The Institute of Agriculture traces its history to 1869 when the University was designated as Tennessee’s Federal Land-Grant Institution. Under terms of the Federal Land-Grant Act, the University was enabled for the first time to offer instruction in agriculture. This later was expanded to include research for the development of new knowledge and extension for dissemination of such knowledge to rural people. Today, the Institute has four main divisions: College of Agriculture, College of Veterinary Medicine, Agricultural Experiment Station, and Agricultural Extension Service. In addition to agriculture and veterinary medicine the Institute conducts research and extension programs in home economics.

Agricultural Experiment Station

Dorsey M. Gossett, Dean
Thomas J. Whatley, Associate Dean
John I. Sewell, Assistant Dean

The Agricultural Experiment Station was established in 1887 by an act of Congress known as the Hatch Act. The purpose of the Experiment Station is to promote fundamental and applied research on all problems primarily affecting the people of Tennessee, but also having national and international implications. The research program embraces studies of the productivity of soils, plants, animals, other capital and people and the combination of these resources necessary to maintain a viable agriculture. Specific research projects relate to development of new and improved crop varieties, insect, disease, and weed control methods, cultural and harvesting techniques, and improved genetics, nutrition, physiology and management of livestock. Other studies deal with various aspects of processing and distributing food and fiber, consumer preferences, food safety and nutritional needs and maintenance of institutions to serve people. The results of investigations are carried to the clientele in the form of bulletins, circulars, and reports through the Agricultural Extension Service, and the state educational system through the Colleges of Agriculture and Education.

Headquarters as well as the Main Station of the Agricultural Experiment Station are located at Knoxville. Eleven branch stations are located across the state. These stations are essential as research laboratories to test the performance of crop and livestock enterprises grown under different soil, climatic, and environmental conditions. The locations of the Branch Stations are as follows:

**Ames Plantation** near Grand Junction includes 18,500 acres (about 10,000 acres in forest). The resources are held in trust by the Hobart Ames Foundation for use by the Institute of Agriculture. Large scale experiments involve forestry, farm management, crop production, and genetics and management of beef cattle and swine.

**Dairy Experiment Station** near Lewisburg is operated in cooperation with USDA/SEA/AR. Major emphases are genetics, physiology, nutrition, and management of Jersey cattle. Production, handling and preservation of feed for dairy cattle are also being evaluated along with waste management systems.

**Forestry Experiment Stations and Arboretum at Oak Ridge, Tullahoma, and Wartburg.**

The 250-acre arboretum at Oak Ridge places emphasis on woody plants. Research in forestry studying genetics, species adaptation, fertilization, and other management practices is under way on the adjoining land. The Cumberland forest consists of two tracts of land in Morgan and Scott counties. Research at this location deals with many of the forest problems in the Cumberland including strip-mining reclamation. The Highland Rim Forestry Station is located near Tullahoma. Research at this location deals primarily with tree improvement through genetics and also management problems associated with the forest of the Highland Rim.

**Highland Rim Experiment Station near Springfield emphasizes research on field crops and beef cattle.** A major thrust is on the development and culture of improved darkfired tobacco varieties. Other research involves problems associated with other agronomic crops, horticultural crops, forages produced on the Highland Rim, and management of beef cattle.

**Middle Tennessee Experiment Station** near Spring Hill is representative of high-phosphate Central Basin soils. Research studies are underway with agronomic crops, vegetables, fruits, ornamental horticulture, beef cattle, and dairy cattle of the Holstein breed.

**Milan Experiment Station** is located in West Tennessee. Research emphases are production problems and mechanization of corn, cotton, and soybeans. Minimum tillage and other approaches to reduce soil erosion are a major thrust at this location.

**Plateau Experiment Station** near Crossville consists of three farms. Studies with beef cattle, and agronomic and vegetable crops provide information about results to be expected under the cooler, more humid climate and special soil conditions of the Cumberland Plateau.

**Tobacco Experiment Station** is located near Greeneville. Extensive research on all phases of burley tobacco is in cooperation with USDA/SEA/AR. In addition, research is underway with beef cattle and other field crops.

