATE COURSES

400 Special Topics (3) May be repeated when topic varies. Maximum 6 hrs.

411 Modern Religious Philosophies (3) (Same as Religious Studies 411.)

412 Classical Indian Systems of Philosophy: The Moksha Tradition (3) (Same as Religious Studies 412.)

420 Topics in History of Philosophy (3) Figures or movements from antiquity through mid-twentieth century. Prereq: 6 hrs of philosophy or consent of instructor. May be repeated when topic varies. Maximum 9 hrs.

425 American Philosophy (3) Colonial to early 20th Century. Prereq: 6 hrs of philosophy or consent of instructor.

430 Topics in Logic (3) Prereq: 6 hrs of logic or consent of instructor. May be repeated when topic varies. Maximum 6 hrs.

440 Contemporary Ethical Theory (3) Topics in metaethics or ethics. Prereq: 6 hrs of philosophy or consent of instructor.

446 Theoretical Issues in Medical Ethics (3) Prereq: 240 or 345 or consent of instructor. (Same as Religious Studies 446.)

460 Philosophy of Science (3) Methodological and conceptual issues in natural and social sciences: patterns of theory modification and replacement, nature of explanation and causation, status of theoretical entities. Prereq: 360 and 1 yr of natural or social science, or consent of instructor.

465 Philosophy of History (3) Speculative and critical aspects of philosophy of history. Prereq: 6 hrs of philosophy or consent of instructor.

473 Philosophy of Mind (3) Problems of mind and body in relation to consciousness and personal identity. Prereq: 6 hrs of philosophy or consent of instructor.

475 Analytic Metaphysics and Epistemology (3) Topics in metaphysics and epistemology in recent Anglo-American tradition. Prereq: 6 hrs of philosophy or consent of instructor.

476 Philosophy of Language (3) Survey of issues such as meaning, reference, and truth. Prereq: 6 hrs of philosophy or consent of instructor.

479 Studies in Recent Continental Philosophy (3) Selected thinkers or topics: existentialism, phenomenology, hermeneutics, structuralism, post-structuralism. Prereq: 6 hrs of philosophy or consent of instructor. May be repeated when topic varies. Maximum 6 hrs.

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

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

520 Topics in the History of Ancient and Medieval Philosophy (3) Intensive critical work on major philosopher or school. May be repeated. Maximum 9 hrs.

522 Topics in the History of Modern Philosophy (3) Intensive critical work on major philosopher or school. May be repeated. Maximum 9 hrs.

524 Topics in the History of Twentieth-Century European Philosophy (3) Intensive critical work on major philosopher or school. May be repeated. Maximum 9 hrs.

527 Topics in the History of American Philosophy (3) Intensive critical work on major philosopher or school. May be repeated. Maximum 9 hrs.

530 Topics in Logic and Philosophy of Mathematics (3) May be repeated. Maximum 9 hrs.

540 Topics in Value Theory (3) May be repeated. Maximum 9 hrs.

542 Ethics (3) Dominant movements in history of ethics. May be repeated. Maximum 9 hrs.

544 Applied Ethical Theory (3) Single author, tradition, or topic in ethical theory, application to issues in health, business, technology, ecology, and other practical fields. May be repeated. Maximum 9 hrs. (Same as Religious Studies 544.)

546 Orientation to Medical Ethics (3) Survey of ethical theories in application to issues in medical ethics. Prereq: Consent of Medical Ethics Committee.

547 Clinical Medical Ethics (2) Medical terminology, hermeneutics, structuralism, post-structuralism, and medical ethics. Prereq: Consent of Medical Ethics Committee. May be repeated. Maximum 4 hrs. S/NC or letter grade.

548 Clinical Residency in Medical Ethics (3-12) Open only to students concentrating in medical ethics. Prereq: Consent of Medical Ethics Committee. May be repeated. Maximum 20 hrs. S/NC only.

553 Philosophical Topics in Literature and the Arts (3) Aesthetics, criticism, art and society. May be repeated. Maximum 9 hrs.

560 Philosophy of Natural Sciences (3) Nature of subject matter and method of science. May be repeated. Maximum 9 hrs.


570 Philosophy of Religion (3) Examination of central problems. (Same as Religious Studies 570.)

575 Topics in Metaphysics and Epistemology (3) May be repeated. Maximum 9 hrs.

577 Philosophy of Mind (3) Relation of mental to physical and of role of words in discourse for mental activities, thinking and feeling. May be repeated. Maximum 9 hrs.

590 Social and Political Philosophy (3) Philosophical problems concerning social and political life: family, state, freedom, justice; major theoretical responses: anarchism, social contract, Marxism. May be repeated. Maximum 9 hrs.

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

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

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

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

620 Topics in the History of Ancient and Medieval European Philosophy (3) May be repeated. Maximum 9 hrs.

622 Topics in the History of Modern Philosophy (3) May be repeated. Maximum 9 hrs.

624 Topics in the History of 20th-Century Philosophy (3) May be repeated. Maximum 9 hrs.

640 Topics in Value Theory (3) May be repeated. Maximum 9 hrs.

646 Topics in Medical Ethics (3) Prereq: Consent of Medical Ethics Committee. May be repeated. Maximum 9 hrs.

675 Topics in Metaphysics and Epistemology (3) May be repeated. Maximum 9 hrs.

Physical Education and Dance

(DEGREES)

(MAJORs)

PHYSICAL EDUCATION AND DANCE

(College of Education)

JOAN PAUL, HEAD

Professors:

Capon, Edward K. (Emeritus), Ph.D. .......... Iowa

Howley, Edward T., Ph.D. ................. Wisconsin

Kozar, Andrew J., Ph.D. ................. Michigan

Lay, Nancy E., Ph.D. ................. Florida State

Liemohn, W. P., Ph.D. ................. Iowa

Paul, Joan, Ed.D. ................. Alabama

Phillips, Madge M. (Emeritus), Ph.D. ....... Iowa

Watson, Helen B. (Emeritus), Ph.D. .......... Michigan

Wrisberg, C. A., Ph.D. ................. Michigan

ASSOCIATE PROFESSORS:


Croiskey, R. J., M.F.A. .......... Southern Methodist

DeSensi, J. T., Ed.D. .......... North Carolina

Jones, Ralph E., Ph.D. ................. Toledo

Mead, B. J., Ph.D. ................. Purdue

Morgan, W. J., Ph.D. ................. Minnesota

Assistant Professors:

Bassett, David R., Jr., Ph.D. .......... Wisconsin

Boroviait, Patricia C., M.S. .......... Tennessee

Donovan, T. J., Ed.D. ................. Houston

Kelley, D. R., Ed.D. .......... Georgia State

Lewis, J. L., Ed.D. ................. Tennessee

McCulchen, M. G., Ed.D. .......... North Carolina

Adjunct Faculty:

Acker, J. E., M.D. .......... Tennessee

Buckles, Tina M., Ph.D. .......... Tennessee


O'Connell, D. G., Ph.D. .......... Toledo


THE MASTER'S PROGRAM

The Department of Physical Education and Dance offers the Master of Science with a major in Physical Education with the following concentrations:

Adapted Physical Education

Exercise Physiology and Fitness

Motor Behavior

Pedagogy in Physical Education

Philosophical and Sociological Foundations of Sport

Sport Management (an interdisciplinary concentration with Health, Leisure, and Safety)

The Master of Science program permits the student to select a thesis or non-thesis option. The thesis option requires a minimum of 30 hours. The non-thesis option requires 32 hours, including a project. All M.S. students must complete a course in research design or statistics and register for two credits of Physical Education 601.
THE DOCTORAL PROGRAM
The Doctor of Education with a major in Physical Education is available with concentrations in the following areas:
Adapted Physical Education
Exercise Physiology and Fitness
Motor Behavior
Philosophical and Sociological Foundations of Sport
The Doctor of Philosophy with a major in Education includes the concentrations and specializations listed under Education.

ADMISSION REQUIREMENTS
Applicants are required to complete the departmental application which will be sent to all students upon their initial inquiry about the program. Specific questions about these programs should be directed to the head of the Department of Physical Education and Dance.

The following retention policy applies to all graduate students seeking a degree in the Department of Physical Education and Dance:
1. Graduate students are required to maintain an overall 3.0 GPA.
2. Any student who falls below this standard will be advised in writing by the department head of the need to discuss the matter with his/her advisor.
3. If a student's overall GPA remains below 3.0 for a second semester, the student will have his/her degree status revoked.

GRADUATE ASSISTANTS
A limited number of graduate assistantships are available for qualified women and men who are graduates of accredited colleges or universities. These assistantships are open to students in the Master's and doctoral programs. Students interested in these opportunities should file their applications before February. Letters should be addressed to:
Graduate Assistantships Coordinator
Department of Physical Education and Dance
The University of Tennessee
Knoxville, TN 37996-2700

ACADEMIC COMMON MARKET
An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UK on an in-state tuition basis. The M.S. program in Physical Education is available to residents of the state of Texas. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.

Physical Education

GRADUATE COURSES
405 Sociology of Sport (3) (Same as Sociology 405.)
414 Physical Activity and Fitness (2) Relationship of exercise to cardio-respiratory function. Body composition, healthy low back, and stress. Prereq: 200, 292. (Same as Health 414.)
423 Readings in Physical Education (2) Review of current and classic literature in physical education.
500 Thesis (1-15) P/NP only. E
502 Registration for Use of Facilities (3-15) Required for those not currently registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/N only. E
509 Graduate Seminar in Public Health (1) (Same as Public Health 509, Nursing 509, Nutrition and Food Science 509 and Social Work 509.)
511 Administrative/Supervisory Processes in Physical Education (3) Organizational concepts, management strategies, and supervisory techniques related to physical education programs at all levels.
512 Application of Theory to Curricular/Methodological Decision in Physical Education (3) Application of curricular principles and theories to educational situations for development of curricula and lessons in physical education. Various methodological approaches.
514 Advanced Philosophy of Sport (3) Major philosophical theories of sport. Various conceptual, moral, aesthetic, and social-political issues.
515 Social Theories of Sport (3) Liberal, democratic and Marxist social theories of sport. (Same as Sociology 594.)
528 Motor Behavior: A Theoretical Perspective (3) Motor behavior from information processing perspective; overview of current research that supports theoretical background. Prereq: Undergraduate course in general psychology or consent of instructor.
531 Biomechanics of Human Performance (3) Human movement: teaching, coaching and sports medicine. Prereq: 422 or equivalent.
532 Seminar in Research Techniques in Physical Education (3) Evaluate, compare, and contrast research techniques in physical education with consideration for and experiences in appropriate review, design, and analysis procedures, and proposal development.
533 Psychology of Sport (3) Social psychological factors influencing human behavior in sport context; discussion of contemporary theory, research, and methodology. Prereq: General psychology course or consent of instructor.
534 Motor Behavior and Skill Acquisition (3) Topical explanation and application of principles of human movement behavior to acquisition and performance of skills; discussion of current research and methodology.
541 Special Topics (1-3) Advanced study in selected disciplinary or professional areas of physical education and/or sport. May be repeated.
542 Sociological Aspects of Sport and Physical Education (3) Study of historical and cultural factors influencing sport and physical education. Pertinent issues and research applications. Prereq: Consent of instructor. (Same as Sociology 542.)
543 Human Motor Development (3) Changes in selected motor performance and related attribute areas during critical developmental periods within context of perceptual-motor development theories and explanations of factors affecting motor behavior.
544 Theories of Physical/Movement Education (3) Integration of various theoretical approaches to physical education/movement education within cultural context; research and field work.
553 Advanced Adapted Physical Education (2) Curriculum development and teaching methodology for programming for child with special education needs. Prereq: 411 or consent of instructor. Coreq: 553.
554 Advanced Adapted Physical Education Practicum (1) Curricula and methodologies implemented in lab in school for handicapped. Coreq: 553.
555 Motor Assessment and Programming for the Child with Special Education Needs (3) Criterion and norm-referenced tests used in development of individualized education programs for children with special physical education/motor development needs. Testing protocols which purport to get at basis of dysfunc-
tion; those which just measure symptoms of dysfunction; efficacy of remediation theories based or related to testing protocols. Evaluation of motor skill in exceptional children and development of remedial programs for children assessed appropriate for school/parent implementation.
560 Philosophy of Fitness (3) Adaptations that take place with training and detraining, and influence of environmental and heredity factors. Prereq: Undergraduate courses in human physiology of exercise. Coreq: 561.
561 Physical Fitness Testing and Evaluation (1) Laboratory; testing and evaluation of physical fitness factors in apparently normal population. Coreq: 560.
562 Advanced Physiology of Exercise (3) Laboratory; quantitative approach to scientific inquiry. Prereq: Undergraduate physiology of exercise.
569 Fitness Testing, Programming, and Leadership for Diverse Populations (3) Clinical experience in selecting, administering, and evaluating exercise tolerance tests on cycle ergometer and treadmill. Individual fitness programs for diverse populations. Practice in leading variety of activities designed to improve health-related fitness components. Prereq: 550. Coreq: 568. (Same as Public Health 569.)
585 Seminar in Gerontology (1) (Same as Human Ecology 585, Nursing 585, Educational and Counseling Psychology 585, Public Health 585, and Social Work 585.)
593 Directed Independent Studies (1-3) May be repeated. Prereq: 532 or consent of instructor.
600 Doctoral Research and Dissertation (3-15) P/NP only. E
601 Research Seminar in Physical Education (1) Research topics in different aspects of physical education, sport, and human movement. May be repeated. S/N only.
622 Directed Independent Research (3-6) Prereq: Doctoral student or consent of instructor. May be repeated.
633 Advanced Motor Behavior (1-3) in-depth analysis, synthesis, and discussion of contemporary theory and topics; research development and production; motor control learning, sport psychology, motor development.
661 Seminar in Exercise and Applied Physiology (1) Prereq: 551. May be repeated with consent of instructor. S/N only.
684 Research Participation in Applied Physiology (1-6) Participation in research with faculty member whose interests coincide with those of student. S/N only.
681 Practicum (1-3) Intern experience in areas of major interest. May be repeated.

Dance

GRADUATE COURSES
410 Ballet: Level III (2) Instruction and practice in advanced classical ballet techniques. Prereq: Dance majors and minors or consent of instructor. May be repeated. Maximum 16 hrs.
415 The Teaching of Creative Dance (2) Theory, methods, materials, and practical experience in presentation and integration of creative dance in grades K-6.
420 Jazz: Level III (2) Instruction and practice in advanced jazz and musical theater dance styles and techniques. Prereq: Dance majors and minors and consent of instructor. May be repeated. Maximum 16 hrs.
430 Modern: Level III (2) Instruction and practice in advanced modern dance techniques. Prereq: Dance
majors and minors or consent of instructor. May be repeated. Maximum 16 hrs.

450 Composition III (3) Application of choreographic and production skills culminating in presentation of two works. Prereq: 350.

460 Rhythmic Analysis (3) Basic nature and principles of music, rhythm, and rhythmic notation; correlation with dance movement and composition. Prereq: Consent of instructor.

465 Dance Notation (3) Fundamentals of movement notation; notation and reading of elementary movement studies.

480 History of Dance I (3) Dance of various societies and culture from pre-history through 19th century.

481 History of Dance II (3) Development of dance in theatre, recreation and education during 20th century.

490 Philosophy of Dance and Related Arts (3) Aesthetic principles and current trends in dance; relationship with other art forms.


496 Dance Pedagogy (3) Principles and methods of teaching of dance with practical application in mini-teaching experience. Prereq: Upperclass or graduate standing and consent of instructor.

**Physics and Astronomy**

(College of Liberal Arts)

**MAJOR DEGREES**

**Physics** M.S., Ph.D.

William M. Bugg, Head

**Professors:**

Bingham, C. R., Ph.D........... Tennessee

Blatt, W. E., Ph.D........... Michigan State

Brau, J. (On Leave), Ph.D........... MIT

Breaux, William, M. A. (On Leave), Ph.D.... Michigan State

Bugg, W. M., Ph.D........... Tennessee

Burgdorfer, J. D., Ph.D........... Frie Universitat Berlin

Callico, T. A., Ph.D........... Purdue

Childers, R. W., Ph.D........... Vanderbilt

Chritophorou, L. G., Ph.D........... Manchester

Close, F. E. (Distinguished Scientist), Ph.D....... Oxford

Colglazier, E. W., Ph.D........... Cal Tech

Collins, T. C., Ph.D. .......... Florida

Condo, G. T., Ph.D. .......... Illinois

Cramer, H. W. (UTSI), Ph.D. ...... Yale

Deeds, W. E. (Emeritus), Ph.D. ...... North Carolina

Dicks, J. B. (Distinguished Prof.), Ph.D. ...... Vanderbilt

Doxk, K., Ph.D. .......... Michigan

Galler, N. M. (Emeritus), Ph.D. .......... Ohio State

Georgiou, S., Ph.D. .......... Manchester

Guldry, M. W., Ph.D. .......... Tennessee

Harris, E. G. (Distinguished Prof.), Ph.D. ...... Tennessee

Hart, E. L., Ph.D. .......... Cornell

Huray, P. G. (On Leave), Ph.D. ...... Tennessee

Jacobson, H. C., Ph.D. .......... Yale

King, D. T. (Emeritus), Ph.D. .......... Bristol

Lewis, J. W. L. (UTSI), Ph.D. ...... Mississippi

Lovell, R. J., Ph.D. .......... Vanderbilt

Macek, J. (Distinguished Scientist), Ph.D. ...... Rensselaer

Mahan, G. D. (Distinguished Scientist), Ph.D. ...... California

Mason, A. A. (UTSI), Ph.D. ...... Tennessee

McGregor, W. K. (UTSI), Ph.D. ...... Tennessee

Nielson, A. H. (Emeritus), Ph.D. ...... Michigan

Obenshain, F. E., Jr., Ph.D. ...... Pittsburgh

Painter, L. R., Ph.D. .......... Tennessee

Parks, J. E., Ph.D. .......... Tennessee

Pegg, D. J., Ph.D. .......... New Hampshire

Riedinger, L. L., Ph.D. .......... Vanderbilt

Ritchie, R. H., Ph.D. .......... Tennessee

Rusak, W. R. (Emeritus), M.S. .......... Tennessee

Schwehrer, H. C. (Emeritus), Ph.D. ....... MIT

Sellin, L. A. (On Leave) (Chancellor's Res. Li. (Scholar)), Ph.D. ...... Chicago

Shih, C. C., Ph.D. .......... Cornell

Stelson, P. H., Ph.D. .......... MIT

Thompson, J. R., Ph.D. .......... Duke

Thompson J. O., Ph.D. .......... Illinois

Wheeler, G. W., Ph.D. .......... Yale

White, J. W. (Emeritus), Ph.D. .......... North Carolina

**Assistant Professors:**

Breinig, M., Ph.D. .......... Oregon

Duckett, K. E., Ph.D. .......... Tennessee

Elston, B. C., Ph.D. .......... MIT

Ferrell, T., Ph.D. .......... Clemson

Hendler, T. H., Ph.D. .......... Rutgers

Lide, R. W., Ph.D. .......... Michigan

Muenihauzer, J. W., Ph.D. .......... Tennessee

Shelley, S. Y., Ph.D. .......... Maryland

Ward, B. F. L., Ph.D. .......... Princeton

**Associate Professors:**

Bottcher, C., Ph.D. .......... Belfast

Strayer, M. J., Ph.D. .......... MIT

**Research Professors:**

Du, Yuan-Chi, Ph.D. .......... Beijing

McCorkle, D. L., Ph.D. .......... Tennessee

Nave, S. R., Ph.D. .......... Tennessee

Sorenson, P. S., Ph.D. .......... Copenhagen

**Research Associate Professors:**

O C-S (On Leave), Ph.D. .......... New York

Warmack, R. J., Ph.D. .......... Tennessee

**Lecturers:**

Fairman, R. C.

Riedinger, T., M.S. .......... Vanderbilt

Graduate programs leading to the Master of Science and the Doctor of Philosophy are offered in a number of concentration areas: atomic and low temperature physics, biophysics, chemical physics, elementary particle physics, health physics, heavy ion atomic physics, molecular spectroscopy, nuclear physics, plasma physics, condensed matter physics, theoretical physics, and ultrasonics.

Departmental graduate programs leading to the M.S. and Ph.D. are also available at The University of Tennessee Space Institute, Tullahoma, where opportunities for study and research are available in quantum optics and laser physics, atomic and molecular spectroscopy, fluid physics, and theoretical physics. For additional information, contact the department head.

**ADMISSION REQUIREMENTS**

A student who enrolls in The Graduate School with the intention of attaining an advanced degree in Physics will have completed an undergraduate major in Physics or its equivalent. Physics 311-12, 321, 431-32, and 461-62-63 or 411-12 constitute the minimum courses prerequisite to graduate study. A student who intends to present Physics as a graduate minor will have completed an undergraduate minor in Physics or its equivalent. Physics 311 and 431-32 constitute the minimum coursework prerequisite to a minor in Physics.

First-year graduate students are required, for advising purposes only, to take a qualifying examination in undergraduate physics during the fall semester registration period.

THE MASTER'S PROGRAM

**Thesis Option**

This program is designed primarily for students intending to go into industrial or governmental laboratories as physicists. The course requirements include 24 semester hours of physics courses, of which at least 12 semester hours are taken from Physics 511-12, 521-22, 531-32, 541-42, or 571-72. Each candidate must present an acceptable thesis, 6 hours of 500, and pass an oral examination on course material and thesis.

**Non-Thesis Option**

This program is designed primarily for students intending to teach in colleges or universities on the elementary or intermediate level, or for students specifically intending to work toward a Ph.D. Students seeking the non-thesis option must apply to the department's graduate committee for permission to enroll under this program. The requirements are the satisfactory completion of 30 hours of coursework composed of 18 semester hours from Physics 511-12, 521-22, 531-32, 541-42, and 571-72; 6 semester hours in a minor field; and 6 semester hours from other courses numbered above 400 (preferably of advanced nature). At least 20 hours must be taken at the 500 level or above. In addition, the candidate must pass a written examination administered by the committee.

**THE DOCTORAL PROGRAM**

All students are expected to take Physics 521-22, 531, 541-42, 551, 561, 571-72, and 611. Physics 601-02 are normally required of students specializing in atomic physics; Physics 621-22 of students in nuclear physics; Physics 626-27 of students in elementary particle physics; Physics 663-64 of students in plasma physics; Physics 681-82 of students in solid state physics; and Physics 681-82 of students specializing in molecular spectroscopy. Students specializing in chemical physics may substitute Chemistry 572 for Physics 551 and should complete at least
Astronomy

GRADUATE COURSES

411 Astrophysics (3) Development of analytical physical models of galactic structure of universe, stellar and interstellar matter, and planetary systems. Topical and interdisciplinary, consideration of quasars, pulsars, black holes and current developments in field. Acceptable for major credit in physics. Prereq: Physics 252 and consent of instructor.

490 Senior Seminar in Astronomy (1-3) Topic of current interest. May be repeated with consent of department. Maximum 6 hrs.

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

501 Graduate Research Participation (3) Advanced research techniques under supervision of staff research director whose research area coincides with interests of student; open to all graduate students in good standing. Prereq: Consent of department and research director. May be repeated with consent of department. Maximum 18 hrs. S/NC only.

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

505 Physics of Fluids (3) Fluid physics, overview of fluid mechanics and associated computational techniques; general description of laminar and turbulent flows; acoustic, supersonic and hypersonic flows; continuum, transitional and free-molecular flows; pipe flow, nozzle flow and sonic orifice expansion flows; reacting and nonreacting flowfields; shock-tube physics; and an introduction to the method of characteristics and Monte Carlo computational techniques.

506 Experimental Methods (3) Principles, real operational behavior and limitations of laser types, radiation detectors, photomultiplier tubes, image intensifiers, image converters, image dissectors, streak cameras, and fast-far-infrared systems including cryogenic-based devices, data acquisition techniques including synchronous detection, digital electronics methods and micro-computer data acquisition and registration methods.

507 Contemporary Optics (3) Topics in geometrical, physical, Fourier, and nonlinear optics and introduc- tory laser physics. Extensive use of computer calculations and design of practical and sophisticated optical systems.

508 Laser Physics (3) Mode analysis, stable and unstable resonators; rate equations and population inversion, saturation, relaxation oscillations, fluctuations and noise, laser stability; quantum theory of laser, photon coherence, mode-locking, Q-switching and frequency stabilization; specific laser types: semiconductor and solid-state, eximer, copper vapor and dye lasers.

511-12 Theoretical Physics (3) Classical theoretical physics, with limited use of mathematics. Prereq: 312, 432, advanced calculus, differential equations, and vector analysis.


532 Advanced Classical Mechanics (3) Variational principles, canonical transformations, Hamilton- Jacobi theory, nonlinear mechanics, elasticity, fluid mechanics. Prereq: 531.


574-75 Group Theory for Physicists (3,3) Introduction to abstract group theory, discrete and continuous groups, representation theory, the classical test of general relativity. Prereq or coreq: 531 and 542.

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


602 Special Problems (3) Especially assigned theoretical or experimental work on problems not covered in other courses. May be repeated. Maximum 9 hrs. E

603 Seminar (1-3) a. Mechanics; b. Radiation; c. Heat and Thermodynamics; d. Electricity and Magnetics; e. Modern Physics. May be repeated with consent of instructor. Maximum 18 hrs. E

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

605 Laser Spectroscopy (3) Application of lasers to spectroscopy of atomic and molecular systems; review of classical multi-pole radiation, atomic L-S and J-
coupling and Zeeman and Stark effects, spontaneous emission of atomic systems, theory of radiation, electric and magnetic susceptibilities, high energy processes, and applications in real estate development planning.