**UT Martin**—The research farm, adjacent to the UT Martin campus, is used for both research and teaching. The research staff at Martin, jointly employed by the Experiment Station and the School of Agriculture, cooperate with other station personnel in planning and conducting research on field crops, beef cattle, dairy cattle, and swine. Emphasis is on problems of importance to the northwestern part of the state.

**West Tennessee Experiment Station** is located at Jackson. Major emphases are all phases of production on agronomic crops produced in the western part of the state. In addition, research deals with problems asso-
Agricultural Extension Service

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

The Agricultural Extension Service serves the entire state of Tennessee. This educational service of the Institute of Agriculture is active in every county extending information on agriculture, home economics, and related subjects to farm families and other citizens.

This educational organization was established July 1, 1914, by an act of Congress commonly known as the Smith-Lever Act. Staff members of the Agricultural Extension Service use a wide range of methods—farm and home visits, educational meetings, field demonstrations, publications, and mass media—in providing educational programs for people who do not have the opportunity to enroll in resident courses of instruction at colleges.

Extension staff members develop and carry out programs to meet the specific needs of the residents of their counties. They work with both adults and youth. Educational activities for boys and girls are organized in schools and in communities. County, state, and federal governments cooperate in carrying out the Agricultural Extension Service program. The United States Department of Agriculture, the State of Tennessee, and each county government provide the financial support. Any county which appropriates funds for the program may have an office located there to serve its residents. Most offices are located in county seat towns. Headquarters for the Agricultural Extension Service is at Knoxville and district administrative offices are located in Cookeville, Knoxville, Chattanooga, Nashville, and Jackson.

As a distinct administrative unit of the Institute of Agriculture, the Agricultural Extension Service works closely with the other units of the Institute—the Agricultural Experiment Station, the College of Agriculture, the College of Veterinary Medicine—in providing a total program of research, instruction, and extension for developing the agriculture of the state.

College of Agriculture

O. Glen Hall, Dean

Curricula in Agriculture

Broad opportunities for individuals to prepare for a future in agriculture, forestry, and wildlife and fisheries science are offered in the College of Agriculture. The college provides curricula leading to the degrees of Bachelor of Science in Agriculture, Bachelor of Science in Home Economics, Bachelor of Science in Forestry, Bachelor of Science in Ornamental Horticulture and Landscape Design and Bachelor of Science in Wildlife and Fisheries Science. The professional degree program in agricultural engineering receives strong support from the College of Engineering and is fully accredited by the Accreditation Board for Engineering and Technology. The forestry curriculum is fully accredited by the Society of American Foresters.

A pre-professional curriculum in veterinary medicine is offered in the college. This program is designed to prepare students for admission to the College of Veterinary Medicine located on the Knoxville campus. Students pursuing programs leading to the degree of Bachelor of Science in Agriculture major in one of several specialized areas of agriculture offered in the college. These major areas are agricultural business, agricultural economics and rural sociology, agricultural education, agricultural mechanization, animal science, food technology and science, and plant and soil science. Specific courses required for each of these areas are given under the departmental headings in this section of the catalog. A student must complete the curriculum outlined by the department in which the student is majoring in order to receive a degree. In all areas of specialization, particular emphasis is placed upon the sciences as a background for agricultural instruction; other courses are included to provide a liberal education. In all subject matter departments there is the opportunity to select elective courses appropriate to the educational objectives of individual students. The choice of electives in each curriculum should be made with the guidance of the faculty advisor.

All academic and general requirements of the University as stated in the front section of this catalog must be met by agricultural students, and they must complete the requirements in one of the organized curricula. Students transferring into the College of Agriculture from other than the UTK campus must have a grade point average of 2.0. Each curriculum leading to the degree of Bachelor of Science in Agriculture includes the requirements of the basic curriculum for agriculture. For this degree, the minimum requirement is 198 quarter-hour credits. A minimum of 45 hours in agricultural courses is required. For the degrees of Bachelor of Science in Forestry and the Bachelor of Science in Wildlife and Fisheries Science, the minimum requirement is 198 quarter-hour credits. For the degree of Bachelor of Science in Agricultural Engineering, the minimum requirement is 200 quarter-hour credits.