Students who have completed the Master of Science in Planning program are prepared for entry-level positions in regional, city, county, and metropolitan planning agencies; they are also prepared for careers in real estate development planning.

The M.S.P. is approved for SREB Aca-

THE MASTER’S PROGRAM

Admission Requirements

Applicants are to submit an application for admission to The Graduate School, two letters of reference from faculty or others who have observed their prior academic work, and a statement describing personal career objectives. If the applicant has prior work experience in planning, a reference letter should also be provided by the work supervisor. Graduate Record Examination scores are requested of all applicants whose undergraduate GPA is below 3.0. Other applicants are encouraged to submit them.

The M.S.P. is approved for SREB Aca-

Degree Requirements

The M.S.P. requires completion of at least 48 hours of graduate credit, at least 30 of which must be in planning. The following courses are the core curriculum required of all students: 510, 511, 515, 520, 521, 523, 530, 531, 532, 540, and 545.

Students should plan to enter the program in the fall term to take the core courses in the proper sequence.

Each student is required to develop an area of concentrated competence beyond the core curriculum. After selecting the area of concentration, usually by the end of the second semester, the student takes a prescribed set of courses in the subject area. Further enhancement of the concentration is gained by taking additional elective courses in the subject and by focusing the thesis or major paper on the subject. Concentration courses are drawn from the planning curriculum and from other departments in the University. Concentrations are available in land use planning, analytical methods in planning, economic development planning, and real estate development planning.

Students have the latitude to propose an alternate specialization consisting of at least 9 hours of coursework, subject to approval by the Graduate School. Courses taken to fulfill this requirement are available in transportation, health, education, environmental, and social planning.

Each student is required to demonstrate competence in individual research. This may be done in one of two ways:

Thesis Option—Complete a thesis for 6 hours credit;

Non-Thesis Option—Complete a major study with acceptable documentation. In order to be eligible for the major study option, the student must have completed at least 12 hours of graduate coursework in planning with at least a 3.5 cumulative grade-point average. The student meeting these criteria may present a proposal to his/her committee for a major study that will include at least 6 hours of subsequent coursework. The proposal shall justify the selection of the topic, describe the approach to the study, and describe the nature of the final product. The topic will normally be expected to reinforce or complement the student's concentration.

Student academic progress is monitored by the faculty. A student failing to maintain an acceptable grade-point average may be placed on probation or dismissed from the program.
Graduate Courses

401 The City in the U.S. (3) Development and character of U.S. cities. Contemporary issues and selected case studies. (Same as Urban Studies 401.)

402 Survey of City Planning (3) History of city development and of planning. U.S. experience in urban and other levels of planning. State of the art, process, comprehensive plan, implementation devices, planning in society. Not for credit for M.S.P. degree.

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


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

510 Fundamentals of Planning (2) History of planning, structure and development of urban areas, operations of contemporary planning, trends and issues.

511 Graphic and Oral Communications in Planning (1)

515 Theory of Planning (2) Analysis of nature and objectives of planning process; role of planner and planning function in public decision-making. Prereq: 510 or consent of instructor.

520 Planning Research Methods (3) Research techniques in subject areas associated with city and regional planning. Research tools, data collection and analysis as basis for planning and decision-making.

521 Computers in Planning (3) Basic computer concepts, hardware and software, use of mainframe and microcomputer in planning and government.

522 Computers in Planning II (3) Software and systems for planning and local government. Content varies. Projects in small group or individual study mode. Prereq: 521 and consent of instructor.

523 Statistics for Planners (3) Applications of basic descriptive and inferential classical and non-parametric techniques in planning research. Data organization and display, measures of location, dispersion and association; data transformations; some basic probability theory; selected one and two sample tests; correlation and regression analysis. Prereq: 520 or consent of instructor.

524 Advanced Data Analysis (3) Applications of statistical data analysis in planning. Regression analysis, plus selected multivariate, non-parametric, and analytical papers and software techniques used in computer-aided data analysis, for data analysis. Prereq: 521, 523 and consent of instructor.

525 Planning Information Systems (3) Design, analysis, and use of information systems in planning and local decision-making. Design of planning decision support systems; use of public data bases; impact of information revolution and new technologies on planning profession. Prereq: Permission of instructor.

526 Library Research for Planning (1) Survey of publications of interest to planners, resources and research techniques. Use of facilities and collections of library.

530 Planning Analysis and Forecasting (3) Methods of data analysis and modeling in urban and regional studies. Population, employment, and economic base studies, forecasting techniques. Coreq: 520 or consent of instructor.

531 Urban and Regional Analysis (3) Past, present and possible future patterns of urban and regional structures drawing on contemporary theories, models, and empirical research.

532 Planning Methods (5) Preparation of comprehensive plans for urban areas or regions. Development of baseline data and forecasts, formulation of alternative plans and strategies, and development of plan implementation programs. Extensive laboratory experience. Prereq: 510, 520, 530 and 531 or consent of instructor.

533 Planning and Transportation (3) (Same as Civil Engineering 558)

538 Urban and Site Design (3-6) Principles of design of residential subdivisions and some components of physical community, shopping centers, institutional complexes, central business districts. Problems of reviewing alternative designs against each other or written regulations. Extensive laboratory experience.

539 Planning for Historic Preservation (3) Planning for preservation, restoration, and conservation of historic buildings, areas and sites as related to comprehensive planning process. National, state, and local government role in preservation, designation of sites, legislative needs, financing and administrative organizations.

540 Legal Aspects of Planning (3) Legal basis for planning and guiding community development. Legal tools of planning. Prereq: 510 or consent of instructor.

545 Planning and Property Development (2) Process of urban physical growth and change; functioning of private sector real estate development and its relationship to planning. Partnership roles of public and private sectors in urban development and redevelopment. Prereq: 510 or consent of instructor.

546 Housing (3) Nature and demand for housing in U.S. and abroad, U.S. experience. Private market processes and public policies. Problems of housing supply, impact of new technology, and governmental programs to improve supply and quality of housing.


551 State and Regional Planning (3) Theory and practice of planning at state, sub-state, and metropolitan levels.

552 Development Planning in the Third World (3) Seminar on urban and regional development in Third World nations. Population growth, settlement patterns, economic development, land framework of integrated resource management. (Same as Ecology 552.)

553 Natural Resource Management and Environmental Assessment in Developing Nations (3) (Same as Ecology 537 and Botany 537.)

554 TVA, Planning and Development (3) Review and evaluation of leading U.S. national experiment in river basin planning and development, Tennessee Valley Authority.

555 Environmental Planning (3) Role of planners and planning in maintenance of balance between natural and built environment. (Same as Ecology 555.)

560 Policy Analysis and Strategic Planning (3) Models of policy making process and role of strategic planning and applied decision making. Quantitative and qualitative approaches, evaluative research and program evaluation, and impact assessment.

590 Practicum (6) Prereq: Consent of instructor. S/NC or letter grade.

591 Special Topics (1-3) Prereq: Consent of instructor.

592 Readings in Planning (1-3) Prereq: Consent of instructor. May be repeated.

593 Problems in Planning (1-3) Prereq: Consent of instructor.

Plant and Soil Science (College of Agriculture)

Major Degrees

Plant and Soil Science

M.S., Ph.D.

John E. Foss, Head

Professors:

Bell, Frank F. (Emeritus), Ph.D. ... Iowa State

Coffey, D. L., Ph.D. ... Purdue

Conger, B. V., Ph.D. ... Washington State

Foss, John E., Ph.D. ... Minnesota

Fribourg, Henry A., Ph.D. ... Iowa State

Josephson, L. M. (Emeritus), Ph.D. ... Wisconsin

Parks, William L., Ph.D. ... Purdue

Pickett, B. S. (Emeritus), Ph.D. ... Michigan State

Reynolds, John H., Ph.D. ... Wisconsin

Saatz, Lloyd F. (Emeritus), Ph.D. ... NC State

Skold, L. N. (Emeritus), M.S. ... Kansas State

Springer, M. E. (Emeritus), Ph.D. ... California

Swingle, H. D. (Emeritus), Ph.D. ... Louisiana State

Winters, Eric (Emeritus), Ph.D. ... Illinois

Associate Professors:

Allen, Fred L., Ph.D. ... Minnesota

Commons, J. T., Ph.D. ... West Virginia

Deyton, D. E., Ph.D. ... NC State

Hayes, R. M., Ph.D. ... Illinois

Krueger, W. A., Ph.D. ... Illinois

Lessman, Gary M., Ph.D. ... Michigan State

Lewis, R. J., Ph.D. ... NC State

Reich, V. H., Ph.D. ... Iowa State

Sams, C. E., Ph.D. ... Michigan State

Tyler, D. D., Ph.D. ... Kentucky

West, D. R., Ph.D. ... Nebraska

Assistant Professors:

Graveel, J. G., Ph.D. ... Purdue

Rhodes, G. N., Jr., Ph.D. ... NC State

The Department of Plant and Soil Science offers graduate programs leading to the Master of Science and the Doctor of Philosophy. Concentrations for the graduate programs are offered in soil science, plant breeding and genetics, and crop physiology and ecology. For further information, contact the department head.

The Master's Program

The program requires writing a thesis based on original research. A minimum of 30 hours is required for the Master's degree program of which 6 credits must be Thesis 500. At least 14 credits must be taken in courses numbered above the 500 level. The student's advisory committee will consist of the major professor, who will act as chairperson of the committee, and a minimum of two other faculty members. The advisory committee approves the student's research problem and coursework and conducts the final oral examination covering the thesis and graduate courses.

The Doctoral Program

A minimum of 72 hours beyond the Bachelor's degree, exclusive of credit for Thesis 500, is required. Of this number, 24 hours must be Doctoral Research and Dissertation 500. A minimum of 26 hours must be completed in courses numbered above 500
exclusive of doctoral research and dissertation, of which 6 must be in courses numbered above 600. A minimum of 9 hours of such coursework taken during the doctoral program must be outside the department in one or more cognate areas.

The student and the major professor should have had a composition of at least four faculty members holding the rank of assistant professor or above, three of whom, including the chair, must be approved by the Graduate Council to direct doctoral research. At least one member must be from outside the department. The committee must approve all coursework applied toward the degree, certify the student's mastery of the major field and any cognate fields, direct the dissertation, and recommend the dissertation for approval and acceptance by The Graduate School.

**GRADUATE COURSES**

411 Soil Microbiology (3) Soil microbial population and role in soil ecosystem, microbial transformations of inorganic and organic compounds, decomposition of residues, dynamics of soil organic matter. Prereq: 210 and Chemistry 110 or 350 or consent of instruc-
tor. F

412 Soil Genesis, Classification, and Mapping (3) Soil genesis and formation; observing and describing morphology, characteristics of agricultural and forest soils; soil chemical and physical properties, classification, mapping. Two Saturday field trips. Prereq: 210 or consent of instruc-
tor. 2 hrs and 1 lab. Sp

413 Soil Chemistry (3) Principles concerning structure and chemical properties of soil materials; colloidal fraction as related to exchange, chemical equilibria, soil acidity, oxidation-reduction, weathering, nutrient availability and waste disposal. Prereq: 311 or con-
sent of instructor. F

414 Soil, Land Use, and the Environment (3) Soil as environmental component and soil properties affecting land use, land source in development planning; consideration of nonengineering aspects of site selec-
tion for land use, soil survey and resource data in land use, recognition and prevention of soil pollution. Prereq: 210 or consent of instructor. Sp; A

420 Crop Physiology and Ecophysiology (3) Principles of plant physiology and ecology as applied to crop pro-
duction. Effects of environmental factors on physiological processes. Prereq: 230, Botany 321. 2 hrs and 1 lab. Sp

433 Agricultural Pesticides (3) Regulation of pesticidal activity and tolerance, plant resistance, consumer and industry, marketing and use. Structure, use, mode of action, degradation and environmental impact of pesticides used in agriculture, forestry and related areas. Prereq: 1 yr biological sciences and 1 semester chemistry, 2 hrs and 1 lab. Sp

453 Principles of Plant Breeding (3) Genetic prin-
ciples and techniques used in crop improvement. Prereq: Botany 220 or equivalent. 2 hrs and 1 lab Sp

471 Statistics for Biological Research (3) Application of statistics to interpretation of biological research. Notation, descriptive statistics, probability, distribu-
tion, confidence intervals, t and chi-square tests, analysis of variance, mean separation procedures, line-
ar regression and correlation. Prereq: Mathematics 121 or equivalent. F

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

501 Seminar (1) Application of speaking, writing, and organizational skills in preparation and presentation of scientific material to both scientific and general audiences. Preparation of abstracts for scientific pre-
sentations. F, Sp

502 Registration for Use of Facilities (1-15) Required for any student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used to satisfy three requirements. May be repeat-
ed, SJ/NC only. E

511 Advanced Soil Fertility (3) Concepts of soil chemistry as related to nutrient movement and adsorption by plant roots. Prereq: Use fertilizer efficiency as measured by plant response factors. Prereq: 413. Sp; A

512 Pedology (3) Physical and chemical weathering processes, factors of soil formation, soil forming processes. Prereq: 412 or consent of instructor. 2 hrs and 1 lab. F, A

514 Soil Physics (3) Physical and chemical relations-
ships among solid, liquid and gaseous phases of soil system. Dynamics, interrelationships and interaction of phases on soil stability, moisture characteristics, aeration and relationship to plant growth. Prereq: 413 or consent of instructor. 2 hrs and 1 lab. F, A

530 Integrated Pest Management (3) (Same as Ento-
myology and Plant Pathology 530.)

532 Advanced Crop Ecology (3) General and specific rela-
tions among environmental factors, crop organ-
isms, and agricultural systems; quantification of macro-
and microclimatic influences on crop growth; world climates, crop distribution and productivity, human cultures, and their interaction. Prereq: 471 or equiv-
alent; 431 or consent of instructor. 2 hrs and 1 lab. F, A

551 Advanced Plant Genetics (3) Discovery of genet-
ics: controlling elements, induced mutations, genome organization, polygenic inheritance, extrachro-
omosomal inheritance, apomixis, incompatibility systems, and genetic engineering of higher plants. Prereq: Biology 220. F, A

552 Quantitative Genetics (3) Genetic analysis of con-

571 Design and Analysis of Biological Research (3) (Same as Animal Science 571.)

593 Special Problems in Plant and Soil Science (1-3) May be repeated. Maximum 6 hrs. E

600 Doctoral Research and Dissertation (1-15) P/NP only. E

601 Special Topics in Crop Science (1-3) Thermody-
namicsofsoilsolutions,dryandwetsoilsurface,soil

603 Special Topics in Crop Physiology and Ecophysiology (1-3) Microecology of agroecosystems, crop dor-

605 Special Topics in Plant Breeding and Genetics (1-3) Genotype by environment interactions, estima-
tion of quantitative parameters, mutations, chromosome dynamics, polyploidy, genetic engineering, inter-
specific hybridization, linkage, screening methods, genome organization. May be repeated. Maximum 6 hrs. E

613 Advanced Soil Chemistry (3) Surface and colloidal
chemistry of soil minerals; recent developments in ion speciation, ion movement, surface charge, and

dynamics, polyploidy, genetic engineering, inter-
specific hybridization, linkage, screening methods, genome organization. May be repeated. Maximum 6 hrs. E

614 Advanced Plant Pathology (3) Principles of plant pathology, disease incidence, identification and control; effect of disease on plant production. Prereq: 471. 2 hrs and 1 lab. F, A

631 Advanced Crop Physiology (3) Relationship of plant physiology to plant morphology, metabolic sys-
tems and enzymatic activities. Practical aspects and current commercial uses of plant growth regulators. Prereq: 471. 2 hrs and 1 lab. F, A

632 Advanced Plant Breeding (4) Development and utilization of concepts of quantitative parameters, inbreed-
ing, heterosis, methods of selection, in vitro breed-
ing, interspecific hybridization, stability param-
eters, genetic resistance and vulnerability to pests and environmental stresses. Prereq: 453 and 571 or equivalent or consent of instructor. 3 hrs and 1 lab. Sp

671 Advanced Research Planning (3) Development of agricultural research projects utilizing prescribed resources and emphasizing experimental design and statistical techniques. Prereq: 571, Animal Science 572. Statistics 461, or equivalent. (Same as Animal Science 671.) F, A

**Political Science**

(College of Liberal Arts)

MAJORS

**DEGREES**

Political Science....................................M.A., Ph.D.
Public Administration..................M.P.A., J.D., M.P.P.

Professors:

Fitzgerald, Michael R., Ph.D. ..... Oklahoma
Gorman, Robert A., Ph.D. ...... New York
Henderson, Lanneal, Jr., Ph.D. California
Hopkins, Anne H., Ph.D. ...... Syracuse
Iredell, Vernon R., Ph.D. ..... Chicago
Lyons, William, Ph.D. ...... Oklahoma
Plaas, Hyram, Ph.D. ...... Utah
Robinson, Nelson M. (Emeritus). Ph.D. ...... Syracuse
Smith, T. Alexander, Ph.D. ...... Ohio State
Stephens, Otis H. (Distinguished Prof.). Ph.D. Johns Hopkins
 Ungs, Thomas D., Ph.D. ...... Iowa
Webborn, David M., Ph.D. ...... Texas

Associate Professors:

Cunningham, Robert B., Ph.D. ...... Indiana
Dodd, Joseph W., Ph.D. ...... Tulane
Evans, Gill C., Ph.D. ...... Columbia
Fierman, William, Ph.D. ...... Harvard
Freeman, Patricia K. Ph.D. ...... Wisconsin (Milwaukee)
Gant, Michael M., Ph.D. ...... Michigan State
Peterson, Robert L., Ph.D. ...... Yale
Schep, John M., II, Ph.D. ...... Florida
Simpson, T. McN., Ph.D. ...... Johns Hopkins

Assistant Professors:

Allende, Juan Augustin, Ph.D. North Carolina
Folz, David H., Ph.D. ...... Tennessee

The Department of Political Science offers the M.A., M.P.A., and Ph.D. The department also offers a dual program with the College of Law. Inquiries concerning all programs should be directed to the depart-
mental office.

**ADMISSION REQUIREMENTS**

Three departmental recommendation forms must be submitted to The Graduate School, at least two of which must be com-
piled by instructors at the institution most recently attended. In addition, nine hours from the portion of the Graduate Record Examination must be submitted.
THE MASTER OF ARTS PROGRAM

A Bachelor's degree or its equivalent is required for admission. Normally an overall average of 3.0 is also required together with an average of 3.2 in the last two years of political science or social science. In addition, applicants must score at least 1100 on the verbal and quantitative parts of the GRE if normally required.

Students pursuing the Master of Arts degree may follow one of two options:

1. Thesis Option: (30 hours) Coursework, preparation of a thesis, and an oral examination on coursework and the thesis, is required. At least 12 of these hours must be in political science, with 6 in the field of methodology (Political Science 510 and 512). No more than 6 hours may be earned through thesis credit.

2. Non-Thesis Option: (36 hours) Coursework, plus a written comprehensive examination on all coursework is required. At least 12 of these hours must be in political science, with 6 in the field of methodology (Political Science 510 and 512), and 3 hours in the 600-level research seminar in the student's first field of interest.

THE MASTER OF PUBLIC ADMINISTRATION PROGRAM

The M.P.A. program is intended to prepare students for public service careers by acquainting them with management principles, analytical tools, and the ethical dilemmas they will face as public administrators. It consists of a total of 36 semester hours, including a core program, an elective specialization, and a recommended internship.

Applicants for admission to the program must have a Bachelor's degree or its equivalent. Normally, an overall average of 3.0 and an average of 3.2 in the last two years of political science or social science courses is required. In addition, a composite score of at least 1100 on the verbal and quantitative parts of the GRE is normally required.

The M.P.A. program is a non-thesis program.

Specific requirements include the following:

1. Core - 21 hours
   a. General perspectives - required courses:
      - 550 Public Administration
      - 552 Organization Theory.
   b. General perspectives - elective courses (3 hours):
      - 556 Policy Analysis
      - 558 The Politics of Administration.
   c. Analytical skills (8 hours):
      - 512 Quantitative Political Analysis
      - 514 Research and Methodology in Public Administration.
   d. Management skills (6 hours). Choose two of the following:
      - 560 Public Budgeting and Finance
      - 562 Public Management
      - 564 Human Resources Management in Public Organizations.

2. Specialization (12 hours)
   A specialization is designed by the student in consultation with the coordinator of the M.P.A. program. Possible specializations include general government, public health, budgeting and finance, planning, natural resources, program evaluation, criminal justice, public relations, personnel, and others.

3. Recommended internship with a public agency. (6 hours)
   Internships are arranged in consultation with the coordinator of the M.P.A. program.

4. A written final examination, which may be followed by an oral examination, is required.

DUAL J.D.-M.P.A. PROGRAM

The College of Law and the Department of Political Science in the College of Liberal Arts offer a coordinated dual degree program leading to the conferred of both the Doctor of Jurisprudence and Master of Public Administration degrees. In this program, a student may earn the M.P.A. and J.D. degrees in about four years rather than the five years that otherwise would be required. Students pursuing the dual degree program should plan to be enrolled in coursework or an internship for one summer term in addition to taking normal course loads for four academic years.

Admission

Applicants for the J.D.-M.P.A. program must make separate application to, and be independently accepted by, the College of Law for the J.D. degree and the Department of Political Science and The Graduate School for the M.P.A. degree. Applicants must also be accepted by the Dual Degree Committee. All applicants must submit a Law School Admission Test (LSAT) score. An applicant's LSAT score may be substituted for the Graduate Record Examination (GRE) score, which is normally required for admission to the M.P.A. program. Application may be made prior to or after matriculation in either the J.D. or the M.P.A. program, but application to the dual program must be made prior to entry into the last 29 semester hours required for the J.D. degree and prior to entry into the last 15 hours required for the M.P.A. degree.

Curriculum

A dual degree candidate must satisfy the requirements for both the J.D. and the M.P.A. degrees, as well as the requirements for the dual program. The College of Law will award a maximum of 9 semester hours of credit toward the J.D. degree for successful completion of approved graduate level courses (500 or 600 level) offered in the Department of Political Science. The M.P.A. program will award a maximum of 9 semester hours of credit toward the M.P.A. degree for successful completion of approved courses offered in the College of Law. All courses for which such cross-credit is awarded must be approved by the J.D.-M.P.A. coordinators in the College of Law and the Department of Political Science. All candidates for the dual degree must successfully complete Administrative Law (Law 821) and are encouraged to take Local Government (Law 824). An internship is strongly recommended for students in the dual degree program, as it is for all M.P.A. candidates, but an internship is not required.

Recommended coursework in the dual program, students will spend one academic year completing the required first year of the College of Law curriculum and one academic year taking courses solely in the M.P.A. program. During the second two years, students may not take courses in the opposite area, without the approval of the J.D.-M.P.A. coordinators in both academic units. In the third and fourth years, students are strongly encouraged to take both law and political science courses each semester.

Dual degree students who withdraw from the program before completion of the requirements for both degrees will not receive credit toward either the J.D. or the M.P.A. degree for courses taken in the other program except as such courses qualify for credit without regard to the dual program.

Awarding of Grades

For grade recording purposes in the College of Law and the Department of Political Science, grades awarded in courses in the other unit will be converted to either Satisfactory or No Credit and will not be computed in determining a student's GPA or class standing. The College of Law will award a grade of Satisfactory for an approved M.P.A. course in which the student earns a grade of B or higher and a grade of No Credit for any lower grade. The Political Science Department will award a grade of Satisfactory for an approved law course in which the student earns a grade of 2.3 or higher and a grade of No Credit for any lower grade. The official academic record of the student maintained by the Registrar of the University shall show the actual grade assigned by the instructor without conversion.

THE DOCTORAL PROGRAM

The Ph.D. program prepares students for careers in college teaching, as well as careers in other occupations related to service in the public or private sectors. Applicants for admission to the program should normally have completed a Master's degree in political science or a related field with a 3.0 GPA (3.5 for international students) and have earned a composite score of at least 1100 on the verbal and quantitative parts of the Graduate Record Examination.

Students admitted to the program must complete 78 hours of course work beyond the Bachelor's degree, must successfully pass written and oral comprehensive examinations in three broad subfields of political science, and must pass a final oral examination on the dissertation.

In addition, students must satisfy a research tool requirement. This requirement may be satisfied either by demonstrating competency in one foreign language, or by completing 12 hours of coursework, numbered 500 or above, in empirical methodology.

In addition to the total hours required for the degree, the following requirements must also be met:

1. At least 63 hours must be in political science courses.
2. At least 48 hours in political science courses must be in courses numbered above 500.
3. Completion of Political Science 510 and 512.
4. At least 6 hours must be earned in political science courses numbered above 600, exclusive of dissertation hours.
5. A total of 24 hours must be earned by writing the dissertation.

GRADUATE COURSES

410 Special Topics in United States Government and Politics (3) May be repeated with consent of department. Maximum 6 hrs.
420 Political Attitudes and Opinions (3) Nature, formation, development, and determination of politically relevant attitudes and opinions in American political system.
421 Political Parties and Interest Groups (3) Examination of role of political parties and organized groups in American politics and government.
422 Political Campaigns and Elections (3) Analysis of nature of campaigns and elections in American political process.
340 United States Constitutional Law: Sources of Power and Restraint (3) Analysis of judicial review, constitutional powers of President and Congress, federalism, sources of regulatory authority, and constitutional protection of political and economic rights.
431 U.S. Constitutional Law: Civil Rights and Liberties (3) Analysis of current issues in civil rights and liberties including: first amendment freedoms, equal protection, privacy and rights of accused.
440 Public Management and Human Resources (3) Mobilization and management of technical and human resources in pursuit of public sector organization goals.
441 Budgetary Process and Financial Management (3) Fiscal planning, budget and expenditure processes in government, their policy and administrative implications.
442 Administrative Law (3) Legal dimensions of administrative power and procedures, and constitutional controls over administrators.
452 Black African Politics (3) Recent evolution and current political environment of Black African nations. (Same as Afro-American Studies 452.)
454 Government and Politics of China and Japan (3) Examination of the political setting, structure and political processes in China and Japan.
455 Latin American Government and Politics II (3) Selected topics on Latin American political dynamics, consideration of leading theoretical explanations. (Same as Latin American Studies 455.)
459 Government and Politics of the Soviet Union (3) Origins and development of Soviet political system, and study of selected policy areas.
460 Revolution (3) Examination of characteristics, theories, and consequences of revolution with particular focus on left-wing revolutions and movements.
461 Policy Making in Democracies (3) Comparative approach to theory and process of making public policies.
463 Contemporary Middle East Politics (3) Governments and movements in Middle East, their characteristics, bases, and interrelationship.
464 Special Topics in Comparative Government (3) May be repeated with consent of department. Maximum 9 hrs.
469 Soviet Foreign Policy (3) Overview of Soviet international behavior since 1917 and examination of selected problems of Soviet foreign policy post World War II.
470 International Law (3) Nature and development of international law and compliance. Function of international law in context of international conflict.
475 Ancient and Medieval Political Thought (3) Survey of major western political thinkers from Socrates to Marsilio of Padua.
476 Modern Political Thought (3) Survey of major western political thinker from Machiavelli to Marx.
500 Thesis (1-15) P/NC only. E
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/ or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E
510 Scope and Methods in Political Science (3) Procedures of analysis in political science.
512 Quantitative Political Analysis (3) Methods and techniques for quantitative political analysis: univariate and bivariate statistics.
513 Quantitative Political Analysis (3) Methods and techniques in quantitative political analysis: multivariate model building.
514 Research and Methodology in Public Administration (3) Basic assumptions and techniques of research in public administration; measurement, analysis, and reporting of data.
520 Political Theory (3) Survey of major ideas, thinkers and works of Western political theory.
528 Topics in Political Theory (3) Selected issues and problems in normative political theory. Specific content determined by instructor. May be repeated with consent of instructor. Maximum 9 hrs.
530 Topics in American Government and Politics (3) Survey of literature, approaches to research and analysis, critical examination of major works, and overview of research in various subfields. May be repeated with consent of department. Maximum 9 hrs.
531 Topics in Parties and Elections (3) Analysis of party systems and electoral behavior. May be repeated with consent of department. Maximum 9 hrs.
534 Topics in American National Institutions (3) Deals with institutional perspectives. May be repeated with consent of department. Maximum 9 hrs.
536 Comparative State Politics (3) Government and political processes of fifty states: general and particular characteristics. May be repeated with consent of department. Maximum 9 hrs.
538 Urban Politics and Administration (3) American urban structures and public policies. May be repeated with consent of department. Maximum 9 hrs.
540 Public Law (3) Selective examination of published research and current approaches in subfields of constitutional law, judicial process, and judicial behavior. May be repeated with consent of department. Maximum 9 hrs.
542 The Politics of Criminal Justice (3) Selective examination of contemporary problems of research and public policy formulation: criminal process; law enforcement; criminal justice and court administration; and prison administration. May be repeated with consent of department. Maximum 9 hrs.
546 Law and the Administrative Process (3) Constitutional position; decisional processes, regulation and management. Limitations on governmental action; questions of structure, role, and administrative choice. May be repeated with consent of department. Maximum 9 hrs.
550 Public Administration (3) Overview of public administration theory and function.
552 Organization Theory (3) Appraisal of major theories of organization and their applicability to public sector.
554 Contemporary Public Policies (3) Problems in one or more public policy areas from political and administrative perspectives. Topics selected by instructor. May be repeated with consent of department. Maximum 9 hrs.
556 Policy Analysis (3) Role of administrators in policy analysis and decision making. May be repeated with consent of department. Maximum 9 hrs.
558 The Politics of Administration (3) Examination of public administration in context of American political system, policy making and political roles of public administrators and agencies. May be repeated with consent of department. Maximum 9 hrs.
560 Public Budgeting and Finance (3) Technical and political aspects of planning, preparing and adopting government budgets. Management implications of revenue collection, debt management, treasury function, accounting, internal auditing, purchasing risk management, post-auditing.
562 Public Management (3) Interpersonal and leadership skills, techniques and methods for planning, decision making, and implementation of management strategies in public sector. May be repeated with consent of department. Maximum 9 hrs.
564 Human Resource Management in Public Organizations (3) Analysis of some contemporary issues, challenges, methods and strategies related to effective management of human resources in public sector.
568 Ethics, Values, and Morality in Public Administration (3) Moral-ethical-value dilemmas confronting administrators in American political system.
567 Comparative Public Administration (3) Comparative study of public administration in modern governments. May be repeated with consent of department. Maximum 9 hrs.
568 Special Topics in Public Administration (3) Analysis of special issues and problems in public administration. May be repeated. Maximum 9 hrs.
569 Internship in Public Administration (3-9) Open to students participating in approved internship programs. May be repeated with consent of department. Maximum 9 hrs. S/NC only.
570 Comparative Government and Politics (3) Selected topics in modern governments. May be repeated with consent of department. Maximum 9 hrs.
572 The Politics of Development (3) Selected topics dealing with political problems of less developed countries. May be repeated with consent of department. Maximum 9 hrs.
574 Area Seminar in Comparative Government and Politics (3) Selected topics in area studies: African, Latin America, Middle East, Soviet Union and Eastern Europe or Western Europe. May be repeated with consent of department. Maximum 9 hrs.
580 International Politics (3) Survey of literature and major aspects of international politics. May be repeated with consent of department. Maximum 9 hrs.
582 Theory and Analysis of U.S. Foreign Policy Processes (3) Theoretical approaches to decision making in foreign policy area and analysis of policy-making process. May be repeated with consent of department. Maximum 9 hrs.
583 Still Topics in International Politics (3) Selected issues and problems in international politics. Specific content determined by instructor. May be repeated with consent of department. Maximum 9 hrs.
584 Foreign Study (1-15) See page 31.
592 Off-Campus Study (1-15) See page 31.
593 Independent Study (1-15) See page 31.
595 Readings and Special Problems in Political Science (1-3) Prereg: Consent of instructor. May be repeated. Maximum 15 hrs.
600 Doctoral Research and Dissertation (3-15) P/NC only. E
610 Research Seminar in Empirical Theory and Methodology (3) Advanced methods and procedures of analysis in political science. May be repeated with consent of department. Maximum 9 hrs.
620 Research Seminar in Political Theory (3) Research into selected topics. May be repeated with consent of department. Maximum 9 hrs.
630 Research Seminar in the American Political Process (3) Research into selected topics. May be repeated with consent of department. Maximum 9 hrs.
640 Research Seminar in U.S. Constitutional Law (3) Systematic analysis of published research and judicial decision: development of constitutional law as major component of public policy. May be repeated with consent of department. Maximum 9 hrs.
Polymer Engineering

See Materials Science and Engineering

Psychology

(College of Liberal Arts)

MAJOR DEGREES
Psychology..........................M.A., Ph.D.
Raymond D. Fowler, Head

Professors:

Burghardt, Gordon M., Ph.D..............Chicago
Burstein, Alvin G., Ph.D.................Chicago
Byrne, Jack F., Ph.D......................Tennessee
Calhoun, William H., Ph.D..............California
Cohen, Charles P., Ph.D.................Kansas
Fine, Harold J., Ph.D....................Syracuse
Fowler, Raymond D., Ph.D..............Penn State
Handel, Stephen J., Ph.D.................Johns Hopkins
Handler, Leonard, Ph.D..................Michigan State
Lawler, James E., Ph.D...................North Carolina
Lounsbury, John W., Ph.D.................Michigan State
Lubar, Joel F., Ph.D......................Chicago
Malone, John C., Ph.D....................Duke
Newton, Kenneth R. (Emeritus), Ph.D.. Tennessee
Pollio, Howard R. (Distinguished Prof.), Ph.D.. Michigan
Rasch, Norman L., Ph.D.................Pennsylvania
Samejima, Fumiko, Ph.D.................Keio
Shrader, Raymond R. (Emeritus), Ph.D.. Tennessee
Sundstrom, Eric D., Ph.D.................Utah
Wahler, Robert G., Ph.D................Washington
Wibeler, J. Albert, Ph.D.................Syracuse

Associate Professors:

Barlow, Jack M., Ph.D...................Tennessee
Johnson, Michael G., Ph.D..............Johns Hopkins
Kanfer, John, Ph.D......................Tennessee
Lawler, Kathleen A., Ph.D..............North Carolina
Louches, Sandra, Ph.D...................Michigan
McIntyre, Anne, Ph.D...................Yale
Morgan, Wesley G., Ph.D.................Tennessee
Saudargas, Richard S., Ph.D...........Florida State
Travis, Charyl B., Ph.D.................California (Davis)

Assistant Professors:

Beavers-Laurence, Lorrie, Ph.D........Tennessee
Berez, William, Ph.D....................Tennessee
Coleman, Jerita, Ph.D...................Harvard
Erickson, Jeffrey, Ph.D................Tennessee
Laurence, Lance T., Ph.D..............Tennessee
Levy, Robert, Ph.D......................California
Murray, James, Ph.D....................Case Western
Nash, Michael, Ph.D....................Ohio

O'Connor, Edward, Ph.D.................Massachusetts
Smith, Michael, Ph.D...................Tennessee
Watrous, Peter, Ph.D...................Tennessee
Waugh, Mark, Ph.D.....................Florida

THE MASTER'S PROGRAM

Graduate study leading to the Master of Arts in general psychology is normally available only to students in the doctoral program in psychology. Requirements are (1) a score of at least 630 on the GRE in psychology; (2) at least 30 hours of graduate-level courses in psychology; and (3) a Master's thesis based on at least 8 hours of Thesis 500. A non-thesis Master's degree is available with the approval of the student's supervisory committee upon successful completion of a total of at least 36 hours in graduate-level courses in psychology and a final written examination.

THE DOCTORAL PROGRAM

A student with a B.A. or B.S. may apply to the Department of Psychology for admission to the doctoral program with a concentration in general psychology or clinical psychology. The doctoral program with a concentration in etiology or physiology is offered through the Life Sciences Program. Doctoral study in industrial and organizational psychology is offered through the Intercollegiate Program in Industrial and Organizational Psychology, to which application is made through the Department of Management.

Departmental Requirements

All students in the doctoral program in psychology must obtain a score of at least 650 on the GRE in psychology by the end of the first year, and all students must pass the departmental general psychology examination (a comprehensive, two-day essay exam offered twice each year) by the end of the second year. In addition, each student must pass the doctoral comprehensive examination, complete an acceptable doctoral dissertation, and conduct a satisfactory oral defense of the dissertation. All doctoral students must complete a minimum of 78 hours of graduate-level courses, including courses required by the program; at least 6 hours in courses outside of psychology; and at least 24 hours of dissertation research (Psychology 600).

General Psychology

This program allows students to select from a variety of specializations oriented toward careers in research and teaching in psychology in academic, institutional, or industrial settings. The program is highly flexible and individualized and seeks to provide a professional apprenticeship. Specializations include behavioral medicine and health psychology, child and adolescent development, cognitive and symbolic processes, conditioning and learning, ethology, existential phenomenology, psychometrics, psychophysiology, social psychology, and others. Requirements of the program are as follows:

1. Statistics 537-38, or equivalent, and two additional courses numbered above 500 in research methodology, quantitative methods, statistics, or psychometrics.
2. Competence in general psychology, demonstrated by completing Psychology 513 (Foundations of Psychology) or Psychology 490 (History and Systems of Psychology) or equivalent, plus at least one course or sequence or equivalent from each of four categories in the following list. (This requirement may be met by passing approved written examinations.)
   b. Comparative and ethnological psychology: 450-59 Comparative Animal Behavior and Laboratory in Comparative Animal Behavior; 545, Ethological Psychology.
   d. Developmental psychology: 511 Developmental Psychology; 512 Life-span Development; 574 Child Psychopathology.
   e. Individual differences and personality: 445 Measurement and Testing; 470 Theories of Personality.
3. Research practicum (509) - research apprenticeship involving participation in the ongoing research of two different members of the faculty during the first two semesters in the program.
4. Pre-dissertation research project completed during the second year, involving the collection of original data or original analysis of existing data, reported in publishable form and acceptable to the doctoral supervisory committee.
5. At least 4 graduate seminars in psychology numbered above 600.

Clinical Psychology

This program is designed to lay the groundwork for a professional career as a licensed clinical psychologist capable of working in both academic and applied settings. The program emphasizes the theoretical foundations of psychology as well as supervised experience oriented toward the development of practical skills. The program uses the scientist-practitioner model of clinical psychology. Requirements are as follows:

1. Apprenticeship with one faculty member during the first year, one day each week.
2. Pre-dissertation research project completed before forming a doctoral supervisory committee, reported in written form acceptable to the student's faculty advisor and the director of clinical training.
3. Supervised clinical placement two days (16 hours) each week during the second, third, and fourth years.
4. Satisfactory completion of listed courses (or equivalents) in the following nine categories:
   a. Foundations of Psychology (513);
   b. Measurement and Testing (445);
   c. Personality Theory and Research (570-71);
   d. Lifespan Development (512);
   e. Statistics and research methods (504)
GRADUATE COURSES


409 Group Facilitation (3) Study of theory and technique through supervised experience in small groups. Prereq: 359 and consent of instructor. May be repeated. Maximum 6 hrs.


424 Psychology and the Law (3) Psychological aspects of legal systems. Prereq: 110 or equivalent, upper-division standing and consent of instructor.

430 Health Psychology (3) Survey of psychological factors related to health and illness: stress, personality, and environment. Applications of psychological treatments to physical illness. Prereq: 110 or equivalent, 210.

434 Psychology of Gender (3) Biological, psychological, and social factors in gender. Importance of gender roles and stereotypes for behavior and experience. Prereq: 110 or equivalent, 210, 220. (Same as Women's Studies 434.)

440 Organizational Psychology (3) Social-psychological analysis of organizations, role-theory and systems theory. Prereq: 360.


450 Comparative Animal Behavior (3) (Same as Zoology 450.)

459 Comparative Animal Behavior Laboratory (3) Coreq: 450. (Same as Zoology 459.)

461 Physiological Psychology (3) Nervous system and physiological correlates of behavior. Biological basis of emotion, learning, memory and stress. Prereq: 110 or equivalent, 210, and 1 yr of biology or zoology introductory sequences or equivalents.

469 Laboratory in Physiological Psychology (3) Laboratory studies of nervous system and physiological correlates of behavior. Coreq: 451.

470 Theories of Personality (3) Survey of major theories of human personality and their development. Prereq: 220 and 300 or 330.

480 Theories of Learning (3) Classical and current approaches to learning and cognition. Prereq: 310.


489 Supervised Research (1-9) Prereq: Consent of instructor. May be repeated. Maximum 12 hrs in 399, 489, 491, 495, and 489 combined may apply toward undergraduate major.

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

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


505 Research Design (3) Techniques for planning and conducting research in controlled and natural settings: experiments, quasi-experiments, observational studies, surveys, and program-evaluations. Development of questions and hypotheses for study. Design of studies to maximize validity. Prereq: Consent of instructor.

508 Readings and Special Issues in Psychology (1-3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

509 Research Practicum (2) Required of first-year graduate students in psychology. May be repeated. Maximum 9 hrs.

510 Topics in Psychology (3) Intensive examination of selected issues in psychology. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

511 Developmental Psychology (3) Normal processes of human socialization; physical, cognitive, and emotional development from conception through infancy, childhood, and adolescence. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

512 Life-Span Development (3) Theories and research concerning normal human development throughout life, adulthood and old age. Prereq: Consent of instructor. (Same as Zoology 516.) S/NC only.

517-18 Proseminar in Industrial and Organizational Psychology (3,3) (Same as Management 567-68.)

520 Interventions for Behavioral Change (3) Principles and techniques for planning, implementing, and evaluating interventions derived from social learning theory. Interventions by people in community: teachers or supervisors. Token economics and strategies for self-control. Prereq: Consent of instructor.

525 Laboratory Techniques and Instrumentation (3) Procedures for laboratory research involving humans and nonhuman animals; techniques for collecting, transforming, storing, and retrieving data using microcomputers. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

526 General Vertebrate Neuroanatomy (3) Lecture and laboratory. Structure and functioning of central and peripheral nervous system. Prereq: 481, 489 or equivalent and consent of instructor. (Same as Zoology 526.)

527 Behavioral Neurology (3) Disorders of nervous system, organic brain dysfunctions. Diagnosis and treatment. Prereq: Consent of instructor.

528 College Teaching in Psychology (3) Concepts, techniques, and materials for teaching psychology at college and/or university level. Supervised practice. Prereq: Consent of instructor. S/NC only.


545 Advanced Animal Behavior (3) (Same as Zoology 545.)

546 Ethological Psychology (3) Basic ethology and comparative psychology. Implications for human behavior. Prereq: Consent of instructor. (Same as Psychology 546.)

549 Internship in School Psychology (1-4) (Same as Educational and Counseling Psychology 549.)

550 Social Psychology (3) Survey of theory and research concerning interpersonal interaction and individual behavior in social context. Prereq: Consent of instructor.

555 Psychometrics (3) Basic concepts: factor analysis, scaling, test theories, psychometric models and their applications, computerized adaptive testing and other topics. Prereq: Statistics 537-538 or equivalent. May be repeated. Maximum 6 hrs.


557 Applied Psychological Measurement (3) Issues and techniques in applying psychological measurement in organizational, clinical, and community research. Prereq: Statistics 537-538 or equivalent or consent of instructor. May be repeated. Maximum 6 hrs.

560 Psychology of Learning (3) Review of current evidence from research involving human and/or nonhuman animals. Prereq: 400 and consent of instructor. May be repeated. Maximum 6 hrs.

570 Personality: Theory and Research I (3) Advanced survey of psychodynamic and neo-Freudian approaches to personality: related research. Prereq: 470 or equivalent.

571 Personality: Theory and Research II (3) Advanced survey of behavioral and humanistic approaches to personality: related research. Prereq: 470 or equivalent.

572 Descriptive Psychopathology (2) Diagnostic criteria of the DSM-III. Examples from written case-histories and recorded interviews. Prereq: Admission to doctoral program in clinical psychology or consent of instructor.

573 Dynamics of Psychopathology (3) Psychodynamic view of the causes and symptoms of major psychoses, neuroses, and adjustment disorders. Prereq: Admission to doctoral program in clinical psychology or consent of instructor.

574 Atypical Development in Childhood (3) Research on etiologies of atypical patterns of development in infancy and childhood. Prereq: 511 and consent of instructor. May be repeated. Maximum 6 hrs.

576 Object Relations (3) European and American conceptions of normal and psychopathological development of object relations. Significance for psychotherapy, psychoanalysis, and psychoanalytic theory. Prereq: Admission to doctoral program in clinical psychology or consent of instructor.

578 Clinical Aspects of Human Sexuality (3) Variation in human sexual behavior. Theories of etiology, treatment. Prereq: Consent of instructor.

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

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

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

594 Psychological Assessment I (3) Basic concepts and techniques of adult assessment: intelligence tests and personality tests. Prereq: Consent of instructor. Admission to doctoral program in clinical psychology or consent of instructor.

595 Psychological Assessment II (3) Basic concepts and techniques of adult assessment, intelligence tests and personality tests. Prereq: Admission to doctoral program in clinical psychology and 594 or consent of instructor.

596 Laboratory in Psychological Assessment (3) Prereq: Admission to doctoral program in clinical psychology or consent of instructor. Prereq: 594 or 595. May be repeated. Maximum 6 hrs.
674 Group Psychotherapy (3) Theory and practice. Prereq: Admission to doctoral program in clinical psychology or consent of instructor. May be repeated. Maximum 6 hrs.

675 Inference in Psychotherapy (3) Uses of actuarial data for assessment of strategies and tactics in psychotherapy. Prereq: Admission to doctoral program in clinical psychology or consent of instructor.

676 Special Techniques in Psychotherapy (3) Prereq: Admission to doctoral program in clinical psychology or consent of instructor. May be repeated. Maximum 12 hrs.

679 Hypnosis and Imagery (3) Demonstration and practice of hypnotic induction. Survey of clinical applications of hypnosis and imagery. Prereq: Admission to doctoral program in clinical psychology or consent of instructor.

680 Seminar in Psychotherapy (3) Prereq: Admission to doctoral program in clinical psychology or consent of instructor. May be repeated. Maximum 12 hrs.

681 Seminar in Assessment (3) Prereq: Admission to doctoral program in clinical psychology or consent of instructor. May be repeated. Maximum 12 hrs.

683 Seminar in Behavioral Medicine (3) Current research and theory concerning relationships between behavior and health. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.

684 Neuropsychology (3) Investigation of brain-behavior relationships in adults and children. Introduction to administration of REITAN neuropsychological screening battery, Luria battery, and other tests of brain dysfunction. Prereq: Consent of instructor.

685 Psychopharmacology (3) Connections between pharmacology and psychology. Prereq: Consent of instructor.

690 Field Work in Industrial and Organizational Psychology (1-12) (Same as Management 690.)

695 Field Placement in Clinical Psychology (1-3) Prereq: Admission to doctoral program in clinical psychology and consent of instructor. May be repeated. Maximum 24 hrs.

696 Psychology Clinic (1-3) Prereq: Admission to doctoral program in clinical psychology or consent of instructor. May be repeated. Maximum 24 hrs.

Religious Studies

(College of Liberal Arts)

Charles H. Reynolds, Head

Professors:

Dungan, David L., Th.D. Harvard
Humphreys, W. Lee, Ph.D. Union
Linge, David E., Ph.D. Vanderbilt
Lusby, F. Stanley, B.D. Colgate Rochester
Norman, Ralph V., Jr., Ph.D. Yale
Reynolds, Charles H., Ph.D. Harvard

Associate Professors:

Fitzgerald, James L., Ph.D. Chicago
Gwynne, Rosalind W., Ph.D. Washington
Hodges, John O., Ph.D. Chicago
Levering, Miriam L., Ph.D. Harvard

Assistant Professors:

Bokenkamp, Stephen R., Ph.D. California
Hackett, Rosalind I. J., Ph.D. Aberdeen

A Master's degree in Philosophy with a concentration in religious studies is available. (Details of this program are described under Philosophy.) Graduate courses in religious studies provide opportunity for students in a variety of disciplines to pursue work in religious studies as a graduate concentration.

GRADUATE COURSES

411 Modern Religious Philosophies (3) Religious implications of major Western thinkers and movements from Nicholas of Cusa to nineteenth-century German Idealists. (Same as Philosophy 411.)

412 Classical Indian Systems of Philosophy: The Moksha Tradition (3) Investigation of selected writings and philosophic problems of traditions of Samkhya, Yoga, Vedanta, Buddhism, or Jainism. Prereq: 374 or 376 or consent of instructor. (Same as Philosophy 412.)

416 Jesus and Paul Compared (3) Central ideas and concepts of each person compared with equivalent concepts in the other. Advanced study of Gospels and Epistles of Paul, involving extensive independent research.

425 Seminar in Western Religions (3) Selected figures, themes, movements, and problems. Content varies. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

430 Seminar in American Religion (3) Selected figures, themes, movements, and problems. Content varies. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

435 Seminar in Asian Religion (3) Selected figures, themes, movements, and problems. Content varies. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

440 Seminar in Comparative Religion (3) Selected figures, themes, movements, and problems. Content varies. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

446 Theoretical Issues in Medical Ethics (3) (Same as Philosophy 446.)

490 Readings and Research in Religious Studies (3) Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

499 Proseminar in Religious Studies (3) For advanced students in religious studies; required for majors. Selected specific topics: nature and function of myth in religion, problem of evil, transcendence, theories of religion, hermeneutics, integrating various disciplines involved in study of religion. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

531 Topics in Religion and Society (3) Prereq: Consent of instructor.

532 Topics in the History of Religions (3) Prereq: Consent of instructor.

533 Topics in Religious Thought (3) Prereq: Consent of instructor.

544 Applied Ethical Theory (3) (Same as Philosophy 544.)

566 Topics in U.S. Religious History (3) Research in methods and sources for investigating United States religious history. Prereq: 391, 353, 355, 430, or consent of instructor. May be repeated. Maximum 6 hrs. (Same as History 566.)

570 Philosophy of Religion (3) (Same as Philosophy 570.)

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

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

593 Independent Study (1-15) See page 31.
Romance Languages
(M College of Liberal Arts)

MAJORS

DEGREES

French ......................... M.A.
Spanish ......................... M.A.
Modern Foreign Languages  Ph.D.

John B. Remeiser, Head

Professors:

Barret, Paul E., Ph.D. ............... California
Brady, Patrick, Ph.D. ................ Sorbonne
Cobb, Carl W., Ph.D. ................ Tulane
Elliott, Jacqueline C., M.A. ......... Illinois
Helfin, William H., Ph.D. .......... Florida State
Irving, Thomas B. (Emeritus), Ph.D. Princeton
Mauro, Ferdinando D. (Emeritus), Ph.D. Columbia
Petrovka, Marj., Ph.D. ............... Kentucky
Pinsky, Clara (Emeritus), Ph.D. .... California
Remeiser, John B., Ph.D. .......... Vanderbilt
Vazquez-Bigil, A. M., Ph.D. ......... Minnesota
Wallace, Albert H., Ph.D. .......... North Carolina
Washburn, Yulan M., Ph.D. ........ North Carolina

Associate Professors:

Brizio, Flavia, Ph.D. ............... Washington
Cazenave, Odile, Ph.D. .......... Penn State
Holmlund, Christine, Ph.D. ......... Wisconsin
DiPuccio, Denise M., Ph.D. ......... Kansas
DiMaria, Salvatore, Ph.D. .......... Wisconsin
Duncan, Cynthia K., Ph.D. ......... Illinois
Handelsman, Michael H., Ph.D. ... Florida
Levy, Karen D., Ph.D. ............... Kentucky

Assistant Professors:

Handelsman, Michael H., Ph.D. ... Florida

The Department of Romance Languages offers two advanced degrees: the Master of Arts in French and in Spanish and the Doctor of Philosophy in Modern Foreign Languages. Inquiries should be addressed to the head of the department. The head, through the coordinators of Spanish and French, will make available further departmental requirements, regulations, and materials not listed below.