The use of transfer credit in technical agriculture appropriate to each organized curriculum will be considered and approved by the advisor of that curriculum and the dean of the College of Agriculture. When desirable, validating or proficiency examinations may be requested to determine competence in an area and to avoid unnecessary repetition. Such examinations should be taken during the first quarter in residence and must be submitted under the supervision of the head of the department in which the course is offered.

A minimum of 27 quarter hours of upper-division technical agriculture appropriate to a specified major is required, and approved by the major advisor, must be completed in residence to fulfill the requirements of baccalaureate degrees offered in the college.

Satisfactory/No Credit Courses

Students may include a maximum of 30 hours in non-directed electives taken on a satisfactory/no credit basis in the total hours required for graduation.

Graduate Study in Agriculture

MASTER OF SCIENCE PROGRAMS

Programs of graduate study leading to the Master of Science degree are offered in all departments in the College of Agriculture. See the Graduate Catalog for details.

A Winter Short Term for Agricultural Extension personnel and other professional agricultural workers is held each year during the last half of the winter quarter. Those attending must be accepted by The Graduate School. Students may take three courses and earn nine quarter hours of graduate credit toward the Master of Science degree. A number of courses are offered annually in extension education and in other departments in the Colleges of Agriculture and Home Economics. Additional information and a five-year schedule of course offerings may be obtained by writing to Professor R. G. Dotson, Head, Department of Agricultural Extension Education, College of Agriculture, Knoxville.

DOCTORAL PROGRAMS

Graduate study programs lead to the Doctor of Philosophy degree in animal sciences, agricultural economics, agricultural engineering, food technology and science, and plant and soil science.

General requirements and policies of The Graduate School of The University of Tennessee relating to admission to the Graduate School, residence, language, research, examination, and admission to candidacy shall apply to these programs and are described in the Graduate Catalog.

Facilities

The College of Agriculture uses the facilities on the agricultural campus, on University farms located near Knoxville, and on the main University campus. On the agricultural campus are found the main agricultural building, Morgan Hall; the Agricultural Engineering Building; McCord Hall; the Dairy Products Building; McLeod Food Technology Building; C. E. Brehm Animal Sciences Building, which includes a large pavilion; Ellington Plant Sciences Building which houses the plant science departments; and greenhouse and experimental work. The buildings which have been erected recently provide facilities comparable to the best in the country for the departments which they serve.

Four farms adjacent to or within eight miles of the agricultural campus are used both for instructional and experimental purposes. Morgan Farm (60 acres), Cherokee Farm (550 acres), Plant Science Farm (212 acres), and a livestock farm (516 acres) provide excellent field laboratory facilities for instructional programs offered in the Col-
le. Cherokee Woodlot (120 acres), the Oak Ridge Forest (2,260 acres), and Ames Plantation (8,000 acres of forested land) provide excellent facilities for field work in forestry, wildlife, and fisheries.

Transportation by bus is provided for classes of agricultural students from the agricultural campus to the University farms, and to other points of interest where instruction may be given. Transportation by bus is provided between the agricultural campus and the main University campus so that students may make the change between classes without serious inconvenience. The facilities of the University on the main campus are available to agricultural students. Courses in the basic sciences, business, communications, engineering, etc., are open to agricultural students and are taught on the main University campus.

**Selection of Curriculum**

Agricultural students who have determined their area of special interest may choose the curriculum most adaptable to their needs when they register as freshmen, and an advisor from the department will be assigned for their counseling. It is not necessary, however, that freshman students select their curriculum until the end of the first year. Those who are in doubt will be assigned a special advisor to assist them in exploring agriculture and to guide them in the planning of appropriate courses of study for the remainder of their college careers. When they choose a curriculum, an advisor will be assigned from that department.

Students with special interest in science, business, or production technology should consult the advisor about selection of appropriate electives. A foundation for advanced study beyond the baccalaureate degree may be established in any curriculum if appropriate electives are included; also, courses may be elected in any of the curricula leading to the degree of Bachelor of Science in Agriculture, in preparation for employment with the Agricultural Extension Service. For this purpose, both the major-curriculum advisor and the agricultural-extension advisor should be consulted.

A very careful choice of electives enables a student with an average grade to complete a double major by satisfying the requirements in each curriculum. For this purpose, the advisors of each curriculum should be consulted, the dean of the College of Agriculture should be informed, and each advisor should maintain a complete record of the student’s progress.