THE MASTER'S PROGRAM

Thesis Option

1. Completion of a minimum of 24 semester hours in coursework plus at least 6 hours in course 500. In French, 501 is required; in Spanish, 550. A minimum of 6 hours may be taken at the 400 level, the rest at the 500 level, and under certain conditions the student may take 600-level seminars. If the student chooses to have a minor (such as Italian or Portuguese), at least 24 hours (including 6 hours of thesis) must be taken in the major, 6 in the minor.

2. A thesis, with a minimum of 6 semester hours in course 500.

3. A written examination covering the coursework and selected items from a master reading list.

4. A final oral examination covering the thesis.

Non-Thesis Option

1. Completion of at least 30 semester hours, with a maximum of 9 at the 400 level, the rest at the 500 level, including 501 (French) or 550 (Spanish). Under certain conditions, the student may take 600-level seminars. If the student chooses to have a minor (such as Italian or Portuguese), at least 24 hours must be taken in the major, 6 in the minor.

2. Three term papers that have been accepted by the student's advisory committee.

3. A written examination covering the coursework and selected items from a master reading list.

4. A final oral examination to discuss the papers (French M.A. only).

THE DOCTORAL PROGRAM

The Ph.D. in Modern Foreign Languages is offered jointly by the Department of Germanic and Slavic Languages and the Department of Romance Languages and requires advanced training in at least two foreign languages.

Admission Requirements

Applicants must have completed a B.A. in either French, German or Spanish to be accepted into this program. Both graduates of institutions in the United States and those with undergraduate degrees from institutions outside the United States must have a grade point average of at least 3.0. Consideration will also be given to applicants who do not have an undergraduate degree in one of the three foreign languages but do have the equivalent of an undergraduate major in one of them.

Requirements for the Ph.D.

Candidates must complete a minimum of 63 semester hours of coursework beyond the Bachelor's degree in addition to 24 hours of doctoral research and dissertation. The program shall consist of a first concentration, a second concentration, and a cognate field.

1. First Concentration: French, German or Spanish. It will consist of a minimum of 39 semester hours beyond the Bachelor's degree, distributed as follows:

   a. Minimum of 21 hours at the 500 level (exclusive of dissertation hours) including French 584 (3), German 560 (3), or Spanish 550 (3); German 512 (3), French 512 (3), or Spanish 512 (3); French 515-16 (2,2), or German 520 (3).

   b. At least 12 hours at the 600 level (exclusive of dissertation hours).

2. Second Concentration: French, German, Italian, Russian, or Spanish (different from the first concentration). It shall consist of at least 18 hours of courses beyond the Bachelor's degree, at least 12 of which must be at the 500 or 600 level.

3. Cognate Field: Six hours must be in courses numbered 400 and above in a field outside the department of the first concentration but related to the student's principal area of research. If the cognate field is yet a third foreign language, a reading proficiency exam will be administered after completion of the 6 cognate hours by the language section concerned.

4. Additional Requirements: A student must demonstrate competence in languages of both his/her first and second concentrations by taking a test in each language. The test will include reading, writing, listening and speaking, and should be completed by the time the student reaches 40 hours of study beyond the Bachelor's degree.

   a. Standardized examinations that may be used for this purpose include applicable portions of either the National Teachers Examination, the MLA Examination for Teachers and Advanced Students, or the proficiency standards of the United States Foreign Service Institute (FSI).

   b. If the student has not chosen a third language as his or her cognate area, basic competence (determined by a reading examination of translation into English administered by the department concerned) in a third language is required. If the student's first and second languages are Romance languages, the third language should be chosen from another language branch.

   c. A comprehensive examination on the language and literature of the first and second concentrations must be passed before the student may be admitted to candidacy.

   d. The candidate will be required to defend his/her dissertation in an oral examination. Central emphasis is put on the doctoral dissertation as a final test of the candidate's scholarly qualifications.

   e. Graduate Teaching Assistants in the program should have the opportunity and will be strongly encouraged to instruct in at least two foreign languages, subject to staffing needs.

   f. Doctoral students will be strongly encouraged to reside and study abroad and will be assisted in identifying potential sources of financial support (e.g. Fulbright, McCutheon, Rotary fellowships).

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 non-resident basis. The Ph.D. program in Modern Foreign Languages is available to residents of the state of Alabama. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.

For additional courses, refer to Germanic and Slavic Languages.

French

GRADUATE COURSES


411 French Literature of the 16th Century (3) Highlights of 16th-century French literature. Excerpts from Rabelais and Montaigne; readings of poems from writers from Lyon and members of Pléiade. Prereq: 212, 218 or equivalent.


420 Contemporary French Literature (3) Modern French literature. Excerpts from contemporary French novelists. Prereq: 212, 218 or equivalent.

421 Advanced French Literature (3) Advanced course on selected topics in French literature. Prereq: 415 or equivalent.

422 American Literature: French (3) American literature written in French.

430 Modern French Literature (3) Modern French literature. Prereq: 212, 218 or equivalent.


512 Advanced Topics in French Literature (1-3) Advanced topics in French literature. Prereq: 412 or equivalent.

141 French Literature of the 18th Century (3) Major works of Enlightenment. Prereq: 212, 218 or equivalent.

142 French Literature of the 19th Century (3,3) French Romanticism and its counter movements: Realism, Parnassianism and Naturalism. Prereq: 212, 218 or equivalent.


531 French Literature of the 16th Century I (3) Literature of first half of 16th Century, Rabelais and other prose writers, humanists, and poetry of Marot, Lyonnais group, and young Pléiade poets.

532 French Literature of the 16th Century II (3) Literature of second half of 16th century, mature works of 'laide writers and such poets, as d'Aubigné and Sponde; Montaigne; writers of scientific works and memorialists; drama.

411 French Literature of the 17th Century I (3) French poems and prose works of 17th century.

542 French Literature of the 17th Century II (3) Classical French theatre of 17th century.

551-52 French Literature of the 18th Century: the Philosophes (3,3) Textual analysis of works of Voltaire, Diderot, Rousseau, and other major French 18th-century writers.

543 Problems in Linguistics: Romance Languages (3) Maximum 6 hrs with consent of department. (Same as Spanish 559 and Linguistics 559.)

541-52 Lyric Poetry of the 19th Century (3,3) Reading and interpreting great French romantic poets, Taur pour l'amour, Parnassians, Charles Baudelaire and Symbolists.

571-72 Trends in Modern French Literature (3,3) In-depth study of some of most revolutionary, challenging poets, novelists, dramatists of 20th century.

581-82 The French Novel (3,3) French Novel from 17th through 20th centuries.


584 Literary Criticism: the Foundations of Romance Criticism (3) Survey of critical ideas utilized over centuries and applied to various types of literature.

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

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

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

Italian


405 Modern Italian Poetry (3) From Pascoli to Manzoni to Calvino. Prereq: 212 or consent of instructor.

409 Directed Readings (3)

510-11 Readings in Italian Literature (3,3) Topics vary. May be repeated with consent of department.

512-13 Special Topics (3,3) Topics vary. May be repeated with consent of department.

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

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

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

Portuguese

401 Dante and Medieval Culture (3) Introduction to significance of this great Italian writer. Prereq: 212 or consent of instructor.

402 Petrarch and Boccaccio (3) Prereq: 212 or consent of instructor.

403-04 Literature of the Rinascimento (3,3) From Pico to Tasso, Quattrocento and Cinquecento. Prereq: 212 or consent of instructor.

405 Modern Italian Poetry (3) From Pascoli to Manzoni to Calvino. Prereq: 212 or consent of instructor.

471 Latin American Civilization (3) Latin America's diverse heritage and major social and political institutions.

472 Masterpieces of Spanish American Literature (3) Close reading of selected works by major Spanish American writers, Darío, Paz, Borges, Fuentes and
others. Genres and periods vary. Prereq: 311, 312 or equivalent.

473-74 Survey of Spanish American Literature (3, 3) 473—Historical survey from Conquest to late 19th century. 474—Major literary movements, writers and works of 20th century. Prereq: 311, 312 or equivalent.

479 Social Protest Literature of Latin American (3) Analysis of literature as means of unmasking social ills that have traditionally beset Latin American. Indigenism, Black literature, women writers, role of writer in Latin American society. Prereq: 311, 312 or equivalent.

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

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

512 Teaching a Foreign Language (3) Practical application of methods for teaching and basic language skills and cultural aspects through seminars, demonstrations, peer teaching, and observation of foreign language classes. Required of all M.A. and Ph.D. students holding Graduate Teaching Assistantships, except those whose previous training or experience warrants their being excused by department.

522 Advanced Communication Skills for Teachers and Other Professionals (3) Advancement of oral and written proficiency in Spanish through extensive use of authentic contemporary materials; class lectures and discussions; oral and written presentations and reports. Especially recommended for graduate students, teachers and other professionals seeking to maintain or enhance high level communicative competency.

531 Old Spanish (3) Old Spanish language and medieval Spanish literature through 13th century.

532 Medieval Spanish Literature (3) Spanish literature of 14th and 15th centuries.

533 The Picarosque Novel (3) Lazarillo de Tormes, Guzmán de Alfarache, and Bucyón.

534 Don Quijote (3)

535 Golden Age Poetry (3) Garciilaso, Fray Luis de León, San Juan de la Cruz, Lope de Vega, Quevedo, and Góngora.


541 Galdós and the 19th-Century Spanish Novel (3) Analysis of works by Galdós and other major 19th-century novelists, Pardo Bazán, Valera, Clarín, and Pereda.


543 The 20th-Century Spanish Novel (3) Baroja, Azorín, Valle-Inclán, Pérez de Ayala, Cela, Delibes, Goytisolo, Matute, and at least one present-day novelist.

545 Modern Spanish Poetry (3) From Bécquer, Unamuno, A. Machado, Jiménez, Lorca, Guillén, Alexandre, and a contemporary, Celaya.

547 Modern Spanish Drama (3) Major playwrights of 20th-century Spain.

550 Techniques of Literacy Analysis and Research Methods (3) Theoretical and critical essays on various techniques of literacy analysis. Exploration of bibliographical and research materials.

551 Special Topics in Spanish or Spanish American Literature (3) May be repeated. Maximum 6 hrs.

552 Directed Readings (3)

559 Problems in Linguistics: Romance Languages (3) (Same as French 559 and Linguistics 559.)


573 The Spanish American Novel: Chile and the River Plate Nations (3) Novels from Chile, Argentina, Uruguay and Paraguay. Modern world.


575 Contemporary Spanish American Poetry (3) Major poets in Spanish American from post-modernismo to present day.

576 Spanish American Drama (3) Major playwrights of 20th-century Spanish America.


579 The Spanish American Short Story (3) Short story by major writers in Spanish America from Romanticism to present day, theory and criticism of genre.

581 Foreign Study (1-18) See page 31.

582 Off-Campus Study (1-18) See page 31.

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

621 Seminar in Spanish Literature (3,3) Topics vary in field of Peninsular literature. May be repeated with consent of department. Maximum 9 hrs.

631 Seminar in Spanish American Literature (3,3) Topics vary. May be repeated with consent of department. Maximum 9 hrs.

Rural Practice

(MAJOR) DEGREE

Veterinary Medicine.......................... D.V.M.

G. M. H. Shires, Head

Professors:

Barron, H. T., D.V.M.......................... Texas A&M
Hall, R. F., D.V.M.............................. Illinois
Shires, G. M. H., B.V.Sc., M.R.C.V.S........ Pretoria

Associate Professors:

Blackford, J. T., D.V.M................. Colorado State
Geiser, D. R., D.V.M........................... Illinois
Goble, D. O., D.V.M.......................... Kansas State
Held, J. P. E., D.V.M...................... Berne
Henton, J. E., D.V.M...................... Michigan State
Hopkins, F. M., D.V.M................ Georgia
Kerr, L. A., D.V.M...................... Oklahoma State
Linnabary, R. D., D.V.M.............. Ohio State
Toal, R. L., D.V.M...................... Georgia

Assistant Professors:

Andrews, F., D.V.M....................... Washington State
Latimer, F. G., D.V.M...................... Ohio State
Pringle, J. K., D.V.M.......................... Guelph
Tarrier, M. A., D.V.M...................... Michigan State

Residents:

Adair, H. S., D.V.M..................... Auburn
Adams, W. H., D.V.M...................... Florida
Evans, R., D.V.M......................... NC State
Korenack, N., D.V.M....................... Louisiana State
Newkirk, K., D.V.M......................... Tuskegee

See Veterinary Medicine for Program Description.

GRADUATE COURSES

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

501 Special Topics in Large Animal Medicine and Surgery (1-4) May be repeated. Maximum 6 hrs. E

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

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

Russian

See Germanic and Slavic Languages

Social Work

(College of Social Work)

MAJOR DEGREES

Social Work.......................... M.S.S.W., Ph.D.

Eunice Shatz, Head

Professors:

Beasley, Lou M., Ph.D...................... Denver
Bleich, M. H., M.S.......................... Ohio State
Bonovich, Robert C., D.S.W................ Washington (St. Louis)
Fryer, Gideon W. (Emeritus), Ed.D........ Columbia
Glisson, C. A., Ph.D....................... Washington (St. Louis)
Granger, Ben P., Ph.D..................... Brandeis
Hirayama, H., D.S.W....................... Pennsylvania
McLarnan, G. (Emeritus), M.S.S.W......... Tennessee
Mullins, M. Kate, Ph.D.................... Chicago
Noe, Roger M., D.S.W...................... Tulane
Orchard, B. (Emeritus), M.S.............. Western Reserve
Orten, J. D., D.S.W....................... Alabama
Rubenstein, H., Ph.D...................... Chicago

Associate Professors:

Avery, R. S., Ph.D......................... Brandeis
Bell, W. J., D.S.W......................... Tulane
Ceilingok, M., Ph.D...................... Washington (St. Louis)
Cruthirds, C. Thomas, D.S.W............. Tulane
Faver, C., Ph.D......................... Michigan
Moses, A. E., D.S.W...................... California
Rowen, R. B., Ph.D...................... Arizona
Tate, Nellie P., Ph.D..................... Brandeis
Vaughn, H. H., Ed.D...................... Tulane
Wachter, Ann R., M.S.S.W................ Tennessee
Wilks, C. S., Ph.D......................... Wisconsin

Residents:

Zarbock, Paul G., M.S.S.W.............. Wisconsin
in all three branches of the college. Admission to the advanced standing program is available from the college. Application for admission to the advanced standing program requires (1) a BSW from an accredited college or university with appropriate preparation in the social sciences, (2) an overall undergraduate GPA of 3.0 or greater, and (3) successful completion of a comprehensive exam or thesis defense.

Field Practice
Field instruction is a critical component of social work education, research, and practice. The faculty works closely with the placement agencies and the field instructors to ensure that students have quality field practice experiences, meeting the objectives of the core curriculum and the concentration.

THE MASTER'S PROGRAM
The Master of Science in Social Work program prepares social workers to provide professional leadership in: (1) the direct provision of social work services and 2) social welfare administration and planning. These objectives are met through a curriculum requiring of all students a professional foundation and a concentration in either social work treatment or social welfare administration and planning.

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 appropriate preparation in the social sciences. At least three-fourths of the applicant's undergraduate work should be in the social sciences, humanities, physical sciences, and other liberal arts subjects. Those with other academic backgrounds should request consultation regarding ways in which they might be admitted.

2. A grade-point average of 2.5 on a 4.0 scale, with preference given to applicants with 3.0 and above. Applicants with less than a 2.5 may be considered for provisional admission on the basis of supplemental evidence of ability to perform at a satisfactory level.

3. Personal qualifications acceptable for entrance into the professional practice of social work. Preference is given to applicants with a B average in undergraduate work and substantial preparation in the social sciences. Applications should be filed no later than March 1 for the year in which admission is desired.

Advanced Standing
The University of Tennessee College of Social Work has an advanced standing program. Admission to advanced standing requires: (1) a BSW from an accredited program, (2) an overall undergraduate GPA of 3.0 or greater, and (3) successful completion of all areas of an examination covering the five foundation areas. Students admitted into advanced standing are required to complete a minimum of 39 hours of study in either of the college's concentrations - social work treatment or social welfare administration and planning. These students will follow the curriculum plan and meet all requirements of the concentration during three semesters of study in the program.

Specific information about the advanced standing program is available from the college. Application for admission to the advanced standing program is through the regular admission process.

Extended Study
Planned part-time programs are available in all three branches of the college. Admissions requirements are the same as for full-time study. Coursework can be completed over a three- or four-year period. One year of the student's period of study must be on a full-time basis.

General Requirements
1. A minimum of 54 semester credit hours including a) completion of foundation courses and field practice (15 hours), b) the course Social Work with Oppressed Populations (2 hours), c) at least five courses (15 hours) and three semesters of field practice (16 hours) in the social work treatment concentration or at least four courses (12 hours) and three semesters of field practice (16 hours) in the social welfare administration and planning concentration.

2. Students may select a thesis or nonthesis option. Those students pursuing the thesis option receive 6 credit hours for successful completion of a thesis.

3. Successful completion of a comprehensive exam or thesis defense.

4. An overall GPA of 3.0 or better on all graded courses and satisfactory performance in field.

The Professional Curriculum
The professional curriculum is a 15-semester hour sequence of five basic areas required of all students before entering either of the concentration programs. As the initial phase of the educational program, the foundation curriculum contributes to the process of professional identification while presenting a comprehensive and broad knowledge base from which to operate in the future as practitioners, supervisors, administrators, and planners.

Upon completion of the foundation curriculum (at the beginning of the second semester), students select a concentration in either social work treatment or social welfare administration and planning.

Social Work Treatment: The social work treatment concentration provides the educational basis for practice with individuals, families, and groups in order to enhance their social functioning, ameliorate problems, and prevent social dysfunction. The concentration provides knowledge of theory and methodology basic to individual, family, and group methods applicable in the treatment of diverse client problems.

Social Welfare Administration and Planning: The social welfare administration and planning concentration provides the educational basis for leadership in the design, implementation, and continued delivery of effective human service programs at local, regional, and state levels. This concentration emphasizes theory and skills related to administration and planning, and permits considerable flexibility in tailoring a program to fit the student's individual interests, capabilities, and career goals.

Field Practice
Field instruction is a critical component of social work education, research, and practice. The faculty works closely with the placement agencies and the field instructors to ensure that students have quality field practice experiences, meeting the objectives of the core curriculum and the concentration.

The college uses a concurrent class and field plan. Students are in field two days per week during the first year and three days per week in the second year.

First-year agency placements are selected to provide experiences related to the foundation curriculum content and beginning concentration. Within the placement, each student's experiences are planned and designed according to educational objectives.

Second-year placements are selected according to the student's area of concentration, individual career interests, and educational needs. The student actively participates with the field practice coordinator and the educational committee in selection of the second-year placement. The second-year field placement experience focuses on the integration of social work knowledge and values, and emphasizes the acquisition and development of practice skills.

Students are responsible for meeting the requirements of their placement agencies in terms of office hours and workload coverage. This responsibility takes precedence over scheduled University breaks and may result in variations in holidays and office hours for the student.

Transfer Credits
Coursework equivalent to the first year of the Master's program, completed in another accredited graduate social work program, is usually accepted toward degree requirements. Applicants must meet the admission requirements of The Graduate School and the College of Social Work. Transfer courses must be approved as equivalent to required and/or elective courses taken for graduate credit and passed with a grade of B or better. An S (earned on an S/NC system) for the field practicum is also accepted. In addition, transfer courses must be part of an otherwise satisfactory graduate program (B average) and be approved by the dean. This coursework must be completed within the six-year period prior to the receipt of the degree.

A maximum of 6 semester credits from work earned in disciplines other than social work may be transferred as elective credits. The student's academic committee must approve the request and the transfer credit must meet Graduate School requirements.

Proficiency Examination
Students in the Master's program may earn a maximum of nine hours by proficiency examination, with the exception of field practice courses. Students interested in proficiency examinations are referred to The Graduate School statement describing the procedure for applying for examination.

THE DOCTORAL PROGRAM
The College of Social Work offers the Doctor of Philosophy with a major in Social Work.

The focus of social work education at the doctoral level is to foster the development of an attitude of scientific inquiry, knowledge of the scientific method, ability to extend the knowledge base of social work practice, and effective participation in leadership roles in social work education, research, and practice.
The emphasis of the doctoral program is upon:

- The analysis of direct intervention and social administration and of the interrelationships among each of them and their societal policy, organizational, and community contexts.
- Research-based knowledge to inform and guide social work practice, social policy, and social welfare program development.

The program consists of foundation courses, elective courses, and dissertation research. The courses are available only in Knoxville. Students and their committees can develop a plan for completing their research in Nashville and Memphis based on the availability of dissertation resources.

**Admission Requirements**

The Ph.D. program is designed for students who have completed a Master’s degree in an accredited school of social work and have post-Master’s social work/social welfare experience. Applicants who do not meet these requirements, but believe they have equivalent credentials should contact the Chair of Ph.D. program for further information regarding admissions criteria.

**General Requirements**

1. A minimum of 60 semester hours beyond the bachelor’s degree including a) completion of 21 credits of required coursework, b) completion of 15 credits of advanced electives, at least 12 of which are taken outside the department, and c) completion of at least 24 credits of dissertation research.
2. Successful completion of qualifying and comprehensive examinations.
3. Completion and defense of the dissertation.

**Curriculum**

The curriculum of the Ph.D. program consists of foundation course work, electives, and dissertation research. The foundation curriculum consists of 21 hours of coursework in the history and philosophy of social work, issues in direct service and administration and planning, areas of practice, and research methodology and statistics. Upon this foundation, students and their academic committees develop a plan of study consisting of coursework in Social Work and other departments of the University. Typically, the foundation curriculum is completed and elective coursework begins during the first year of study, the elective requirement is completed and dissertation research begins in the second year of study, and dissertation research is continued in the third year of study. While it is generally expected that the coursework will be completed on a full-time basis, dissertation research can be completed on a planned part-time basis.

Specific courses required are 601, 602, 612, 613, 640, and Statistics 531 and 532. A student working full-time on the dissertation registers for 12 hours of 600 per semester.

**Examinations**

All doctoral students are required to pass a qualifying examination and a comprehensive examination. The comprehensive examination is administered by members of the doctoral committee and is designed for the student to demonstrate comprehensive knowledge of the major and cognate areas and the dissertation topic. In case of failure of either examination, the student may request a retake. The result of the second examination is final.

**ACADEMIC COMMON MARKET**

An agreement among southern states for sharing graduate programs allows legal residents of states to enroll in certain programs at UTK on an in-state tuition basis. The M.S.S.W. and Ph.D. programs in Social Work are available to residents of the state of Arkansas; the Ph.D. to residents of Kentucky or West Virginia. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.

Graduate students majoring in fields other than social work are admitted to certain social work courses with the approval of the College of Social Work and the student’s major professor.

**GRADUATE COURSES**

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

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

508 Practicum in Social Work Research (3-6) Supervised research in the application of research methods to social work. Prereq: 510 and consent of faculty conducting investigation. May be repeated. Maximum 6 hrs. S/NC only. E

509 Graduate Seminar in Public Health (1) (Same as Public Health 509, Nursing 509, Nutrition and Food Science 509, Physical Education 509.)

510 Social Work Research (3) Research methodology applied to problems in social welfare. Problem formulation; research design; ethics; instrument construction: data collection, analysis, and reporting; statistical procedures; research reporting; and evaluation and critique of published research. Prereq: Admission to college or consent of instructor. F

512 Social Work Practice (3) Basic theory, values, and methodology generic to social work practice at various levels and encountered from ecological perspective. Assessment, planning, communication, and evaluation skills. Classroom and skills laboratory experiences. Prereq: Admission to college or consent of instructor. F

514 Human Behavior and Social Environment (3) Theories pertaining to individual, family, small group, and community in context of functions, structure, roles, and processes. Systems conceptualized along functional-dysfunctional and normal-deviant continuum: stress, development and maturation. Open systems approach. Emphasis on developmental, biophysical, psychological, and social variables, implications of culture, race, ethnicity, and gender. Prereq: Admission to college or consent of instructor. F

516 Social Welfare Policy and Services (3) Development of contemporary social policy at local, state, national, and international levels. Contribution of social work professionals to formal policy-making processes through which macrosocial change is effected and through which aggregate social welfare services are proposed, authorized, financed, and programmed. Theories of complex organizations applied to social welfare service delivery settings. Prereq: Admission to college or consent of instructor. F

518 Social Work with Oppressed Populations (2) Social work’s professional role in working with individuals and groups in American society whose oppression is based upon distinguishing characteristics: age, sex, economic class, religion, sexual preference, handicap, or race. Prereq: Admission to college or consent of instructor. Sp

520 Social Work Treatment with Individuals and Families (3) Nature and process of practice with individuals and families in helping them cope with problems of living. Working with disadvantaged clients and enhancing client competence. Prereq: Foundation or consent of instructor. Sp

522 Social Work Treatment with Groups (3) Theories and practice of social work with small groups. Treatment groups, task groups. Prereq: Foundation or consent of instructor.