**Optional Minors:** Agricultural students may have single or multiple minors in agriculture or in other colleges recorded on their transcripts without regard to course overlap among majors and minors. A minor in a department of the College of Agriculture requires a minimum of 24 credit hours in courses numbered 1000 or above and above the majority of credit hours at the 3000 and 4000 level. At least 12 of the credit hours required for the minor must be completed at UTK. Specific requirements are listed by each department offering a minor. Minors offered in the College of Agriculture are open to students of other colleges who have the approval of their advisor and department.

Students who transfer to the College of Agriculture from another institution, or from another college in UTK, should consult the dean if in doubt about the curriculum they wish to follow and for assignment to an appropriate advisor. Requests for substitutions or special examinations should be submitted for consideration during the first quarter of study in the selected curriculum.

**Basic Curriculum for Agriculture**

All students except those majoring in Food Technology and Science working for the degree of Bachelor of Science in Agriculture will include in their course of study the following minimum requirements. The sequence and the selection of courses not specified will be guided by the advisor.

<table>
<thead>
<tr>
<th>Hours Credit</th>
<th>Course Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture 1110, Introduction to Social Science</td>
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</tr>
<tr>
<td>Agriculture 2120, Introduction to Agricultural Engineering</td>
<td>4</td>
</tr>
<tr>
<td>Agriculture 1150, Animal Science for Agriculture</td>
<td>4</td>
</tr>
<tr>
<td>Agriculture 1460, Food Technology and Science for Agriculture</td>
<td>4</td>
</tr>
<tr>
<td>Agriculture Science, (courses listed in department curriculum)</td>
<td>26</td>
</tr>
<tr>
<td>English and Communications. (English 1010 or 1011, 1020 or 1023, 1030 or 1033, Speech 2311, and elective 100-200 level in English or communications)</td>
<td>18</td>
</tr>
<tr>
<td>Mathematics 1540-50-60, (general mathematics)</td>
<td>12</td>
</tr>
<tr>
<td>Biological Science, (entomology and plant pathology, biology, botany, microbiology, or zoology)</td>
<td>12</td>
</tr>
<tr>
<td>Physical Science, (courses listed in department curriculum)</td>
<td>16</td>
</tr>
<tr>
<td>Social Science and Humanities. (Economics 2510-20 and electives, 10 hours not more than 3 areas)</td>
<td>18</td>
</tr>
<tr>
<td>Other Courses or Electives Hours Specified By Departments</td>
<td>76</td>
</tr>
<tr>
<td>Total: 198</td>
<td></td>
</tr>
</tbody>
</table>

1. Or equivalent honors courses.
2. The Mathematics 1840-50-60 sequence may be necessary in some courses of study.
3. Economics 2510-20, Agricultural Economics 2110, Agricultural Economics 4120 or 4610, Agricultural statistics.
4. Principles of Agricultural Economics 1110-20-30-40-50, 20 hours including Economics 2510-20 and physics or geology, 16 hours. 10 hours (3 areas) | 18 |
5. This curriculum is designed to prepare students for employment in the rapidly expanding field of agricultural business. Recognition is given to the desire of many college graduates to continue to work with agriculture through many private and public services where major emphasis is in areas other than farm production. This program emphasizes particularly those capacities needed for the management phases of agricultural business. Course offerings in the College of Business Administration have been used freely in this curriculum.

Preparation is given for such work in accountancy, livestock agriculture, marketing, fertilizer and feed business, cooperative business management, agricultural credit agencies, farm real estate and appraisal services, agricultural representatives with banks, public and private market analysis, agricultural journalism, and farm information services utilizing mass communications.

Minor in Agricultural Business consists of 30 credit hours including Economics 2510-20, Agricultural Economics 3120 or 3320, Agricultural Economics 3410 or Accounting 2110, Agricultural Economics 4120 or 4810, 13 hours of Agricultural Economics and Rural Sociology electives.

**Administrators:**

- Directors: Director of Agriculture, Associate Director of Agriculture.
- Associate Directors: Agricultural Sciences, Agricultural Economics, Agricultural Education, Agricultural Research, Agricultural Extension.
- Professors: Martin, Brooker, McLemore, Mundy, Associate Professors: Park and Whipple.
- Assistant Professor: Manley.

This curriculum is designed to prepare students for employment in the rapidly expanding field of agricultural business. Recognition is given to the desire of many college graduates to continue to work with agriculture through many private and public services where major emphasis is in areas other than farm production. This program emphasizes particularly those capacities needed for the management phases of agricultural business. Course offerings in the College of Business Administration have been used freely in this curriculum.

Preparation is given for such work in accountancy, livestock agriculture, marketing, fertilizer and feed business, cooperative business management, agricultural credit agencies, farm real estate and appraisal services, agricultural representatives with banks, public and private market analysis, agricultural journalism, and farm information services utilizing mass communications.

Minor in Agricultural Business consists of 30 credit hours including Economics 2510-20, Agricultural Economics 3120 or 3320, Agricultural Economics 3410 or Accounting 2110, Agricultural Economics 4120 or 4810, 13 hours of Agricultural Economics and Rural Sociology electives.

**Course Load**

- Students desiring to take more than 19 hours per quarter must have the approval of the dean of the college.

**Agricultural Economics and Rural Sociology**

**Agricultural Business Curriculum**

Advisors: Professors Martin, Brooker, McLemore, Mundy. Associate Professors: Park and Whipple.

- Assistant Professor: Manley.

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Agricultural Economics and Rural Sociology

Senior Electives 12
Statistics 3110 3

Junior
"Non-departmental social science and humanities 6
Non-departmental agricultural electives 3
*Business administration electives 6
Electives 9 or 10

Total: 198 hours

*Agricultural Education

Advisors: Professors Wiegert and Craig; Associate Professor Todd

The curriculum in agricultural education is planned in cooperation with the College of Education. All agricultural education courses are offered in the College of Education.

This curriculum is designed to prepare students for entering professional agricultural education service. Graduates are qualified to teach vocational agriculture. The curriculum also provides training for those who wish to enter farming, industry, and governmental services associated with agriculture and other occupations.

The senior courses in agricultural education (except Ag. Ed. 4110) are taught at selected off-campus centers. These courses are scheduled concurrently each quarter during the regular school year.

Students should file applications for student teaching in the College of Education. (See admission to Teacher Education and Student Teaching section.)

Students meeting the requirements for general vocational agriculture certification may secure endorsements in ornamental horticulture and agricultural mechanics by meeting the following requirements:

Orchard Horticulture—18 quarter hours of courses in ornamental horticulture and landscape design and/or plant and soil science. Subject matter areas must include plant propagation, greenhouse management, growing media, landscape design, and nursery management.

Agricultural Mechanics—18 quarter hours of courses in agricultural mechanization. Subject matter areas must include agricultural power and machinery, soil and water conservation, and agricultural structures.

Freshman Hours Credit
Agriculture 1110-20-30-40-50 20
Biology 1210-20 8
English 1010 or 1011; 1020; 1031 or 1032 or 1033 9
Mathematics 1540-50-60 or 1840-50-60 12

Sophomore
Agricultural economics 2410 3
Biology, science electives 4
Chemistry 1110-20 or 1510-20 and Physics 1210-20 or Geology 1410-20 or Chemistry 1110-20 or 1510-20 and Physics 1210 or Geology 1410 16
Computer Science 1410 or 1510 or Office Administration 2730 3 or 4

Junior
Agricultural Education 3120 3
Agricultural economics and rural sociology electives 6
Economics 3111-12-20 or Economics 3110-20 and 3 hours economics electives 6
Non-departmental agricultural electives 6
Non-departmental social science and humanities electives 8
Rural Sociology 3420 3
Statistics 3110 3
Electives 12

Senior
Agricultural Economics 4140, 4320 and 4430 9
Agricultural economics and rural sociology electives 6

Economics electives 3
English 4140 3
Finance 3510 3
Non-departmental agricultural electives 6
Speech 3021 4
Statistics 3220 3
Electives 12

Total: 198 hours

*One hour must be in PE.

Agricultural Engineering

AGRICULTURAL ENGINEERING CURRICULUM

Advisors: Professors Luttrel, Bledsoe, Henry, McDow, Tompkins, and Wilhelm.