524 Psychopathology and Social Deviance (3) Theories and recent research in etiology of psychic dysfunction and social variance. Categorical approach to psychopathology. Prereq: Foundation or consent of instructor.

526 Research for Assessment of Social Work Treatment (3) Application of research methods for assessment of social work treatment. Prereq: Foundation 522 or 520, or consent of instructor. Sp


531 Family Therapy in Social Work Practice (3) Major family therapy theories and techniques, perspectives on family dynamics and interactions, and techniques of treatment and their application to families from diverse social and cultural backgrounds. Prereq: Foundation and 520, or consent of instructor.

532 Short-Term Treatment (3) Theory and practice of planned short term treatment, emergency treatment, and crisis intervention. Prereq: Foundation and 520, or consent of instructor.

533 Social Work Treatment with Couples (3) Theories regarding contemporary marriage styles, problems in relationships, and application of treatment methods and skills for problem resolution. Prereq: Foundation and 520, or consent of instructor.

534 Social Work Treatment with Children and Adolescents (3) Examination of various treatment modalities for assessing and treating children and adolescent. Prereq: 520 and 522, or consent of instructor.

540 Administration of Social Welfare Programs and Services (3) Analysis and interpretation of social services and programs, with special emphasis on the development of services to clients. Models of social work administration, their historical and philosophical perspectives, context for designing organizational structure and processes, planning, developing and implementing agency policies and programs, and management of service delivery system. Prereq: Foundation or consent of instructor.

542 Financial Management and Resource Development in Social Welfare Administration (3) Administrative decision-making related to financial planning and resource allocation in human service organizations. Knowledge and skills in accounting, budgeting and auditing, techniques in fundraising, grant writing, marketing, and other financial management and resource development techniques. Prereq: Foundation or consent of instructor.

544 Management Information Systems and Evaluative Research (3) Management information systems design and implementation; evaluative research design and methodology; and utilization for organizational decision-making and policy setting. Prereq: Foundation or consent of instructor.

546 Human Resources Development in Social Welfare Administration (3) Administrative and leadership skills required for high level positions. Development of human resources within context of organization and its environment. Prereq: Foundation or consent of instructor.

550 Seminar in Social Welfare Administration and Planning (2-3) Areas and issues relating to methods...
and techniques of social welfare administration and planning. Prereq: Foundation or consent of instructor. May be repeated. Maximum 6 hrs.

551 Seminar in Social Welfare (2-3) Social welfare problem areas or field of practice. Prereq: Foundation or consent of instructor. May be repeated. Maximum 6 hrs.

552 Community Organization (3) Locality development, social planning and social action as practice models for development of resources to meet human needs. Prereq: Foundation or consent of instructor.

553 Social Planning (3) Theory, philosophy, implications for programs for planning social change in diverse fields of service. Prereq: Foundation or consent of instructor.

554 Social Policy Analysis (3) Techniques for assessing social, political, and economic implications of social policy proposals. Prereq: Foundation or consent of instructor.

560 Seminar in Human Behavior and Social Environment (3) Areas of current importance in understanding human behavior and social environment. Specific theories, research and/or issues. Prereq: Foundation or consent of instructor. May be repeated. Maximum 6 hrs.

561 Supervision and Consultation in Social Work (3) Roles, techniques, and practices of social work supervision and consultation. Prereq: Foundation or consent of instructor.

562 Social Work and Black Families (3) Historical and contemporary theories about black family systems. Development of frameworks to assess and plan for black families within service delivery systems. Prereq: Foundation or consent of instructor.

563 Social Aspects of Illness (3) Social, economic, and emotional problems arising from or related to illness and disability and their implications for social work. Prereq: Foundation or consent of instructor.

564 Substance Abuse (3) Survey and analysis of social, cultural, medical and psychological factors underlying alcoholism and drug abuse and addiction; recent research and treatment innovations. Prereq: Foundation or consent of instructor.

565 Roles and Status of Women (3) Causes and consequences of women's social and economic roles and statuses in American society. Variations in women's experiences by race and ethnicity, class, age, and life-cycle. Prereq: Foundation or consent of instructor.

566 Social Gerontology (3) Physical, psychological and social aspects of aging. Major social policies and programs. Prereq: Foundation or consent of instructor.

570 Advanced Standing (12) Twelve-week program providing qualified students with intensive academic and field experience to enter final year of graduate study upon successful completion of term. S/NC only. 30

580 Field Practice (3) Instruction and supervision in social work practice. Prereq or coreq: 512. S/NC only. 30

581 Field Practice (4) Instruction and supervision in social work practice, student's selected concentration in social work treatment or social welfare administration and planning. Prereq: Foundation. S/NC only. 30

582 Field Practice (8) Instruction and supervision in social work treatment or social welfare administration and planning. Prereq: Foundation, 581. Prereq or coreq: Treatment: 520, 524, S/NC only. 30

583 Field Practice (6) Instruction and supervision in social work treatment or social welfare administration and planning. Prereq: 582. S/NC only. 30

584 Field Practice (2-6) Instruction and supervision in social work practice. Prereq or coreq: 512. May be repeated. Maximum 6 hrs. S/NC only. 30


593 Independent Study (1-6) Individualized study, student selects, designs, and completes examination of special issue or problem. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. S/NC only. 30

600 Doctoral Research and Dissertation (3-15) P/NP only. 30

601 Research for Social Work Practice I (3) Epistemological and methodological considerations for both quantitative and qualitative research for social work practice. F

602 Research for Social Work Practice II (3) Epistemological and methodological considerations for both quantitative and qualitative research for social work practice. Sp

604 Research in Social Service Settings (3) Advanced research, under faculty supervision, of practice issues in community agency. Prereq: First year required. Ph.D. courses or consent of instructor. May be repeated. Maximum 9 hrs. F, Sp

608 Evaluative Research for Social Work Practice, Programs and Policy (3) Techniques and strategies for quantitative and qualitative analysis for social policy's impact on individuals and groups and for evaluating processes and outcomes of social work practice. F


640 History of American Social Work (3) Social, cultural, economic and political contexts for development of social work profession, development of education for profession, and modern welfare system. F

660 Issues in Social Work Knowledge Building (3) Advanced seminar in theory and model building in direct intervention, administration and planning. Prereq: First year required Ph.D. courses or consent of instructor. May be repeated. Maximum 9 hrs. F, Sp

693 Directed Study in Social Work Research (3) Advanced individual study, under faculty guidance, of social work practice issues. Prereq: First year required. Ph.D. courses or consent of instructor. May be repeated. Maximum 9 hrs. F, Sp

Sociology

(College of Liberal Arts)

MAJOR DEGREES

Sociology ........................................ M.A., Ph.D.

Thomas C. Hood, Head

Professors:

Betz, D. Michael, Ph.D. .......... Michigan State
Black, John A., Ph.D. .............. Iowa
Champion, Dean J., Ph.D. .......... Purdue
Clelland, Donald C., Ph.D. ........ Michigan State
Hastings, Donald W., Ph.D. ....... Massachusetts
Hood, Thomas C., Ph.D. .......... Duke
Ploci, Donald R., Ph.D. .......... North Carolina
Shever, Neil R., Ph.D. ............. Illinois
Wallace, Samuel E., Ph.D. ......... Minnesota

Associate Professors:

Kurtz, Suzanne B., Ph.D. ......... Illinois (Chicago)
Perrin, Robert G., Ph.D. ......... British Columbia

Assistant Professors:

Benson, Michael L., Ph.D. .......... Illinois

Cable, Sherry, Ph.D. .............. Penn State
Gaventa, John P., Ph.D. .......... Oxford

The Sociology Department offers graduate study leading to the Master of Arts and the Doctor of Philosophy. The M.A. program includes a thesis and non-thesis option. The graduate program has concentrations in criminology; energy, environment, and resource policy; and political economy. The criminology concentration includes 505, 551, 653, and 655. The energy, environment and resource policy concentration includes 560, 563, 661, 662, 663, and 665. The political economy concentration includes 504, 540, 541, 643, 844, and 845. Both the Master's and the doctoral program allow for the construction of individualized programs of study. Detailed information may be obtained from the Director of Graduate Studies in Sociology. All incoming students will be advised by the Director of Graduate Studies.

ADMISSION REQUIREMENTS

1. Acceptable scores on the general Graduate Record Examination (GRE scores in sociology are requested but not required). 2. Three letters of recommendation (forms may be obtained from the department).

3. Completion of the appropriate previous degree (baccaulareate, preferably with a major in one of the social sciences, for the M.A. program; Master's degree in one of the social sciences for the doctoral program).

THE MASTER'S PROGRAM

Thesis Option

A total of 30 hours, including 24 hours of coursework and 6 hours of Thesis 500, is required. Students are strongly encouraged to complete 3-6 hours of theory (521, 622), 6 hours in methodology (531, 534), and 6 hours in statistics (535-36). Two-thirds of all credits must be completed at or above the 500 level. Sociology courses at the 400 level must be approved by the student's advisor. An oral final examination is given at the end of the program. Students planning to pursue a Ph.D. program are strongly encouraged to take the thesis option.

Non-Thesis Option

A total of 30 hours of coursework is required. Students are encouraged to complete 3 hours of theory (521), 6 hours of methodology (531, 534), and 6 hours of statistics (535-36). Non-thesis students may select one of two plans: Plan 1 (concentration and secondary area) or Plan 2 (special studies).

Plan 1: A final written examination in one of the department's concentrations is required. Completion of 6 hours of coursework in a secondary area of specialization required. The secondary area may be chosen from outside the department, subject to the approval of the student's advisory committee.

Plan 2: The student must complete a special course of studies, subject to the approval of the student's committee and the Graduate Program Committee. A final written examination in the area of specialization is required.
Subject to approval by the student’s committee, up to 12 hours may be taken in courses outside the department for either program.

THE DOCTORAL PROGRAM

Coursework
Forty-eight hours of coursework beyond the baccalaureate degree are required (exclusive of S/NC credits). Students who enter the program without the courses recommended for the M.A. program (521, 531, 534, 535-38) or equivalents are required to take remedial work beyond the minimum course requirements. Completion of 622 is recommended. Completion of 24 hours in each of two concentrations is encouraged. A student who cannot achieve his/her educational goals within the department’s concentrations may construct an individualized course of study subject to the approval of the student’s doctoral committee and the Graduate Program Committee. Twelve hours of course credit in sociology at the 600 level is required. Sociology courses at the 400 level may not be taken without the consent of the student’s advisor and the Graduate Program Committee. Six hours may be taken in related fields without petitioning the Graduate Program Committee for approval. The student’s program may include a minor or cognate field.

Comprehensive Examinations
Written examinations in four areas are required (theory, research methodology, and two substantive areas). Doctoral students are eligible to take the theory and methodology examinations whenever offered. Substantive examinations may be taken upon completion of theory and methodology examinations, specializations within concentrations, or other areas of specialization. Detailed information on examinations may be obtained from the department.

Dissertation and Final Examination
A dissertation based on original research must be completed (24 hours). The candidate must pass an oral defense of the dissertation, including the theory and methodology related to the research, in accordance with the deadlines specified by The Graduate School.

ACADEMIC COMMON MARKET
An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UTK on an in-state tuition basis. The Ph.D. program in Sociology is available to residents of the state of South Carolina. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.

GRADUATE COURSES

405 Sociology of Sport (3) Social meaning, organization, and process of sport. Prereq: 291 or consent of instructor. (Same as Physical Education 405.)

413 Formal Organization (3) Analysis of organizational models, typologies, and theories; hierarchies of authority; communication; interpersonal relations in work settings; organizational change.

414 Organization of Medical Care (3) Organization of health care facilities, staff-patient relationships, demographic characteristics, and prevalence of disease.

415 Sociology of Aging (3) How roles and statuses change with age in relation to major social institutions; impact that rapidly increasing number of older people has on society; effect of society on older people.

446 The Modern World System (3) Critical examination of capitalist world system as social system, its coherence, boundaries, regions, member groups, dealings, and patterns of conflict. Analysis of who gets what, why, and how in global political economy.


455 Society and Law (3) How laws and legal processes are affected by social change, social impact of legal sanctions, relations between law and social justice.

459 Organizational and Corporate Crime (3) Analysis of crime and deviance committed by organizations. Case studies of corporate and organizational crime, organizational dynamics of crime, theories of corporate crime, and organized responses to this type of crime by governmental regulatory agencies.

462 Populations (3) Demographic factors and social structure; trends in fertility, mortality, population growth, migration, distribution, and composition; population policy.

464 Urban Ecology (3) Relation of humans to their urban environment: conservation and use of appropriate technology. (Same as Urban Studies 464.)

471 Sociolinguistics (3) (Same as English 471 and Linguistics 471.)

480 Diffusion of Agricultural Technology (3) (Same as Rural Sociology 480.)

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

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

504 Sociological Foundations of Political Economy (3) Survey of contemporary sociological theories of political economy, sources of political and economic power and conflict.

505 Foundations of Criminology (3) Critical overview of contemporary criminological theory, theories, and policies of crime causation and theories of responses to crime. Prereq: 350 or equivalent.

507 Foundations of Social Psychology (3) Current and classical theoretical perspectives in social psychology.

510 Teaching Sociology (3) Art and craft of teaching sociology from curricular considerations through teaching techniques. May be repeated. Maximum 6 hrs.

521 Sociological Theory I (3) Assessment of what sociological theory is; its major figures and their approaches to understanding society.

531 Research Methods in Sociology (3) Research design, measurement, sampling, quantitative and qualitative data collection techniques, data, reduction, and analysis.

534 Advanced Sociological Analysis (3) Underlying assumptions and logical procedures used by sociologists in formulating explanations; foundations of sociological research strategies and techniques.

535-36 Statistical Analysis in Sociology I and II (3.3) Should be taken in sequence. 536—Data reduction, exploratory data analysis, general linear model. 535—Sampling; inferential statistics based on general linear model, introduction to multi-variate analysis. Prereq: Statistics 201 or consent of instructor.

540 Occupations (3) Occupations in relation to individuals and society, technology, economic stratification, and social organizations.

541 Collective Behavior, Social Movements, Social Change (3) Basic theory and research on conditions of social unrest in human collectivities and efforts of collectives to change existing society.

542 Sociological Aspects of Sports and Physical Education (3) (Same as Physical Education 542.)

543 Sociology of Development (3) Sociological theories and studies of development: modernization, colonization, dependency, comparative impact of various developmental paths upon selected aspects of social structure and change.

551 Delinquency and the Social Structure (3) How study of delinquency and juvenile justice is affected by changing structure of childhood and adolescence, changing demographic and institutional influences, and changing views about responsibility and punishment.

560 Environmental Sociology (3) Systematic treatment of current research in environmental sociology. Social impact analysis and conflicts over environmental issues.

563 Demographic Techniques (2) Standard rates and measures of demographic variables, life table analysis, increment-decrement models, and survey techniques of population analysis.

580 Advanced Rural Sociology (3) (Same as Rural Sociology 580.)

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

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

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

594 Social Theories of Sport (3) (Same as Physical Education 515.)

595 Special Topics in Rural Sociology (1-3) (Same as Rural Sociology 593.)

599 Readings (3) Selected topics. May be repeated. Maximum 6 hrs.

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

611 Complex Organization (3) Selected topics in formal organizations; cases and incident process analysis; examines strategies for dealing with organizational change, authority hierarchies, communication patterns, technology and organizational structure; job satisfaction, motivation, morale and interpersonal phenomena.

622 Sociological Theory II (3) Distinct schools of sociological theory and contributions of their principal exponents. Prereq: 521 or consent of instructor.

629 Supplementary Readings in Sociological Theory (3) Individual guidance. Preparation for comprehensive examination. Prereq: Consent of instructor. S/NC only.

633 Survey Design and Analysis (3) Systematic exploitation of survey problems through student participation in design and analysis of survey. Prereq: 531 or consent of instructor.

636 Field Research (3) Research experience in selected field sites using techniques of interviewing, participatory observation, and other methods of field research. Prereq: 531 or consent of instructor.

639 Supplementary Readings in Methodology (3) Individual guidance. Preparation for comprehensive examination. Prereq: Consent of department. S/NC only.

643 Class Analysis (3) Critical analysis of theories and research on class structure and conflict.

644 Political Sociology (3) Critical examination of theories of state and political processes.

645 Advanced Studies in Political Economy (3) Topical seminar. Prereq: 504 or consent of instructor. May be repeated. Maximum 6 hrs.

653 Sociology of Law (3) Intensive examination of selected topics in sociology of law. Prereq: 505 or consent of instructor.

661 Theory and Methods of Human Ecology (3) Historical and contemporary studies of interaction between humans and their environment. Prereq: Consent of instructor.

662 Urban and Regional Sociology (3) Historical and contemporary studies of South and Appalachian region with comparisons to other regions.

663 Advanced Studies in Population (3) Current theoretical issues and methodological advances in fertility, mortality, and migration in modern or historical demography. Prereq: 563 or consent of instructor. May be repeated. Maximum 6 hrs.

665 Advanced Studies in Energy, Environment and Natural Resources Policy (3) Topical seminar covering particular line of research and theory within area. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.

675 Advanced Studies in Social Psychology (3) Selected topics in social psychology. Prereq: 541 or consent of instructor. May be repeated. Maximum 6 hrs.

695 Advanced Special Topics (3) Topic of special interest or student-initiated courses that will not be regularly offered. Prereq: Consent of department. May be repeated. Maximum 6 hrs.


Spanish

See Romance Languages

Special Programs

(College of Liberal Arts)

Lynn Champion, Director

The following courses are restricted to participants in the James R. Stokely Fellows Program in the College of Liberal Arts. Selection of participants is based on academic ability, references, an application essay, and a personal interview. Secondary school teachers, administrators, guidance counselors, and librarians may apply. For additional information, contact the program director.

GRADUATE COURSES

510 Perspectives in the Liberal Arts (2) Seminar on nature and development of liberal arts through study of formative tests and critical figures, Bible, Plato, Descartes, Milton, Darwin, Freud, Marx.

520 Inquiry in the Liberal Arts (2) Seminar on nature of creative inquiry in liberal arts and sciences; an overview of pivotal issues within and between disciplines pertinent to identifying and solving problems related to personal and social progress.

530 Learning in the Liberal Arts (2) Builds upon readings, presentations, and discussions of 510 and 520 by reflecting on them in distinct but related contexts—classroom, region called Appalachia, and perspectives and experiences associated with liberal arts.

Special Services Education

(College of Education)

MAJORS

Special Education .................................. M.S.
Rehabilitation Counseling .................................. M.S.
Education ................................. Ph.D.

Laurence J. Coleman, Head

Professors:

Coleman, Laurence J., Ph.D............ Kent State
Doll, E. E. (Emeritus), Ph.D........ Pennsylvania
Frey, Roger M., Ed.D...................... Illinois
George, Thomas, Ed.D.............. Tennessee
Hargis, Charles H., Ed.D............. Colorado State
Kronick, Robert F., Ph.D........... Tennessee
Miller, James H., Ed.D...................... Auburn
Schindler, W. Jean, Ph.D........... Kent State
Woodrick, William E., Ed.D........ Mississippi

Associate Professors:

Bennent, Susan M., Ed.D........... Columbia
Cassell, Jack L., Ph.D.............. Kansas
Colvin, Craig R., Ed.D.............. Virginia
Hannum, Michael C., Ed.D........... Northern Colorado
Kopp, Katherine H., Ph.D......... George Peabody
McClam, T., Ph.D.............. South Carolina
Mulkey, S. Wayne, Ph.D............ Florida State
Welch, Olga, Ed.D.............. Tennessee
Woodside, M. R., Ed.D............ VPI

Assistant Professors:

McLean, J. D., Ph.D............ Chicago
Warden, K., Ph.D.............. Tennessee

Instructors:

Ashmore, Don L., M.S............. Tennessee
Barnes, Wendell W., Jr., M.Ed........ Georgia
Griffin, M., M.S........... Tennessee

Lecturer:

Byrd, H. L., Jr., M.S............. Tennessee

The Department of Special Services Education offers graduate programs leading to the Master of Science and in Rehabilitation Counseling. The department also participates in the Doctor of Philosophy program in Education as described under Education.

THE MASTER'S PROGRAMS

The Master's program in Special Education offers concentrations in the following areas: 1) hearing impaired; 2) gifted; 3) learning disabilities; 4) mental retardation; 5) multiple disabilities; 6) socially or emotionally maladjusted; 7) early childhood special education; and 8) general special education.

Teacher certification can be obtained while working toward the Master's degree. Course offerings are available that lead to general special education teacher certification and to certification to teach hearing impaired children.

The Rehabilitation Counseling program enables counselors to acquire competencies which facilitate the movement of a person with disabilities toward optimal functioning in the three broad areas of living, learning, and working. The rehabilitation counselor works primarily with adults who are being served in various public and private settings. Students should expect to spend four semesters, including summer, in classwork and in internships.

Both majors have a thesis and non-thesis option. If a student elects to do a thesis, the Master's program will contain a minimum of 30 semester hours including 6 hours of Thesis. Eighteen semester hours in special education coursework is required.

The non-thesis option requires a minimum of 36 semester hours total with a minimum of 18 in special education. In the non-thesis option, a final written comprehensive with an oral examination is required.

ADDITIONAL PROGRAMS

Under the sponsorship of the Office of Special Education and Rehabilitation Services (O.S.A.R.S.), specialized institutes for the preparation of professionals to adapt their skills toward services to hearing impaired and deaf people are provided. A federally supported Educational Consortium provides staff development and technical assistance for postsecondary programs serving hearing impaired students in a 13-state southeastern region.

Details concerning each program can be obtained by writing to the department head.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of states to enroll in certain programs at UTK on an in-state tuition basis. The M.S. program in Special Education is available to residents of the state of West Virginia; the M.S. in Rehabilitation Counseling is available to residents of Louisiana. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.

Special Education

GRADUATE COURSES

410 Pre-Internship Seminar (1) Orientation, objectives and policies of internship program. Must be completed term immediately preceding internship. Prereq: Admission to teacher education program. S/NC only. Sp,Su

423 Communication Processes for the Hearing Impaired (3) Expressive and receptive vocabulary development in sign communication. Fingerspelling and educational applications of sign language.

424 Nature of Hearing Impairments (3) Basic principles of audiology: anatomy and physiology of hearing; nature and causes of hearing loss; methods and instrumentation for assessment of hearing level; interpretation of audiological services to medical and other rehabilitative disciplines.

425 Introduction to the Psychology and Education of the Hearing Impaired (3) Primarily for those planning to teach hearing impaired. Overview of research related to psychology, social adjustment, communication methodology, language development and education of hearing impaired. Survey of literature. Visits to programs.

433 Clinical Practice in Speech-Language Pathology (1-4) [Same as Audiology and Speech Pathology 433. ]
434 Clinical Practice in Speech-Language Pathology II (1-4) (Same as Audiology and Speech Pathology 434.)

440 Voice Disorders (3) (Same as Audiology and Speech Pathology 440.)

451 Psychology and Education of the Mildly Handicapped (3) Nature and characteristics of mildly handicapped students with learning disabilities, emotions, and behaviors; intervention techniques; curricula, approaches, techniques, and evaluation and development of materials. Coreq: Corq 480, F.

452 Psychology and Education of the Moderately and Severely Handicapped (3) Nature and characteristics of children with moderate and severe handicapping conditions, and educational strategies necessary to accommodate them. Traditional and innovative trends and approaches. Coreq: Corq 490, Sp.


456 Speech and Language Basis of Learning Disabilities in the Classroom (3) Normal communication development; understanding of speech and language impairments in school-age students; integration of oral/ written communication skills into existing curricula, especially for high incidence special education students. Ed.

470 Psychology of the Exceptional Child (3) Variances in exceptional children; general characteristics and educational needs. Implications of developmental variations for functioning as adults. Opportunity to expand study upon particular exceptionality. Enrollment limited to non-special education majors.

471 Internship I: Special Education (3-15) Intensive experience designed to allow student to practice art and science of teaching exceptional children under supervision of experienced teachers. Prereq: 480. Ed.

473 Audiology II (0) (Same as Audiology and Speech Pathology 473.)

480 Field Experience with Mildly Handicapped Students (3) Practicum in teaching mildly handicapped persons. Planning, developing, implementing, and evaluating instruction. Coreq: Corq 451, F.


482 Speech and Language Services in the Schools (3) Organization and implementation of speech and language programs in schools. IEP process as it affects assessment, case-selection, and programming for students age 4-21. Procedures and mechanisms, group intervention, and classroom consultation.

483 Clinical Practice in Communication Disorders in Schools (3) Supervised practice with children with communication disorders. Prereq: 433, 434 (80-100 clinical contact hrs), 482.

484 Internship with Hearing Impaired Children (6) Supervised practicum with preschool, day school and residential students.

490 Field Experience with Moderately and Severely Handicapped Students (3) On-site teaching experience with moderately and severely handicapped children and youth. Coreq: Corq 452, F.

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

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

503 Problems in Lieu of Thesis (1-5) May be repeated. Maximum 9 hrs. S/NC only. E

504 Clinical Experience in Teaching and Supervision of Exceptional Children (3) Placement in educational settings. May be repeated. Maximum 9 hrs. S/NC or letter grade.

506 Internships in Teaching in Special Education and Rehabilitation (3-15) Placement in professional settings to gain first-hand understanding of supervision of master practitioners. Enrolment limited to those in fifth-year program. S/NC only.

509 Vocational Guidance and Career Planning With Hearing Impaired (3) Utilization of psychological, educational, social and vocational, diagnostic materials and resources appropriate for hearing impaired persons to provide for personal career decisions and individualized rehabilitation plan.