The College of Agriculture, with the cooperation of the College of Engineering, offers a four-year curriculum leading to the degree of Bachelor of Science in Agricultural Engineering. The curriculum is fully accredited by the Accreditation Board For Engineering and Technology. Industry, government agencies, research and testing organizations, and foreign service offer employment opportunities to agricultural engineers.

The minimum requirements for admission include two units of algebra, one unit in geometry, and one-half unit in trigonometry. Students may remove deficiencies by registering for special classes during the freshman year.

The curriculum gives training in the fundamentals of engineering applied to problems of agriculture. In the senior year, the comprehensive design of systems and their components is emphasized.

Graduates may pursue careers in design, analysis, or development in the following specialties: agricultural power and machinery, agricultural structures and environment, electric power and processing, soil and water conservation engineering, and food engineering.

The curriculum provides for elective courses which can be taken in the student's area of interest. Students should check with their advisors each quarter regarding the selection of courses.

Students majoring in agricultural engineering are eligible to participate in the Engineering Cooperative Scholarship program, Engineers' Day program, and other student activities in the College of Engineering. They are also eligible for selection into Tau Beta Pi and Alpha Zeta. Agricultural engineering majors interested in the Cooperative Engineering Scholarship program should consult with the head of the Department of Agricultural Engineering.

Freshman Hours Credit
Agricultural Engineering 1130 3
Agriculture 1130-40 8
Basic Engineering 1410-20-30 12
Basic Engineering 1410 2
Agricultural and Environmental Science Curriculum

Advisors: Professors Luttrell, Bledsoe, Henry, McCow, Tompkins and Wilhelm.

The agriculture and environmental science curriculum is administered by the Department of Agricultural and Environmental Science, and is comprised of majors and minors in a variety of fields, including agriculture, forestry, and environmental science. The curriculum is designed to provide students with a broad understanding of the agricultural and environmental sciences, as well as specific training in particular areas.

Majors

1. Agricultural Engineering
2. Agricultural Economics
3. Agricultural Communication
4. Agricultural Education
5. Agricultural Economics
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200. Agricultural Economics

Total: 200 hours

1 Or equivalent honors course.
2 If Mathematics ACT is less than 28, take Mathematics 1700 prior to 1980 (see advisor for alternate course schedule). Credit toward graduation will not be granted for Mathematics 1701.
3 A list of selected electives must have approval of student's advisor prior to registration in the course.
4 Agricultural and environmental science majors.

Agricultural Mechanization Curriculum

Advisors: Professors Dotson, Dickson and Carter.

No formal undergraduate curriculum is offered in agricultural extension education, but undergraduate courses are available as electives in each formal curriculum. Courses are designed to: (1) develop in prospective extension workers and other interested students an understanding of the functions, responsibilities, and techniques of the Cooperative Agricultural Extension Service, and (2) provide prospective extension workers with practical extension work experience in selected training counties. Graduate majors and minors are offered in agricultural extension education. Graduate courses are designed to develop in present extension workers and other interested students those competencies needed for improving the effectiveness of their work. Professor Dotson will give guidance for designing emphasis in agricultural extension education.

Animal Science Curriculum

Advisors: Professors Barth, Ericson, Lidvall, McLaren, Montgomery, Richardson, Shirley, Shrode; Associate Professors Backus, Hitchcock, Kattke, Mashunic, Robbins, Waller; Assistant Professor Bell, Godkin, Heitmann, Oliver, and Smalling.

This curriculum is designed to prepare students for leadership careers in livestock and in related industries. Swine, poultry, sheep, dairy, and beef cattle production and management may be involved, providing the opportunity for special or additional training in the dynamic livestock and husbandry technology (production). Through course selection, the student, therefore, may prepare for general or livestock farming, management, business, veterinary school, or elect the pre-veterinary courses preparatory for specialization. Elective selection permits special training for work with feed companies, meat animal, milk, egg, or poultry production, managerial or marketing groups, other educational agencies, supply and equipment business, agricultural extension services, agricultural communication, public relations, and various organizations associated with agriculture.