519 Speech Development of Hearing Impaired (4) Theories of speech development, approaches in training perception and production of speech, and aural habilitation. Practicum experiences.

521 Language Development of Hearing Impaired I (3) Language problems of hearing impaired contrasted with scope and sequence of normal language development. Formal linguistic systems used to describe language development problems.


523 Practicum in Hearing Impairment (3) Receptive and expressive language capabilities of hearing impaired student. Designing, teaching, and post-testing unit of instruction for remediation of specific language errors. Prereq: 522.

524 Linguistics in the Education of the Hearing Impaired (3) Recent research and developments in theoretical and applied linguistics. Prereq: 521, 522, 523, 529.

525 Manual Communication (3) American Sign Language (ASL) and culture of American deaf community. Acquisition of basic linguistic properties of ASL, cultural differences between hearing and deaf community, and vocabulary development. Prereq: Prior sign language experience or consent of instructor.

526 Advanced Sign Language (3) Intermediate ASL stressing fluency of expressive and receptive communication with deaf people and structure and history of language. Prereq: 525 or equivalent.


529 Teaching Reading to the Hearing Impaired (3) Specific methods necessary to teach the prelingually hearing impaired student. Practice in preparation of developmentally appropriate reading materials. Methods which assist in integrating hearing impaired students in regular reading curricula and materials. Prereq: 521.

530 Orientation to Rehabilitation (3) History, philosophy, legal and economic bases, current issues, and practices in public and private rehabilitation programs. Qualifications of service providers, assessment, plan development, and provision of services to people who have disabilities and vocational handicaps. Identification, utilization, and evaluation of rehabilitation resources.

532 Case Load Management in Rehabilitation (3) Techniques and procedures involved in management of caseloads in Federal-State vocational rehabilitation agencies, private rehabilitation companies, and public or private rehabilitation facilities. Analysis of appropriate industrial management models related to rehabilitation programs. Prereq: 522.

533 Job Analysis, Development, and Placement (3) Determining employment-readiness of people with disabilities, identifying appropriate jobs for selected clients, job development and placement, and establishing and maintaining employment. Job analysis, job modification and re-engineering, marketing, and employer-serving techniques; legislation impacting job placement; support of work; and use of occupational information.

535 Vocational Evaluation: Statistical Methods (3) Processes and techniques used to determine vocational assets and liabilities to people with disabilities. Functional analysis of biographical and interview data, selection and use of psychometric instruments; integration of statistical data into diagnostic reports; application of computer-generated reporting systems.

537 Vocational Evaluation: Clinical Methods (3) Process, principles, and techniques used to assist individuals in determining and understanding their own work behavior and vocational potential. Selection and use of occupational exploration programs and work samples; application of situational tasks, job tryouts, and simulated work experiences in vocational evaluation. Clinical interpretation of data through formal staff conference, vocational counseling, and report writing.

539 Transition from School to Work (3) Development of programs and procedures to facilitate adjustment of exceptional persons to independent living. Evolving perspectives of work, attributes of effective programs, and interface between school-based programs and rehabilitation agencies.

541 Psychosocial Aspects of Exceptionalities (3) Psychosocial implications used to assist individuals in determining and understanding their own work behavior and vocational potential. Selection and use of occupational exploration programs and work samples; application of situational tasks, job tryouts, and simulated work experiences in vocational evaluation. Clinical interpretation of data through formal staff conference, vocational counseling, and report writing.

545 The Rehabilitation Interview (3) Interview as used in assessment and planning with people who have disabilities and vocational handicaps.

547 Practicum in Rehabilitation (3) Supervised experience in area of rehabilitation; application of concepts, principles, and skills. Prereq: Consent of instructor.

549 Internship in Rehabilitation Counseling (12) Supervised practicum in rehabilitation counseling. Full time clinical experience for second-year students (600 clock hrs required).

551 Psychology of Learning Disabilities (3) Overview of learning disabilities; review of field's historical perspectives and emerging direction; basic theories of learning disabilities; medical aspects of research, assessment and treatment; characteristics of children and youth, especially learning disabilities; implications for teaching, data collection, instructional programming, decision-making related to nature and needs of persons with learning disabilities.

553 Assessment of Exceptional Students (3) Historical and legal issues related to assessment; concepts of evaluation models; test instruments and assessment processes demonstrated, practiced, results applied to educational programming; basic statistics relative to norm and criterion-referenced testing covered. Coreq: 593, 5.

554 Assessment in Early Childhood Special Education (3) Development of knowledge and skills in appropriate formal and informal assessment of handicapped infants and young children, testing procedures, identification, symptoms of disturbed child compared and contrasted to normal social and emotional growth.

556 Instructional Systems for the Emotionally Disordered (4) General characteristics of exceptional person and models of instruction; simulation, demonstration, and media. Teaching techniques, materials, and teacher/pupil family interactions. The use of positive communication through art, music, role play, puppetry, bibliography, and group interactions.
THE MASTER'S PROGRAM

The M.S. program in Statistics provides students with the foundations in theory and practice required for careers in applied statistics. In addition to the education traditionally offered in such a program, the department offers a concentration in industrial statistics, which provides unique opportunities for experiences in practical applications of statistics. Through involvement in The University of Tennessee Institute for Productivity Through Quality and related programs, department faculty participate in a variety of consulting and research projects in industry. Students may supplement their classroom study with an industrial internship and participation in research projects dealing with industrial problems. Department faculty also collaborate with researchers from many academic disciplines and hold joint appointments with the College of Agriculture, the Computing Center and the Medical Center. Statistics graduate students can gain extensive non-industrial consulting experience by becoming research assistants within such organizations. All students are required to participate in supervised internship or consulting activities as part of their graduate program.

Individuals with undergraduate or graduate degrees in other disciplines are encouraged to enter the program. The candidate's major ground should include differential and integral calculus of several variables. Individuals with limited mathematics background should seek departmental guidance regarding specific ways in which they may prepare themselves for the program by taking coursework as non-degree students. Requests for application forms and further information may be sent to the Director of Graduate Studies, Department of Statistics, Stokely Management Center, University of Tennessee, Knoxville, TN 37996-0532.

Admission Requirements

General admission requirements for The Graduate School are stated beginning on page 13. Applicants for Statistics must submit results of the Graduate Record Examination (GRE) general portion, although GRE exam scores may be substituted. Applicants for the statistics program must have completed at least two years of college-level mathematics, including the calculus of several variables and matrix algebra, and be proficient in a computer language. Applicants whose native language is other than English must submit results of the Test of English as a Foreign Language (TOEFL).

Curriculum

A minimum of 33 credit hours must be completed for the Master's degree. Required of all students are 6 hours in statistical methods, 6 hours in statistical theory, 1 hour in statistical computing, and 3 hours in either supervised internship. Students must complete a minimum of 21 hours in approved statistics courses, exclusive of consulting, internship, independent study, or thesis.

Thesis or Independent Study

The thesis option for the Master's degree requires the student to complete 6 hours for the thesis. Alternatively, the non-thesis option requires a minimum of 3 hours for an independent study project.

Comprehensive Examination

Students must pass a two-part written comprehensive examination covering 1) theory and 2) methods. Upon failing either part of the examination, the student may retake it. The second examination is final. For students writing a thesis, this examination must be passed before the thesis is defended.

INTERCOLLEGIATE GRADUATE STATISTICS PROGRAM

The Intercollegiate Graduate Statistics Program is a formal University of Tennessee academic program established to recognize graduate students for completing the requirements of a major or minor in Statistics as part of their degrees. The program enables a student to obtain the M.S. in Statistics simultaneously with the Ph.D. or Ed.D. in another department. The program also enables a student to obtain a Statistics minor along with the M.S., Ph.D., or Ed.D. in another department. The program is administered by an executive committee with advisory input from the program faculty. The program is open to well-qualified graduate students in all departments which have an approved Statistics curriculum and/or joint major curriculum offered through the program. Curriculum requirements for the statistics component of each joint degree are specified in terms of completion of alternative sequences of course options. Course options consist of courses in statistics, offered either by the Department of Statistics or by other departments, that have been reviewed and approved by the Executive Committee. Interested students should contact their major department head for information on specific course requirements.

General Admission Requirements

1. The student's sponsoring department must have established with the Executive Committee an approved joint degree program along with specified sequences of statistics courses taught by the Statistics Department and/or other departments.
2. The student's Admission to Candidacy form must contain all courses required for the Statistics minor/major set off in a group and labeled "Statistics courses required for the minor/major."
3. In many cases, a student may not decide to apply for participation in the program until he/she has completed two or three statistics courses. In that case the student's major professor should file a program change with the cooperating departments and assist the student in obtaining a Statistics Department faculty member to serve on the student's committee.

Degree Requirements

The program offers the M.S. in Statistics with a minor in another department, a joint major program in which the student earns a Master's or doctoral degree in the student's sponsoring department along with the M.S. in Statistics, and a joint major and minor program in which the student earns a Master's or doctoral degree in the student's sponsoring department along with a minor in Statistics. The table below presents the minimum number of semester hours in statistics for each of these alternatives. The hours do not represent the minimum required for the degree program. The student selects courses to satisfy the requirements established by the student's sponsoring department and approved by the Program Executive Committee.

The student's committee must include a faculty member of the Statistics Department at the rank of Assistant Professor or above. The student's formal examination procedure as established by the sponsoring department must include an appropriate section on statistics. Successful completion of the Statistics minor/major is recognized by appropriate documentation on the student's transcript. Students who do not complete all requirements for the Statistics major/minor will still receive academic credit for statistics courses they have successfully completed.

Degree Program: Hours
M.S. in Statistics, minor outside of Statistics 21
M.S. outside of Statistics, minor in Statistics 8
M.S. outside of Statistics, major in Statistics 16
M.S. outside of Statistics, Ph.D. Doctorate outside of Statistics,** minor in Statistics 24
M.S. outside of Statistics, M.S. Doctorate outside of Statistics, M.S. in Statistics

*Approved Statistics courses from the Department of Statistics and/or other departments.
**Courses taken for the minor or the Master's degree in Statistics may fulfill requirements for the doctoral degree. Contact the home department for details.

BUSINESS ADMINISTRATION CONCENTRATION

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

MBA Concentration: Statistics. Minimum course requirements are 571, 566, 572 with prerequisites.

ACADEMIC STANDARDS

A graduate student in the College of Business Administration whose grade-point average falls below 3.0 will be placed on probation. A student on probation will be dropped from the program unless his/her cumulative graduate grade-point average is 3.0 or higher at the end of the probationary


572 Applied Linear Models (3) Simple and multiple linear regression using matrix algebra and general linear model, polynomial regression, weighted least squares regression, variable selection techniques, multicollinearity, regression diagnostics; general linear model approach to analysis of data from designed experiments. Use of standard computer packages. Prereq: 571 and matrix algebra.

573 Design of Experiments (3) One-way ANOVA, multiple range tests, equal and unequal variances, transformations; factorial experiments, completely randomized designs, analysis of covariance, split-plot and nested designs, fractional factorials, sequential designs. Prereq: 571.

585 Principles of Statistical Process Management (3) Control charts and other statistical techniques applied to management of business processes. Prereq: Consent of department head.

587 Graduate Seminar (1-6) Directed readings and active participation in colloquium program of Department of Statistics and of student's minor program. Prereq: Consent of statistics department director of graduate studies. May be repeated. Maximum 6 hrs. S/NC only.

592 Internship (1-6) Supervised off-campus experience in application of statistical principles and methods in business, industry, or government. Written and oral report. Prereq: 4 courses in graduate-level statistics and consent of statistics department director of graduate studies. May be repeated. Maximum 6 hrs. S/NC only.

593 Independent Study (2-6) Faculty directed readings and investigation of specified topic in probability or statistics. Written report and oral presentation. Prereq: 2 courses in statistics and consent of the statistics department director of graduate studies. May be repeated. Maximum 8 hrs. S/NC only.

595 Statistical Consulting Practicum (1-6) Supervised on-campus experience helping on-campus researchers plan, manage, data, and develop and perform analyses specific to designs and hypotheses. Discussion of activities in regular seminar meetings. Final written reports and/or detailed diaries. Prereq: 572 or 538. May be repeated. Maximum 6 hrs.


673 Linear Models (3) Review of full rank models and models not of full rank with application to unbalanced designs, generalized inverses, estimable functions, b.i.i.e., linear hypothesis testing, reductions in sums of squares, least squares means, mixed model equations, methods of variance component estimation from unbalanced data. Prereq: Analysis of variance.

675 Categorical Data Analysis (3) Log-linear analysis of multidimensional contingency tables. Logistic regression. Theory, applications, and use of statistical software. Prereq: 1 yr graduate-level statistics, regression analysis and analysis of variance and familiarity with CMS or VAX, or consent of instructor.

681 Special Topics in Probability (1-3) Presentation of specialized topics in probability and stochastic processes. May be repeated. Maximum 6 hrs.

683 Special Topics in Statistics (1-3) Presentation of specialized topics in statistics. May be repeated. Maximum 6 hrs.
The degree requires a minimum of 60 hours of graduate study. Credits earned for the Master's degree may meet program requirements in the courses which contribute to the program objectives of the candidate. A major core of studies offers advanced concepts in technological and adult education.

**THE DOCTORAL PROGRAM**

The comprehensive Ed.D. program in the department is designed to provide opportunities for graduate students to achieve professional objectives, develop needed competencies, and gain desirable experiences and understanding of technological and adult education. The minimum requirements in the doctoral program consist of the following: departmental specialization, 12 hours; departmental core and electives, 21 hours; cognate field, 9 hours; professional education core, 9 hours; research techniques, 12 hours; and dissertation, 24 hours. A minimum of 90 hours above the baccalaureate is required.

The Doctor of Philosophy with a major in Education includes concentrations and specializations as listed under education.

**ACADEMIC COMMON MARKET**

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UTK on an in-state tuition basis. The M.S. and Ed.D. programs in Technological and Adult Education are available to residents of the state of South Carolina; the Ed.D. program is available to residents of West Virginia. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.

**GRADUATE COURSES**

401 Utilization of Community Resources (3) Strategies of developing linkages between vocational education and private sector through advisory committees, councils, and working partnerships. Development and management of public relations programs. Prereq: 3 yrs teaching experience. Sp

415 Coordination Techniques (3) Necessary procedures, duties, and responsibilities to implement, maintain, and evaluate successful cooperative education programs. Prereq: Senior standing and consent of instructor. Sp

430 Principles and Organization of Business and Marketing Education (3) Historical background and development needs. Principles of vocational education in business and marketing, curriculum implications; establishing, evaluating, and improving programs.

432 Methods and Materials in Business and Marketing Education (3) Teaching techniques, aids and evaluation in subject matter fields. Prereq: Consent of instructor. F,S

436 Supervised Occupational Experience (3) Practical field experiences in selected settings under supervision of practitioner and departmental representative. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

510 Foundations of Technological and Adult Education (3) Historical, philosophical, economical, social, and psychological foundations of vocational, technical, and adult education; fundamental principles and contemporary objectives. Prereq: Consent of instructor. F

511 Issues and Trends in Technological and Adult Education (3) Academic, socioeconomic, cultural, and other implications of special students. Prereq: 9 hrs of graduate credit. F

513 Special Topics in Technological and Adult Education (1-3) Specific objectives, activities, and evaluation. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E

514 Individual Study in Technological and Adult Education (3) Prereq: Consent of supervising instructor. Approval form must be filed in office of department head. May be repeated. Maximum 6 hrs. E

515 Microcomputer Operations and Programming in Education (3) Operating procedures and BASIC programing for education and training applications. Hands-on experience in operating and programming microcomputers, writing, debugging, and running educational programs using sequential data files. Prereq: Teaching, administrative, or related experience in education or training, or consent of instructor. E

516 Microcomputer Software Development (3) Advanced software design in BASIC; random access and binary files, search and sort algorithms, and bitmap graph performance. Hands-on learning and program development. Prereq: 515 or consent of instructor. E

518 Education Specialist Research and Thesis (3) May be repeated. Maximum 9 hrs. P/NP only. E

521 Program Development and Operation in Technological and Adult Education (3) Theories and methods from research to practice in planning and operating adult education programs. Prereq: Consent of instructor. F

522 Adult Development (3) Changes in characteristics of adults over life span implications for adult education. Prereq: Consent of instructor. F

523 Post-Secondary Education for Adults (3) History, evolution, philosophy, structure and functions of post-secondary, sub-university institutions, their programs and clientele. Prereq: Consent of instructor. Sp,S

524 Continuing Professional Education (3) Theories and concepts supporting design and management of educational programs for adults in professions. Prereq: 510 or equivalents, Sp

530 Methods and Materials for VOE Programs (3) Development of instructional aids, recent developments and research, individualized instructional, and occupational clusters. Prereq: 510 or equivalent, Sp,S

531 Organization and Supervision of VOE and Marketing Programs (3) Developing office and marketing occupations, guidelines in cooperative laboratory, and model office programs. Trends in office and marketing education, physical facilities, state plans, instructor qualifications and advisory committees. Prereq: Consent of instructor. F

532 Improvement of Instruction in Basic Business and Marketing Education (3) Issues, research findings, methods, and materials for improved instruction of both secondary and post-secondary levels. Prereq: 12 hrs of graduate credit. Sp,S

533 Improvement of Instruction in Office Technology (3) Research, principles of learning issues, and materials in typesetting, word processing, microcomputers, automated accounting and data processing at secondary and post-secondary levels. Prereq: Consent of instructor. F,S

535 Curriculum in Business and Marketing Education (3) Curriculum designs in career, secondary, post-secondary education, Legislation, technology, social, economic and research results that affect business and marketing education. Prereq: Consent of instructor. F,S

536 Organizing and Teaching Adult Business and Marketing Education (3) Planning, organizing, promoting teaching, and evaluation of business and marketing programs in business and marketing education; utilizing trade associations, employment agencies, business groups and advisory committees in program implementation. Prereq: 3 yrs teaching experience and consent of instructor. F

537 Measurement in Business and Marketing Education (3) Testing and evaluation of learner performance in business and marketing education; teacher-made tests. Prereq: Consent of instructor. Sp,S

540 Special Topics in Business and Marketing Education (1-3) Specific objectives, activities, and evaluations vary. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E

541 Practicum in Business/Marketing Education (3) Practicum and upgrading experiences in non-traditional settings for business and marketing teachers. Prereq: 15 hrs of graduate credit. E

542 Problems in Business and Marketing Education (3) Selective research illustrating problems in teaching of business and marketing education and related areas. Prereq: Consent of instructor. E

550 Administration of Industrial Education Programs (3) Developing, staffing, administering and evaluating trade, industry, and business education programs in secondary and post-secondary school settings. Prereq: Consent of instructor. Sp,S
551 Supervision of Industrial Education Programs (3) Techniques used to improve industrial education programs. State, local, development, curriculum improvement, and program updating techniques. Prereq: 455 or equivalent. F,Su

552 History and Philosophy of Industrial Education (3) Social, political, and economic events that impact development of industrial education. Philosophical problems: justification, values, principles and concepts of industrial education. Prereq: Consent of instructor. F,Su

553 Planning Technical Education Facilities (3) Preparation of educational specifications, site selection, and working relationships with other professionals involved in process of planning technical education facilities. Prereq: Consent of instructor. F,Su

554 Technical Program Planning (3) Instructional systems pertaining to analysis, design, development, implementation, and evaluation of trade, technical supervisor and related training. Prereq: Curriculum development course and consent of instructor. F,Su

555 Curriculum Planning for Industrial Education Programs (3) Developing performance-based, criterion-referenced instructional programs. Prereq: 374 or 554 or consent of instructor. Sp,Su

556 Staff Development Programs (3) Strategies for assessing, planning, and implementing programs for professional development of vocational-technical personnel. Prereq: 551 or consent of instructor. Sp

557 Advanced Methods of Teaching Technical Subjects (3) Field selection and effective application of innovative methods and teaching specialized skills and technical information. Diversifying and individualizing teaching of technical subjects. Prereq: 373. Sp,Su

558 Seminar in Industrial Education (1-3) Current issues, innovations, problems associated with technical programs. Prereq: 12 hrs of graduate courses. May be repeated. Maximum 6 hrs. F,Su

559 Evaluation of Technical Training Programs (3) Internal and external evaluation of training programs to maintain quality control and/or to justify revisions. Prereq: 455 and consent of instructor. Sp

571 Supervisory Skills for Improving Industrial Productivity (3) Philosophy of improving industrial productivity through quality and introduction to basic tools of statistical process control. Deming philosophy, control charting and interpretation, process capability, techniques for training hourly workers in quality control, and measurement procedures for quality control. Prereq: Statistics course and consent of instructor. F,Su

572 Advanced Training Methods for Industrial Productivity (3) Techniques of training hourly workers in use of statistical process control tools. Techniques for involving hourly workers and supervisors in quality insurance, inventory control, and productivity improvement programs. Prereq: 571. Sp,Su

600 Doctoral Research and Dissertation (3-18) Pr/NP only. E

601 Curriculum Planning in Technological and Adult Education (3) Curriculum theory, models, concepts, planning evaluation and implementation of specialized program areas. Prereq: 555 or equivalent. Sp,Su

602 Planning and Evaluation of Programs in Techni cal and Adult Education (3) Techniques utilized in planning, developing, and evaluating instructional programs. Prereq: 500 level planning course and permission of instructor. Sp,Su

604 Seminar in Technological and Adult Education (1) Required 2 consecutive semesters during doctoral residency. May be repeated. Maximum 3 hrs. S/NC only. E

605 Administration and Supervision of Technologi cal and Adult Education (3) Leadership, policy, organization, planning, personnel, student development services, and budgeting relating to vocational, technical and adult education at secondary, post-secondary, and higher education levels. Principles, problem solving, and management activities. Prereq: Administrative theory course and consent of instructor. F,Su

610 Research Development in Technological and Adult Education (3) Proposal development, theoretical base, research design, sampling, application of statistics, and evaluation of research in technological and adult education. Prereq: 6 hrs of advanced statistics courses and consent of instructor. Sp,Su

611 Internship in Technological and Adult Education (3) Field experience in relevant organizations. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs. E

613 Special Topics in Technological and Adult Education (3) Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E

615 Advanced Microcomputer Software Applications (3) Advanced programming and applications of intelligent or program-generating software. Progression of commercial relational data-base management programming environments. Concepts and applications of communications and networking. Hands-on environment. Prereq: 516 or equivalent. Sp,Su


620 Seminar in Adult Education (3) Issues in adult education theories and concepts, philosophical positions, research trends and methodologies. Prereq: 510 or equivalent. F,Su

621 Advanced Seminar in Program Planning (3) Concepts, principles, and theories related to program planning in adult education. Prereq: 521 or equivalent. Sp

622 Advanced Seminar in Adult Development (3) Adult development research and designing research for studies of life cycle. Prereq: 522 or equivalent. Sp,Su

626 Adult Problem Solving and Learning (3) Contemporary research and theories in adult problem solving and learning. Prereq: 522 or equivalent. F,Su


621 Higher Education in Business and Marketing Education (3)

Textiles, Merchandising and Design

(College of Human Ecology)

MAJORS DEGREES

Interior Design .......................................................... M.S.
Textiles and Apparel .................................................. Ph.D.

Larry Wadsworth, Acting Head

Professors:
Blakemore, Robbie G., Ph.D. ...... Florida State
DeLong, A. J., Ph.D. ................. Penn State
DeJonge, Jacquelyn O., Ph.D. ....... Iowa State
Drake, M. F., Ph.D. .................. Penn State
Duckett, Kermit E., Ph.D. ......... Tennessee
Ford, Imogene M., Ph.D. .......... Penn State
Moran, W. J., M.S. .................. Wisconsin
Wadsworth, Larry C., Ph.D. ........ NC State

Associate Professors:
Bressey, Randall R., Ph.D. ......... Florida State
Dyer, C. L., Ph.D. .................. North Carolina
Rabun, Josette, Ph.D. .............. Tennessee

Assistant Professors:
Crouse, J. L., Ph.D. ................. NG State
Dillard, S. J., M.S. .................. Florida State
Havasy, J. B., Ph.D. ............... Ohio State
Houser, T. L., M.S. ................. Tennessee
Simpson, Ethel, Ph.D.............. Oklahoma State

Interior Design

The Department of Textiles, Merchandising and Design offers a Master's degree in Interior Design. This program is the only Master's degree program in the nation accredited by the Foundation of Interior Design Education Research (FIDER). To enter the program, students are expected to have a good foundation in this area. The program of study will prepare students for careers in interior design or architectural firms, public and private agencies, and educational institutions. Interested students should contact the department head for more information.

ADMISSION REQUIREMENTS

A complete file for review includes a College of Human Ecology application, Graduate Record Examination (GRE) scores for the general section, and completion of three Graduate School Rating Forms by individuals who can attest to the potential for graduate education. Forms may be obtained from the Dean's Office, College of Human Ecology.

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.

ACADEMIC STANDARDS

1. Evaluation of student progress will normally occur prior to enrollment for thesis hours during the second semester of full time enrollment in interior design. The review of the student will be undertaken by the interior design faculty with consideration given to factors such as: GPA (minimum 3.0), portfolio evaluation, and demonstrated research capability.

2. If progress or performance is deemed insufficient, the faculty may recommend probation with specific goals set for a specified time or termination.

THE MASTER'S PROGRAM

Major (Required courses: 510, 552, 554, 590) 18-21 hours
Cogitate Area 9 hours
Research Methods 3 hours
Thesis 6 hours
TOTAL 36 hours

A comprehensive oral examination, administered by the thesis committee, will occur upon completion of thesis research. A non-thesis option is not available.
Textiles and Apparel

The Department of Textiles, Merchandising and Design offers the Master's degree. Students are expected to have a good foundation in one of these areas to enter the program. The program of study will prepare students for careers in industry, business, public and private agencies, and educational institutions. Interested students should contact the department head for more information.

ADMISSION REQUIREMENTS

A complete file for review includes a College of Human Ecology application, Graduate Record Examination (GRE) scores for the general section, and completion of three Graduate School Rating Forms by individuals who can attest to the potential for graduate education. Forms may be obtained from the Dean's office, College of Human Ecology.

ACADEMIC STANDARDS

1. Each graduate student will be evaluated at the end of the second semester (or after completing a minimum of 18 graduate hours).
2. If the student's GPA is below 3.0, the faculty may recommend probation with specific goals set for a specified time or termination.

THE MASTER'S PROGRAM

Major (Required courses: 540, 550/552*, 580, 590)

Cognate Area

Statistics

6 hours

Thesis

6 hours

TOTAL

34 hours

*Students with textile science background must take 550; students without it must take 522.

A comprehensive oral examination, administered by the thesis committee, will be given upon completion of the thesis research.

A non-thesis option is not available.

THE PH.D. CONCENTRATION

Students enrolled in the Ph.D. program in Human Ecology with a concentration in textiles and apparel take one common course which provides a foundation for the integration of textiles and apparel in the context of the near environment. A required departmental research seminar exposes students to research being conducted in all areas of study in the department. Textiles and apparel concentration requirements include:

1. Nineteen hours in required textiles and apparel courses: 550, 552, 540, 590, 641, 685, and 695;
2. College Professional Seminar, Human Ecology 610;
3. Research Seminar, 590. Attendance at seminar is required for all full-time students;
4. Nine credit hours in research methods including 6 hours of 500-level statistics;
5. Nine hours in a cognate area;
6. Textiles and apparel courses in area of specialization (16-20 hours); and
7. Dissertation (24 hours).

GRADUATE COURSES

500 Thesis (1-15) P/NC only. E
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when the student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E
510 Problem Solving in Interior Design (3) Use of systematic, interdisciplinary methodology and design research methods as part of design problem-solving experience. Lecture and studio. Prereq: 510, 564, or consent of instructor. Sp, A
520 Research Methods in Interior Design (2-4) Methodology for historic preservation problems in interior design. Prereq: Architecture 403 or consent of instructor. Sp
522 Seminar in Interior Design (3) Twentieth-century design concepts, persons, motivations, and creative components leading to visual innovation. Prereq: 470 or consent of instructor. F
523 Research Methods in Interior Design (3) Methodological approaches appropriate to interior design. Prereq: 9 hrs of graduate level interior design or consent of instructor. May be repeated. Maximum 9 hrs. E
545 Environmental Factors in Interior Design (3) Human factors and associated research techniques and design methodologies related to interior architectural environments. Design requirements from anatomy, physiology, anthropology and social and behavioral sciences. Prereq: 6 hours of behavioral science and 6 hrs natural science, or consent of instructor. Sp
546 Environmental Design Analysis (3) Integrative problem-solving/studio from multidisciplinary perspective. Systems approaches. Available to students from design disciplines and social and behavioral sciences. Prereq: 564 or consent of instructor. May be repeated. Maximum 6 hrs. F,A
580 Directed Study in Interior Design (1-3) Independent advanced research in selected areas from field of interior design. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E
581 Directed Study in Historic Preservation (1-3) Independent advanced research in historic preservation relevant for interior design. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E
582 Directed Study in Historic Design (1-3) Independent advanced research in area of historic stylistic movements and their corresponding period. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E
583 Directed Study in Furniture Design (1-3) Independent advanced research in furniture design. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs. E
584 Directed Study in Environmental Design (1-3) Independent advanced research in environmental design analysis. Prereq: 574 or consent of instructor. May be repeated. Maximum 9 hrs. E
590 Research Seminar (1-2) S/NC only. E

Textiles, Merchandising and Design

161
580 Research Methods in Textiles, Apparel and Design
(3) Fundamentals of scientific research methods; issues of applied research in textiles, apparel and interior design. Prereq: 9 hrs textiles/apparel graduate coursework. May be repeated. Maximum 9 hrs.

590 Research Seminar (1) Research topics in textiles and apparel. S/NC only. F,Sp

593 Directed Study (1-3) Individual problems in textiles, merchandising or apparel. Prereq: 9 hrs textiles/apparel graduate coursework. May be repeated. Maximum 9 hrs.

595 Advanced Topics in Textiles and Apparel (1-3) Lecture, group discussion on specialized topics: apparel production management, functional design, handicapped/elderly, historic costume, historic textiles, international issues, non-wovens, thermal properties. Prereq: 9 hrs textiles/apparel graduate coursework. May be repeated. Maximum 9 hrs. Su

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

625 Physical Chemistry of Fibers (3) Physical chemistry of fibers and fiber forming polymers; surface chemistry and chemical properties of fibers. Prereq: 522, Mathematmatics 251, or equivalent. Sp,A

626 Physics of Fiber Structures (3) Morphology of polymeric structures; thermal and processing history on mechanical, electrical and chemical properties of fibers. Prereq: 522, Physics 231 and Mathematics 231 or equivalent. F,A

641 Social and Psychological Theories of Apparel Consumerism (3) Theories and concepts from social science, fashion, consumer behavior in relation to apparel. Prereq: 540 and 6 hrs of sociology and/or psychology, or consent of instructor. Sp,A

651 The Consumer and Public Policy (3) Economic, social, legal and political framework for policy decisions; economic evaluation of policies that affect consumer. Economic implications for societal groups, disadvantaged. Prereq: 550 or 552, or consent of instructor. Sp

685 Integrative Design: Development and Marketing (3) Systems-oriented approach to strategies involved in product development; methods for identifying critical factors central to decision making and techniques for synthesizing information. Prereq: 24 hrs graduate coursework. F

695 Advanced Topics in Textiles and Apparel (3) Lecture, group discussion, individual research on advanced topics and research areas of current significance: future direction, professional issues, theoretical approaches. Prereq: 9 hrs textiles/apparel graduate coursework. May be repeated. Maximum 9 hrs.

Theatre
(College of Liberal Arts)

MAJOR

THE MASTER'S PROGRAM

At least 60 semester hours, 40 of which must be at the 500 level or above are required for the degree of Master of Fine Arts with a major in Theatre, which is normally to be completed in three consecutive years of full-time residence. Theatre 501 is required for the first semester of residence. Also required are Theatre 401, 310-11, and at least 3 hours in drama tech and criticism. 310-11 may be waived by proficiency examination. Students using this examination must complete 6 hours in advanced theatre history and drama tech/criticism, including at least one course from each of the two areas.

Students in the MFA program are evaluated annually by juried performance or portfolio submission. Continuance in the program is with the approval of the faculty committee for the MFA program. Satisfactory completion of the comprehensive examination is prerequisite to entry into the third year. Thesis and oral defense (Theatre 500, 6 hours minimum) must be completed satisfactorily before the degree is conferred.

In addition to the core requirements listed above, each area of concentration has specific requirements:

Design/Technical Production

Required courses are at least 12 hours of 580 Design and Technical Production Seminar, and at least 3 hours in the projects courses. Theatre 401 Principles of Design is required the first year of residence. Theatre 430 Play Directing is required of scene design students lacking an appropriate undergraduate foundation in directing.

Acting

Theatre 520-21-22-23-24-25 Master Class are required, along with one course in directing and two hours each in voice and dance.

Assistant Professors:
Black, W., M.F.A. Illinois
DeCuur, L.J., M.F.A. Tulane
Schmitt, P., Ph.D. Wisconsin
Adjunct Faculty:
Arnoult, P., M.A. Catholic
Parris-Bailey, L., B.F.A. Howard

Theatre 620-21-22-23-24-25 Master Class, and 3 hours of 536 Projects.

Playwriting

Required are 470-71 Playwriting, at least 12 hours of 573 Playwriting Seminar, and at least 3 hours of 585 Production Workshops.

Dramaturgy

An additional two courses in dramatic theory and criticism are required as are Theatre 570 Dramaturgy: Theory and Practice, at least 6 hours of 585 Production Workshops, 430 Play Directing, 3 hours of 536 Projects in Directing, and 12 hours of 573 Seminar and Projects. In addition, students must select an arts and humanities specialization comprising at least one year of language study plus 6 hours in the selected area.

REQUIREMENTS FOR SECOND MASTER'S DEGREE

Students admitted to the MFA program who have already earned a Master's or a doctoral degree may apply up to 12 credit hours from the previous graduate program to the MFA degree with approval of the student's committee, the Dean of the College of Liberal Arts, and the Dean of The Graduate School.

Any such credits applied from a previous graduate program would be from courses that are directly relevant to the student's MFA curriculum and must have been earned within the time limit (6 years) established for completion of the MFA degree.

GRADUATE COURSES

401 Principles of Theatrical Design (3) Fundamental principles of design; visual and structural relationships. Projects assigned to develop understanding and perception.

409 Stage Make-up (2) Problems in make-up design and application, character analysis, physiognomy and characature. Prereq: 320.

410 Dramatic Theory and Criticism (3) Theatre aesthetics from Aristotle to present.

420 Special Studies in Acting (3) Content varies. Exercises in selected concentrated areas; styles, techniques, approaches; Shakespeare, movement, humor. Prereq: 320.

425 Advanced Phonetics (3) Phonetic aspects of contemporary dialects of English language. Prereq: Consent of instructor.

430 Principles of Play Directing (4) Problems in composition, picturization, rhythm, movement. Prereq: 320, 221, and consent of instructor.


445 Advanced Costume Construction (3) Advanced studies in construction technique, tailoring, vacuum forming, plastic molding, and cobbaging. Prereq: 345 or consent of instructor.

446 Costume Patternmaking (3) Draping patterns for period costumes. Consistory and study of historic patterns 1500-1900. Prereq: 345 or consent of instructor.

450 Advanced Scenery Technology I (3) Study and practice of theatre woodworking; production participation required. Prereq: 350. Graduate credit to theatre M.F.A. students only.

451 Advanced Scenery Technology II (3) Study and practice of metalworking and plastics for theatrical
546 Advanced Costume Patternmaking (3) Advanced studies in patternmaking period costume. Development of historic patterns through flat pattern method. Prereq: 446.

549 Projects in Costume Technology (1-3) Individualized studies in costume technology in theatre production. Prereq: Consent of instructor. May be repeated. Maximum 6 hrs.


553 Projects in Scenic Design (1-3) Conception and completion of major projects, both hypothetical and actual, in scenic design. May be repeated. Maximum 9 hrs.

554 Studies in Scenic Design (3) Advanced scenic design techniques and approaches to design for complex dramas and varied dramatic forms. May be repeated. Maximum 6 hrs.

560 Projects in Lighting Design (1-3) Conception and completion of major projects, both hypothetical and actual, in lighting design. Prereq: Consent of instructor. May be repeated. Maximum 9 hrs.

562 Special Problems in Lighting Design (3) Advanced problems in lighting design and theory, problems in Broadway production and touring. Prereq: 462 or consent of instructor.

563 Projects in Sound Design (1-8) Production assignment as sound designer on approved play and/or relevant projects in field of sound design/history/methodology. Prereq: 463 or approval of instructor. May be repeated. Maximum 9 hrs.

570 Dramaturgy: Theory and Practice (3) Methods and materials. Prereq: Consent of instructor.

571 Seminar & Projects in Dramaturgy (3) Directed study and experience. Prereq: Consent of instructor. May be repeated. Maximum 18 hrs.

573 Seminar in Playwriting (3) Exercises and projects tailored for advanced students in playwriting. Prereq: Consent of instructor. May be repeated. Maximum 18 hrs.

576-78 Studies in Dramatic Theory and Criticism (3) Broad-based study of major ideas about drama.

580 Design and Technical Production Seminar (1-6) Selected aspects of scenic design and technical production. Prereq: Consent of instructor. May be repeated. Maximum 18 hrs.

585 Production Workshops (1-6) Directed experience in production collaborations. Prereq: Consent of instructor. May be repeated. Maximum 12 hrs.


Transportation
See Marketing, Logistics and Transportation

Urban Practice
(College of Veterinary Medicine)

MAJOR

DEGREE

Veterinary Medicine............................................. D.V.M.

D. J. Krahwinkel, Head

Professors:

Brace, J. D.V.M............................................California (Davis)
THE PROFESSIONAL PROGRAM

Admission Requirements
To qualify for admission to the professional program of the College of Veterinary Medicine, a candidate must have completed at least the minimum pre-veterinary requirements listed below. These may be met at any accredited college or university that offers courses equivalent to those at The University of Tennessee, Knoxville, and must be completed by the end of spring term of the year in which the student intends to enroll. Biochemistry requirements must have been satisfied within five years of the time the student wishes to enter the program.

Subject Area Semester Hours
English 6
Humanities and Social Sciences* 18
Calculus 6
Physics 8
General Chemistry 8
Organic Chemistry 8
Biochemistry** 4
General Biology 3
Genetics 3
Cellular Biology*** 3
Total 72

*May include, for example, courses in English literature, speech, music, art, philosophy, religion, language, history, economics, anthropology, political science, psychology, sociology, and geography.

**Exclusive of laboratory.

***It is expected that this requirement will be fulfilled by a course in cellular or molecular biology. An appropriate microbiology course may be approved if cellular or molecular biology is not offered.

Admission Procedures
Admission of new students is for the fall semester, with first priority given to residents of Tennessee. Forms and instructions for making application for admission may be obtained, after September 1 each year, from:

Director of Admissions
201 Student Services Building
The University of Tennessee
Knoxville, TN 37996-0200

Applications must be completed and mailed in time to reach the UTK Director of Admissions by January 15 each year. All supporting documents, official transcripts, Veterinary College Admission Test (VCAT) (formerly VAT) (results from a test taken with 24 months of the January 15 application deadline date), and letters of reference must arrive not later than 30 days after the application deadline date. NON-TENNESSEE APPLICANTS MUST HAVE A MINIMUM CUMULATIVE GRADE-POINT AVERAGE OF 3.2 ON A 4.0 SCALE.

Applications are accepted only from U.S. citizens or permanent residents of the U.S.

D.V.M. Curriculum

The curriculum of the College of Veterinary Medicine is a nine-semester, four-year program. Each class begins in August and graduates four years later in May. The first three years follow the traditional fall and spring semesters with the summer break following years one and two. The final year of the professional curriculum begins immediately following semester six and is a continuous clinical training schedule extending over one calendar year.

The first year consists mostly of pre-clinical subjects such as anatomy, physiology, histology, and microbiology. Included in this first year also are subjects such as physical diagnosis and anesthesiology. Considerable integration of subject matter is incorporated during this time.

The second and third years include the study of diseases, their causes, diagnoses, treatment and prevention and are taught on a team-oriented basis.

The final year (three semesters) is devoted to intensive training in the solving of animal disease problems, including extensive clinical experience in the CVM Teaching Hospital. The final year consists of a series of clinical blocks through which each student will rotate.

An innovative feature of this curriculum is the designation of semester six as one in which the individual student may select his or her courses of study. This format allows select students with an interest in advanced or dual-degree programs to enroll in all, some, or none of the regularly scheduled courses during that semester. Students will be required to complete at least 16 credit hours and these hours will be credited toward the D.V.M. The semester of elective study offers a truly educational alternative for select students in the CVM which is intended to enhance professional growth, concentration and additional career choices.

In addition to education in the science and art of veterinary medicine, students receive instruction in paramedical subjects such as animal behavior, medical communications, professional ethics, jurisprudence, economics, and practice management.

The curriculum requires successful completion of 154 semester credits.

Extramural Programs

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

THE GRADUATE PROGRAM

The College also administers a graduate program involving all departments and leading to the Master of Science and the Doctor of Philosophy. 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), 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 64). This program provides a wide spectrum of interdisciplinary training that prepares graduates to assume positions in biomedical environments and in teaching or research capacities involving humans or animals.

ACADEMIC COMMON MARKET

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UTK on an in-state tuition basis. The M.S. and Ph.D. programs in Comparative and Experimental Medicine are available to residents of the state of Kentucky. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.

PROFESSIONAL COURSES


817 Special Problems in Microbiology (1-8) Extramural and specially designed study for students interested in select topics in bacteriology, mycology, virology and immunology.

821-22 Anatomy I, II (4,4) Gross and applied anatomy; neural structures of common domestic animals: dog, cat, horse, cow. Dissection of embalmed specimens, prossections, slides, models, and living animals.

823-24 Physiology I, II (4,4) Introduction to concepts and problems in physiology; base for clinical applications and for formal training in pharmacology, medicine, pathology, and surgery. Cellular, nervous, cardiovascular, renal, digestive, endocrine, and reproductive physiology.


827 Special Problems in Animal Science (1-8) Extramural and specially designed study for students interested in select topics in anatomy, histology, and physiology.

830 Art of Veterinary Medicine I (1) Paramedical subjects important to veterinary practice: practice management, interpersonal relations, communications, jurisprudence, ethics, careers, animal behavior and veterinary history. May be repeated. S/NC only.

831 Physical Diagnosis (1) Basic care, leading, restraint, and handling domestic animals. Introduction to physical examination and diagnostic techniques used by veterinarian.

832 Anesthesiology (2) Principles of anesthesiology: pharmacology of anesthetic agents, and introduction to anesthetic techniques in veterinary medicine.

833 Epidemiology/Public Health (4) Principles of epidemiology and public health: Host-agent relationships, public health aspects of veterinary medicine, and role of veterinarian in ecology and food hygiene.

834 Hematopoietic System (3) Pathophysiology, special pathophysiology, and clinical management of diseases of the hematopoietic and lymphoid organs and tissues. Principles, methods of laboratory evaluation of diseases from other organ systems.

835 Medical Interaction (2) Multidisciplinary laboratories and lectures of physical, pharmacological and surgical concepts. Applied techniques in animal handling to facilitate anesthesia, surgery, post-surgical recovery and wound healing. Demonstration of physiological processes and drug effects.
The Department of Zoology offers the Master of Science and Doctor of Philosophy with concentrations in aquatic biology, ecology, cell and molecular biology, physiology, genetics, and reproductive and development biology.

**Requirements for Admission**

Applicants for graduate study are expected to have a background no less extensive than that required of undergraduate majors in this department. This includes a knowledge of the basic principles of cell biology, genetics, and ecology. Other requirements for admission are:

1. one year of general zoology or biology;
2. 18 semester hours of upper division zoology or biology;
3. two years of chemistry including one year of general inorganic chemistry;
4. one year of mathematics including calculus;
5. one year of physics;
6. Graduate Record Examination scores (general and biology); and
7. a grade-point average of 3.0 out of 4.0. Otherwise superior students, deficient in one or more of the above requirements, may be admitted at the discretion of the department's Graduate Affairs Committee.

**The Master's Program**

Special requirements in Zoology are as follows: (1) completion of course requirements as determined by the candidate's faculty committee, including a course in biostatistics; (2) achievement of a 3.0 or better GPA in all courses taken for graduate credit; (3) completion of a thesis.

**The Doctoral Program**

Special requirements in Zoology are as follows:

1. courses as determined by the candidate's faculty committee, including a course in biostatistics;
2. an oral and comprehensive written examination in zoology and allied fields in which the candidate has had training;
3. a reading knowledge of at least one foreign language in which there exists a sizeable amount of literature relevant to the major field of study. The student has the option of demonstrating a reading knowledge of this foreign language by (a) passing the official reading examination given by the language department or (b) earning a grade of at least B in the second semester of a special language reading course for graduate students. This foreign language requirement must be fulfilled before a student can take the comprehensive examination.

**Academic Common Market**

An agreement among southern states for sharing graduate programs allows legal residents of some states to enroll in certain programs at UTK on an in-state tuition basis. The Ph.D. program in Zoology is available to residents of the states of Georgia or South Carolina. Additional information may be obtained from the Residency Assistant in the Office of Graduate Admissions and Records.

**Graduate Courses**

403 General Genetics Laboratory (2) Experiments designed to illustrate basic principles of inheritance—primary organism—Drosophila. Prereq: Biology 220. 2 labs.
404 Cytological Technique (2) Practical experience with a variety of techniques: microscopy, embedding and sectioning, chromosome preparations, autoradiography, in situ hybridization, histochemistry, and immunofluorescence. Prereq: Biology 210, 2 labs.
405-06 Minicourse in Zoology (1,1) Select advanced topics in zoology, concentrated in time and subject matter. Consult departmental listings for topics offered. Prereq: As announced. Maximum 3 hrs. May apply toward zoology major.
410 Advanced Cell Biology (3) Molecular and supramolecular structure and functions of eukaryotic cells: regulatory mechanisms, physiology, behavior and cellular interactions. Prereq: Biology 210, 220, 2 hrs and 1 lab.
415 Parasitology (3) Parasitic relationships: physiological, ecological, evolutionary and economic aspects. Prereq: Biology 230 or consent of instructor. 2 hrs and 1 lab.
420 Cell and Tissue Structure and Function (4) Study of animal cells and tissues at light and electron microscope levels. Prereq: Biology 210. 2 hrs and 2 labs.
430 Immunology (2) (Same as Microbiology 430.)
439 Immunology Laboratory (1) (Same as Microbiology 439.)
449 Laboratory in Physiology (2) Prereq or coreq: 440 or 445.
450 Comparative Animal Behavior (3) Principles and methods of ethology; ecological, developmental, physiological and evolutionary aspects. Coreq: 469. (Same as Psychology 450.)
459 Comparative Animal Behavior Laboratory (3) Introduction to observational and experimental research in ethology. Coreq: 450. (Same as Psychology 459.)
460 Evolution (3) Modern concepts of animal evolution. Prereq: Biology 220.
465 Human Genetics (3) Genetic and molecular principles and problems of human inheritance. Prereq: Biology 220.
470 Aquatic Ecology (3) Introduction to physiological nature of inland waters with description of benthic communities and their interrelationships. Prereq: Chemistry 120-30 and Biology 230. 2 hrs and 1 lab.
472 Arachnology (3) Biology of spiders, mites, scorpions and relatives. Prereq: 360 or 380. 2 hrs and 1 lab.
473 Herpetology (3) Biology of amphibians and reptiles, ecology and adaptive radiation. Prereq: Biology 230. 2 hrs and 1 lab.
474 Ichthyology (3) Evolution, classification, collection and identification, distribution and biology of fishes, freshwater fauna of Eastern North American. Prereq: Biology 230 or consent of instructor. 2 hrs and 1 lab.
475 Ornithology (3) Behavior, ecology, populations, evolution and field identification of birds. Prereq: Biology 230. 2 hrs and 1 lab.
476 Mammalogy (3) Evolution, classification, biogeography, ecology, behavior and functional anatomy of mammals. Prereq: Biology 230 or equivalent. 2 hrs and 1 lab.
480 Physiology of Exercise (3) Functions of body in muscular work: physiological aspects of fatigue, training and adaptation to environment. Prereq: 230 or 440. 2 hrs and 1 lab.
490 Comparative Endocrinology (3) Comparative analysis of physiology and morphological endocrine glands in vertebrates and invertebrates, their role and interaction in maintenance of organism and species. Prereq: 440 or equivalent.
500 Thesis (1-15) PrNp only. E
501 Graduate Research Participation (3) Advanced research techniques studied under supervision of staff research director. Open to graduate students in good standing. Prereq: Consent of department and research director. S/NC only.
502 Registration for Use of Facilities (3-15) Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before degree is completed. May not be used toward degree requirements. May be repeated. S/NC only. E
504 Special Topics (1-3) Selected directed readings or special course in topics of current interest. Consult departmental listing for offerings. May be repeated with consent of instructor. Maximum 6 hrs. S/NC only.
506 Research Methods (1-3) Instruction in methods and techniques of research. Consult departmental listing for offerings. May be repeated with consent of instructor. Maximum 9 hrs. S/NC only.
507 Animal Cell Culture (2) Techniques for culture of animal cells, tissues, and organs. 1 hr and 1 lab.
508 Methods of Taxonomy (2) Speciation, taxonomic decisions, approaches to systematics and rules of nomenclature. Prereq: Consent of instructor.
513 Advanced Developmental Biology (3) Molecular and genetic aspects of differentiation and morphogenesis; current literature. Recommended prereq: Life Sciences 511-12.
516 Colloquium in Ethology (1) (Same as Psychology 516.)
520 Advanced Mammalian Physiology (5) Cellular and organ systems physiology. Prereq: Undergraduate general anatomy and physiology and Biochemistry 410 or equivalent or consent of instructor.
521 Experimental Physiology (2) Laboratory principles and techniques in modern physiology; principles of physiological recording. Prereq: 520 or consent of instructor. 2 labs.
522 Advanced Muscle Physiology (3) Cellular and molecular aspects of muscle contraction and nerve control of contraction, and their relationship to locomotor adaptations in whole animal. Prereq: 440 or 445.
523 Physiology of Hormones (3) Cellular and organismal action of hormones in invertebrates and vertebrates. Prereq: 490 or consent of instructor. Recommended prereq: Biochemistry 410. 2 hrs and 1 lab.
524 Physiological Ecology of Animals (3) Adaptive physiological response of animals to natural changes in or extremes of physical and biotic environment. Terrestrial vertebrates. Prereq: Undergraduate courses in animal physiology and ecology, 440 and Biology 230 or equivalent.

525 Physiological Ethology (3) Behavioral endocrinology and neurology from ethological perspective; reciprocal relationships of physiology and behavior in natural context. Term paper, review of assigned topic, creative development of special aspect. Prereq: 450 or undergraduate physiology, or consent of instructor.

526 General Vertebrate Neuroanatomy (3) (Same as Psychology 526.)

540 Insect Taxonomy I: Major Orders (3) Survey of classification of major orders of insects, with practical experience in identification of insects at family level. Prereq: Consent of instructor. 4 hrs combined lecture and lab.

541 Insect Taxonomy II: Minor Orders (3) Survey of classification of minor orders of insects, with practical experience in identification of insects at family level. Prereq: 540 or consent of instructor. 4 hrs combined lecture and lab.

542 Insect Structure and Function (3) Integrated study of morphology and physiology of insect tissues and cell level of insects. Prereq: Consent of instructor.

543 Aquatic Insects (3) Taxonomy and biology of aquatic insects; immature forms. Prereq: Consent of instructor. 2 hrs and 1 lab.

544 Fresh Water Invertebrate Zoology (3) Ecology and taxonomy of fresh water invertebrates exclusive of insects. Prereq: 360. 3 hrs lab and field study.

545 Advanced Animal Behavior (3) Second-level course in ethology, stressing evolution, genetics, physiology, ecology and human behavior. Prereq: 450 or equivalent. (Same as Psychology 545.)

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

560 Biometry (3) Statistical methods in analysis of quantitative biological data. Prereq: Statistics course or consent of instructor.

573 Population Biology (3) Genetics and ecology of natural populations of plants and animals and aspects of behavior in determining population structure. Prereq: Introductory courses in ecology and genetics. (Same as Botany 573 and Ecology 573.)

583 Zoogeography (3) Processes determining geographic distribution of animals and distribution and composition of animal communities. Prereq: Ecology course or consent of instructor.

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

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

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

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

601 Advanced Topics (1-3) Readings and discussion of recent advances. Consult the departmental listing for offerings. May be repeated with consent of department. Maximum 9 hrs.

602 Seminar in Cell and Molecular Biology (1) Readings and discussion based on current literature. May be repeated. Maximum 12 hrs.

603 Seminar in Genetics (1) Readings and discussion based on current literature. May be repeated. Maximum 12 hrs.

604 Seminar in Developmental Biology (1) Readings and discussion based on current literature. May be repeated. Maximum 12 hrs.

605 Seminar in Physiology (1) Readings and discussion based on current literature. May be repeated. Maximum 12 hrs.

606 Seminar in Aquatic Biology (1) Readings and discussion based on current literature. May be repeated. Maximum 12 hrs.

607 Seminar in Ecology (1) Readings and discussion based on current literature. May be repeated. Maximum 12 hrs.

608 Seminar in Ethology (1) Readings and discussion based on current literature. May be repeated. Maximum 12 hrs.

610 Current Topics in Cell and Developmental Biology (1) Critical analyses of current literature in journal club format. May be repeated. Maximum 10 hrs. S/NC only.
FACILITIES FOR RESEARCH AND SERVICE
Facilities for Research and Service

Bureau of Educational Research and Service  
(College of Education)  
Timothy J. Pettitbone, Director  
Four major types of activities—research, development, educational services, and publications—are channeled through the Bureau of Educational Research and Service (BERS), located in 212 CEB. The research activities relate to the development of research proposals, conducting and/or assisting in research, and assisting others in development of research proposals in the College of Education. Developmental activities relate to change efforts in curricular content and instrumental methodology. Educational services include a wide list of activities such as in-service educational programs, consultant services, and technical assistance and administrative training programs. Official publications of the College of Education are developed through the Bureau. A limited number of graduate student assistantships are available.

Center for Business and Economic Research  
(College of Business Administration)  
David A. Hake, Director  
The staff of the Center for Business and Economic Research engages in studies of the business and economic environment in Tennessee, the southeast, and the nation. The Center, located at 100 Glocker, serves the business community, state government, individuals, and The University through dissemination of various kinds of economic and socioeconomic information; supports the faculty of the College in seeking funding for research projects; and, through its Computer Resources Group, provides support for integration of technology in the College of Business Administration. Staff members conduct research in regional economics, public finance, and areas related to socioeconomic problems in the region. The Center publishes the results of research in monograph form so that significant developments in the various business disciplines and economics can achieve widespread exposure. In addition, the Center staff does contract research on business and economic problems for governmental organizations and private industry. The Center publishes the Tennessee Statistical Abstract and the Survey of Business. The Center is a member of the Association for University Business and Economic Research.

Center for Computer Integrated Engineering and Manufacturing  
(College of Engineering)  
William T. Snyder, Acting Director  
The Center for Computer Integrated Engineering and Manufacturing (CCIEM) was established in 1985 and is an interdisciplinary organization within the College of Engineering. The Center, located at 124 Perkins Hall, provides education, research, and service to American industry in the integration of engineering design, manufacturing, and management. CCIEM state-of-the-art computer hardware and software enables faculty and staff to undertake a design and manufacturing agenda crucial to industry. The goals of the Center are to: (1) utilize state-of-the-art CAD/CAM and CIM technologies in engineering research, education, and practice; (2) perform research in communication technologies between heterogeneous computers and control devices; (3) develop computer-based education course-ware; and (4) work with industry in the automation of manufacturing processes and office functions.

CCIEM is supported by U.S. corporations through a variety of funding mechanisms with The University of Tennessee. CCIEM, in turn, supports industry, as well as the academic needs of the College of Engineering faculty, through research and access to necessary computer hardware and software.

Center for International Education  
(Office of Vice Provost/Student Affairs)  
James Gehlhar, Acting Director  
The Center for International Education (CIE), 201 Alumni Hall, telephone 974-3177, promotes and supports all aspects of international education and international exchange at UTK, both for American students and faculty and for students and faculty from other countries. The administration of official linkage agreements between UTK and institutions of higher education in other countries is coordinated by CIE.

American students: CIE provides information and advice about study-abroad options open to UTK students, including the exchange programs it administers between UTK and universities in thirty countries on six continents. CIE coordinates campus administration of such international grants and scholarships as the Fulbright, Rhodes, and Marshall programs, and provides information about other sources of funding for overseas study and research, including the Rotary Foundation, St. Andrews, and German Academic Exchange Service (DAAD) grants. Within its library on study, work and travel abroad, CIE has information about student summer job programs in six countries.

International students and scholars: CIE provides information and assistance in matters relating to United States visa regulations, to UTK requirements for international students, and to UTK academic policies and registration procedures. It publishes The Link, a newsletter for UTK's international community, and administers the insurance policy required of all international students at the University. International student advisors are available to discuss academic and personal concerns. Orientation programs conducted at the beginning of
each term facilitate adjustment to the campus and community, as does the international student orientation camp prior to the fall term.

The International House, 1515 Cumberland Avenue, is CIE’s on-campus social, recreational, and programming center that serves as a gathering place for international and U.S. students, faculty and staff.

International students seeking admission to UTK should write directly to the Office of Graduate Admissions and Records.

Center for Measurement and Control Engineering
(College of Engineering)
E. C. (Bud) Muly, Director
The Measurement and Control Engineering Center, 101 Perkins Hall, is a university/industry cooperative research center sponsored by the College of Engineering of The University of Tennessee, the Instrumentation and Control Division of Oak Ridge National Laboratory, and the National Science Foundation. The Center’s program combines education, research, and technology transfer. Interested graduate students apply for affiliation with the Center and are required to take graduate-level courses in measurement science and control theory. Graduate assistantships are provided for qualified students by the Center. The research is funded by major U.S. industrial companies and focuses on theoretical and practical developments in measurement and control, concentrating on areas that will significantly improve the productivity, reliability and safety of industrial systems and processes.

Centers of Excellence
The Centers of Excellence grew out of Tennessee’s Better Schools Program, an initiative to upgrade state-aided education at all levels. State officials and legislators wanted to give a few outstanding academic programs in state-aided colleges and universities a special push toward prominence, well beyond regular annual increases for programs. In 1984, the General Assembly appropriated and the governor approved $10 million for the first Centers of Excellence throughout the state. The public colleges and universities submitted their proposals for Centers of Excellence to the Tennessee Higher Education Commission, which made the final determinations. Funding has been extended each succeeding year, and now seven of the University’s twelve Centers of Excellence are sponsored by UT, Knoxville.

Concurrently, the University has received state funding, which it must match dollar for dollar, for Chairs of Excellence. These Chairs are $1 million endowed professorships in areas of significance to the University and to the individual, foundation, or corporation providing the matching gift money.

The combination of the Centers of Excellence and Chairs of Excellence adds a dimension to the University of Tennessee that is not easily equaled by other institutions. UT’s reputation as the premiere university in the state and as a regional and national leader in instruction, research, and public service is enhanced as a result of the infusion of these special funds.

For information concerning the individual centers sponsored by UTK, contact:

Center for Laser Applications
Dr. Dee Reekie, Director
UT Space Institute
Tullahoma, TN 37388
(615) 455-0631 Ext. 475

Center for Livestock Diseases and Human Health
Dr. Hyram Kitchen, Director
108 Morgan Hall
UT Knoxville
Knoxville, TN 37996
(615) 974-7262

Center for Materials Processing
Dr. Joseph Spruell, Director
435 Dougherty Engineering Building
UT Knoxville
Knoxville, TN 37996
(615) 974-5336

Center of Excellence in New Venture Analysis and Entrepreneurship
Dr. Roger Jenkins
527 Stokely Management Center
UT Knoxville
Knoxville, TN 37996
(615) 974-5053

Science Alliance
Dr. Lee Riedinger
611 Physics Building
UT Knoxville
Knoxville, TN 37996
(615) 974-7805, 974-6785

Waste Management Research and Education Institute
Dr. William Colglazier
327 South Stadium Hall
UT Knoxville
Knoxville, TN 37996
(615) 974-4251

Communications Research Center
(College of Communications)
Michael Singletary, Director
The Communications Research Center, 98 Communications Bldg., is an adjunct to the communications graduate program. Objectives of the Center are: (1) to conduct original research in mass and public communication; (2) to disseminate research-generated information; and (3) to provide research services to faculty and students, professional communicators, and others interested in improving the quality of human communications.

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

Mainframe computers operated by UTCC include an IBM 3081D, an IBM 3090 200E with two vector processors, two VAX 8800 processors and one VAX 6220 processor in a VAXcluster, a VAX 8650 supporting ULTRIX-32, and two computers, a VAX 8650 and a VAX 8810, in the Knoxville Academic Management System. UTCC also makes available more than 100 microcomputers in remote user work areas. All the UTCC mainframe computers provide both batch computing and timesharing services. The latter includes the Conversational Monitor System (CMS) under the VM/SP operating system on the IBM 3081D, the VMS operating system on the VAXcluster, ULTRIX-32 on a VAX 8650, and Coursewriter III (an online Computer Assisted Instruction system) and Time Sharing Option (TSO) under MVS/ESA on the IBM 3090.

UTCC timesharing can be accessed through a terminal or microcomputer attached to one of more than 800 directly connected lines or 60 dialup lines. All UTCC timesharing services are available through the Digital Communications Associates (DCA) terminal port selection and multiplexing system. The UTCC DCA system is connected to the DCA system at the Oak Ridge National Laboratory. In addition, DECNets links the VAXcluster at UTCC with VAX computers located in the Computer Science Department and the College of Engineering on the Knoxville campus, at the UT Space Institute in Tullahoma, and at the University of Tennessee, Memphis. Several sites on the Knoxville campus are connected by Ethernet, a network that provides rapid access to data in remote locations and supports several protocols including LAT, TCP/IP, and XEROX.

The Knoxville campus network is connected to Internet which provides access to other Internet sites such as those on ARPANET and MILNET via the Southeastern University Research Association Network (SURANet). SURANet connects to the National Science Foundation Network (NSFNET) which joins other state and regional networks as well as directly connecting the five NSF supercomputing centers: the Cornell National Supercomputing Facility, the National Center for Supercomputing Applications at the University of Illinois, the Pittsburgh Supercomputing Center, the San Diego Supercomputer Center, and the John von Neumann Center.

UTCC is an affiliate of the Pittsburgh Supercomputing Center, the National Center for Supercomputing Applications at the University of Illinois, and the Cornell National Supercomputer Facility. Consulting services are provided by UTCC on those systems to UTK researchers whose work is supported by the National Science Foundation. The Cornell National Supercomputer Facility has two IBM 3090-600E’s, each with six vector facilities. The National Center for Supercomputing Applications has a four processor CRAY X-MP/48 and a CRAY2 with two VAX 11/785 front-end computers. The Pittsburgh Supercomputing Center has a four-processor Cray X-MP/48 with scalar and vector processor capability and two attached VAX 8650 front-end computers.
UTCC is also a member of BITNET, a network of more than 2,100 computers located at educational and research institutions throughout North and South America, Europe, and Asia. It allows the rapid exchange of messages and files associated with university work.

Software available on the mainframe consists of the commonly used compilers and interpreters, as well as a large number of programs for statistical, mathematical, engineering, operations research, and graphics applications. UTCC also provides users access to some public domain software for microcomputers and is the administrator for a number of site licenses for microcomputer software. Included is communications software for connecting several types of microcomputers to the mainframes for terminal emulation and file transfer.

UTCC maintains 20 user work areas on the Knoxville campus, including locations in the A.V. Williams Building and the C. E. Dunford Hall. A graphics center, located in Ferris Hall on the Knoxville campus, has storage and refresh graphics terminals, digitizing tablets, graphics workstations with integrated tabletpads, and graphics plotters. Additional graphics equipment, including terminals and a large digitizing tablet, is located in the user work area in the Art and Architecture Building. Many of the terminals and microcomputers in the user work areas are capable of being used for graphics.

A CalComp 1051 vector plotter is used to produce graphics output from jobs run on the IBM and the VAXcluster computers. An IBM 6670 and an Imagen laser printer are used to produce high quality printed output. The Imagen printer can also produce graphics at 300 dots per inch. A large digitizing tablet, one to five hours in length, are taught throughout the year on topics including programming languages, job control language, vector processing, the use of graphics, and the statistics and management applications available at UTCC. During each term break, UTCC consultants conduct a four-day seminar on the use of either the IBM or VAXcluster computers for faculty, staff, and graduate students. Many courses are available on videocassette in Audiovisual Services in the John I. Sewell, Associate Dean

Don O. Richardson, Dean

The Energy, Environment, and Resources Center, 329 South Stadium Hall, was created to encourage interdisciplinary research directed at solutions to problems related to energy and the environment. The Center provides assistance to faculty interested in developing research and public service projects, manages research and development projects that involve several disciplines, and assists Tennessee government and industry in specific problems related to energy, environmental, resource, and technology policy issues. The Center has a close working relationship with researchers at the Oak Ridge National Laboratory and the Tennessee Authority.

Current research includes hazardous and radioactive waste management, information systems, industrial fuel use trends, energy conservation in buildings and industry, electronic utility modeling, environmental research needs, energy education and information, probabilistic risk assessment, and ethical and value issues in technology policy.

Institute of Agriculture

D. M. (Petey) Gossett, Vice President

The Institute of Agriculture traces its history to 1897 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 1897, agricultural programs at the University have been expanded to include research for the development of new knowledge and extension for dissemination of such knowledge to rural people. Thus the Institute of Agriculture has come to include the work of four main divisions: Agricultural Experiment Station, Agricultural Extension Service, College of Agriculture, and College of Veterinary Medicine.

Agriculural Experiment Station

Don O. Richardson, Dean

The Agricultural Experiment Station was established by The University's Board of Trustees on June 8, 1897, five years before the passage of the Hatch Experiment Station Act by the U.S. Congress. The University was one of the first five institutions in the U.S. to establish an Agricultural Experiment Station. Since its beginning, the Station has given first attention to investigations of concern to the agriculture of Tennessee.

The objectives of the Tennessee Agricultural Experiment Station are the creation and utilization of new knowledge through research. Fundamental research is directed toward: (a) Understanding the basic science of the processes of plant and animal production through conversion into usable products and services; (b) Understanding the resource and market forces which affect the production, transfer, processing, and utilization of agricultural commodities and the resulting impact on the economic well-being of the agricultural population of Tennessee and the State of Tennessee; (c) Understanding the interaction of agricultural production and land uses on natural resources and the environment as they relate to long-term productivity and the quality of rural life; (d) Understanding the impact of food and fiber resources and the chemicals used in their production on people's well-being and the quality of life. Applied research utilizes these understandings to formulate effective production and marketing systems and to foster the development of a physical and economic environment that provides for the needs of rural, farm, and urban citizens.

The work of the Agricultural Experiment Station follows 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 consumer and consumer 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, mechanization, and more efficient feeding and management of livestock.

The program is designed and administered by the staff located at Knoxville. A majority of the faculty have teaching responsibilities in addition to their research. To assist in the research program, the Station supports over 120 graduate students. To serve Tennesseans, diversified agricultural research stations are operated at Crossville, Grand Junction, Greeneville, Jackson, Knoxville, Lewisburg, Martin, Milan, Oak Ridge (forestry), Springfield, and Spring Hill. Professional and technical staff are in residence at these stations.

Agricultural Extension Service

M. Lloyd Downen, Dean

Mildred F. Clarke, Associate Dean

Billy G. Hicks, Associate Dean

D. Ray Humberd, 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 attend classes or other institutions. The Service is the social and educational link between the land-grant universities of the South and people living in rural areas.

The Service is carried on through offices in each of the 95 counties of the state. Educational programs are conducted mainly in four major program areas: agriculture and natural resources, community resource development, home economics, and education of young people through 4-H Clubs. Co-operative extension agents, 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 where 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.

**Library, The University of Tennessee, Knoxville**

Paula Kaufman, Dean

The University of Tennessee, Knoxville Library owns approximately 1,600,000 volumes, more than 3,000,000 manuscripts, 70,000 microfilm reels, and 1,600,000 items of other microtext, plus audio and video recordings, and United States and United Nations documents. The UT Library currently subscribes to more than 18,000 periodicals and other serial titles. The Library's membership in the Association of Research Libraries reflects the University's emphasis on graduate instruction and research and the support of large, comprehensive collections of library materials on a permanent basis.

Library holdings in Knoxville are housed in the new 350,000 square foot facility, the John C. Hodges Library, and its branch libraries for agriculture-veterinary medicine and music. Special features of the new Hodges Library include a fully-equipped Microcomputer Lab and a state-of-the-art, fiber-optic wired Audiovisual Services department. The Library also has comfortable study space for 3,500 students, 308 graduate student carrels, and 196 faculty studies.

The Special Collections Library in the James D. Hoskins Building is a repository of regional and local materials, Tennesseana, and other specialties, including legislative papers and memearies of many Tennessee political figures. Special Collections materials are of particular interest to scholars in the fields of history, political science, social sciences, biological sciences, and the arts.

Library research holdings are augmented by Reference and Information Services and by Interlibrary Loan. Reference and Information Services provides access to commercially available databases, while Interlibrary Loan borrows monographs and obtains copies of other material from libraries around the world. Library holdings are accessible via a sophisticated online catalog which can be searched both in the library and from home or office computers.

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

**Management Development Center**

(College of Business Administration)

John E. Riblett, Director

The College of Business Administration's continuing education efforts are offered through the Management Development Center, 709 Stokely Management Center. The Center emphasizes consistent high-quality programming, small class sizes, outstanding faculty, a highly participatory style of instruction, and an applied orientation. The programs range from customized 'in-plant' programs, to the four-week University of Tennessee Executive Development Program (TEDP).

The TEDP is tailored to the needs of upper-level managers and has a strategic focus. Its major objectives are to develop executives for increasingly higher levels of management responsibility and to sharpen existing executive skills needed for comprehensive decision-making and leadership. The management development program is designed for mid-level managers and is operational in scope. It is appropriate for both the experienced manager who has not had advanced management training and the individual being developed for a mid-level position. Other programs include: (1) the Institute for Productivity Through Quality, which teaches the techniques of statistical process control in an intensive 130-contact-hour program for both managers and executives; (2) The Senior Institute for Productivity Through Quality, a one-week program that provides a strategic overview of statistical management; (3) the Administrative Services Institute for Productivity Through Quality, a two-week program that applies the philosophy and tools of statistical management to non-manufacturing environments; (4) the Design of Experiments Institute, a three-week program that provides advanced statistical training with computer application; and (5) the Executive Development Program for Distribution Managers, which focuses on providing the distribution manager with an intensive exposure to contemporary management approaches.

**Off-campus Graduate Centers**

**Kingsport University Center**

UTK offers at Kingsport resident graduate programs in science and engineering at both the Master's and doctoral levels. The program is operated within the policies formulated by the Graduate Council of UTK and is coordinated with the graduate and undergraduate offerings of East Tennessee State University. Students who enroll in this program must be admitted to The Graduate School of UTK. Information and application forms may be obtained from Dr. 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 leading to Master's degrees in Business Administration with a concentration in management, and in Statistics. The Master's and doctoral degrees are available in engineering, mathematics, and physical sciences. Courses are given in late afternoons and evenings with research facilities provided by and used in conjunction with the Oak Ridge Associated Universities (ORAU). This program is supported under a subcontract with ORAU with principal support coming from the Martin Marietta Corporation. 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.

**Nashville Graduate Engineering Program**

Opportunities for graduate study leading to the Master of Science in Industrial Engineering and other disciplines, as the need and resources permit, are offered by 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 with majors in Educational Administration and Supervision and Vocational-Educational Technical Education. Students who enroll in this program must be admitted to The Graduate School of UTK. Information and appropriate forms may be obtained from the Director, c/o Dean, College of Education, UTC, Chattanooga, Tennessee 37403.

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

The University provides programs leading to the M.S. and Ph.D. degrees in various areas of biomedical sciences. Graduate students have the opportunity to study and do research in conjunction with the Biology Division of the Oak Ridge National Laboratory. For complete information concerning the program, see page 50.

**College of Social Work**

UTK offers a fully accredited two-year program leading to the Master of Science in Social Work through the College of Social Work, with programs in Knoxville, Nashville, and Memphis.

The UTK College of Social Work also offers a Doctor of Philosophy with a major in Social Work. For complete information concerning the programs, see page 141.
The Psychological Clinic
(College of Liberal Arts)
Alvin G. Burstein, Director
The Psychological Clinic supports graduate training in clinical psychology. Psychological diagnosis and psychotherapy are offered on an outpatient basis, with medical consultants, to the general public as well as to University students, upon referral by a physician.

Transportation Center
(Office of Vice Provost)
Stephen Richards, Acting Director
The Transportation Center was created in 1970 to foster and facilitate interdisciplinary research and public service in the field of transportation at The University of Tennessee. It began operating full-time in 1972 and since then has contributed greatly to the overall research program of The University. The Center, 357 South Stadium Hall, is a University-level organization administratively positioned with the Office of the Vice Provost for Research at UTK. The Center’s staff is organized into four research divisions and one support division. The five division managers provide the overall management needed to conduct transportation research, service, and training activities efficiently and effectively.

The Center has three goals. The first is to conduct a program of research in transportation that is recognized for its excellence, comprehensiveness, innovation, productivity, and national leadership. The second is to develop and sustain the technical expertise for high quality transportation research by the faculty and students within the various departments and colleges of UT. The third goal is to serve the transportation research, service, and training needs of state and local government, business, and industry in Tennessee, the southeast region, and the nation.

The University of Tennessee Space Institute
Kenneth E. Harwell, Dean
Richard M. Roberds, Associate Dean
The Space Institute is a graduate education and research institution located on a 365 acre lakeshore campus in Middle Tennessee. UTSI was established in 1964 and has evolved into an internationally recognized institution for graduate study and research in engineering, physics, mathematics, and computer science. The accredited academic programs and educational policies of the Space Institute have their origins in appropriate departments of The University of Tennessee, Knoxville. The more than 45 faculty members of the Institute carry out these accredited academic programs through classroom teaching, informal seminars, active research, and directing the research of their students in an environment of creative work and advanced study. Programs are available to students devoting full-time or part-time effort toward M.S. and Ph.D. degrees, those interested in continuing education for updating and broadening knowledge, and those who wish to pursue post-doctoral research.

Graduate degree programs are available with majors in Aerospace Engineering, Avionics Systems, Chemical Engineering, Computer Science, Electrical Engineering, Engineering Science, Industrial Engineering, Mathematics, Mechanical Engineering, and Physics. In addition to the fundamental studies characteristic of each discipline, research opportunities are available in many areas including aerodynamics, atmospheric science, fluid mechanics, advanced space propulsion, knowledge engineering, energy conversion processes, thermal sciences, space systems, remote sensing, propulsion, computational fluid dynamics, and other aspects of atmospheric and space flight.

The Institute has an established Center of Excellence in Laser Applications and offers graduate studies and research opportunities in laser diagnostics, laser materials interactions, picosecond processes, and coherent and non-linear optics.

The Institute was established in part to increase the research and engineering resources of Tennessee through education and practice in relevant scientific and technical areas and in part to interface University faculty and student research with the Air Force Arnold Engineering Development Center. The faculty, research activities, and facilities of the Institute, and those available at Arnold Center through appropriate contractual arrangements, provide students an unusual opportunity for significant research in these areas. Students who enroll at UTSI are admitted to The Graduate School, The University of Tennessee, Knoxville. Graduate Research Assistantships are available for qualified students. Further information may be obtained from the Dean, The University of Tennessee Space Institute, Tullahoma, Tennessee 37388.

Water Resources Research Center
(Office of Vice Provost)
E. William Colglazier, Director
The Water Resources Research Center, 309 South Stadium Hall, is a federally designated institute for the conduct of water research for the state. The purposes of the Center are: (1) to assist and support all the academic institutions of the state, public and private, in pursuing water resources research which addresses a wide range of problems of interest to the state, region, and nation; (2) to provide information dissemination and technology transfer services to state and local government bodies, academic institutions, professional groups, environmental organizations, and others, including the general public, who have an interest in water resources matters; (3) to promote education in fields relating to water resources and to encourage the entry of promising students into careers in these fields.
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