Students have the opportunity, through appropriate course selection, to obtain double majors by combining the animal science curriculum with another curriculum. Students majoring in the animal science curriculum may if they desire arrange to minor in various other curricula. The requirements for these minors shall be stipulated by the department supervisor in the particular curriculum. Students majoring in other curricula may opt to minor in animal science.

A minor in animal science consists of 28 credit hours including 2810, 2810, 3210, 3310, 3410, 3510 and one 3600 course and one 4800 course.
Students outside of the College of Agriculture should add Agriculture 1130-39.

Requests for substitution of similar courses in biology or zoology will be considered on an individual basis. It is suggested that the 3600 and 4800 series deal with the same class of livestock.

**Freshman**

<table>
<thead>
<tr>
<th>Hours Credit</th>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>12</td>
<td>Biology 1210, 1230</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Chemistry 1110, 1120, or 1510-20</td>
<td></td>
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<tr>
<td>8</td>
<td>English 1010 or 1011; 1200; 1031 or 1032 or 1033</td>
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<td>9</td>
<td>Mathematics 154-50-60 or 1840-50-60</td>
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<tr>
<td>8</td>
<td>Physics 2210-20-30</td>
<td></td>
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<tr>
<td>2</td>
<td>Plant and Soil Science 2130</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Speech 2311 and communications elective</td>
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</tbody>
</table>

**Sophomore**

<table>
<thead>
<tr>
<th>Hours Credit</th>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>8</td>
<td>Agriculture 1120, 1150</td>
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</tr>
<tr>
<td>8</td>
<td>Animal Science 2610, 2810 (core requirement)</td>
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</tr>
<tr>
<td>7</td>
<td>Chemistry 1130 or 1530, and 3211-19 or 2230, or Biochemistry 3110, or Nutrition 3130</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Economics 2510-50</td>
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<td>Microbiology 2910-11</td>
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</tr>
<tr>
<td>4</td>
<td>Plant and Soil Science 2130</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Physics 2210-20-30</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Communications elective</td>
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</tr>
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</table>

**Junior**

<table>
<thead>
<tr>
<th>Hours Credit</th>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>2</td>
<td>Electives</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Humanities-society social electives</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hours Credit</th>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Non-animal science agricultural electives</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Animal science (core requirement; Animal Science 3210, 3230, 3230, 3330, 3410, 3420, 3510)</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Directed electives- evaluation</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Communications elective</td>
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</tr>
<tr>
<td>2</td>
<td>Electives</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Humanities-society social electives</td>
<td></td>
</tr>
</tbody>
</table>

Total: 198 hours

**Senior**

<table>
<thead>
<tr>
<th>Hours Credit</th>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Animal Science 4810 (core requirement)</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Directed electives</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Humanities-society social electives</td>
<td></td>
</tr>
</tbody>
</table>

**Pre-Veterinary Medicine Option Curriculum**

Advisors: Professors Barth, Erickson, Lidwall, McLaren, Montgomery, Richardson, Shirley, Shrode; Associate Professors Backus, Hitchcock, Kattesh, Masincupp, Robbins, Waller; Assistant Professors Bell, Godkin, Heitmann, Oliver, Smalling.

This program is designed to guide the student in meeting the admissions requirements of The University of Tennessee College of Veterinary Medicine. The completion of specific subject matter requirements and the attainment of a satisfactory grade point average, according to established minimum requirements for entrance into the professional curriculum of the College of Veterinary Medicine. However, each year the number of applicants is much greater than the number of available spaces. Therefore, meeting or exceeding the minimum requirements does not assure acceptance by the College of Veterinary Medicine, and each pre-veterinary medical student should, early in the college career, elect a possible alternative career choice. The admission requirements listed below are those required by The University of Tennessee College of Veterinary Medicine. Their completion will generally fulfill the requirements for other veterinary colleges. However, students intending to apply to schools other than The University of Tennessee College of Veterinary Medicine must complete a minimum of 120 hours. They must complete their pre-veterinary requirements by the end of the spring quarter of the year in which they are applying. It is strongly recommended that each interested student plan to pursue at least a three-year pre-veterinary program. Inquiries concerning possible course substitutions and the combining of the pre-veterinary program with a degree program should be directed to the department's pre-veterinary advisors. It is possible for students who are accepted into the College of Veterinary Medicine at the end of their third year to receive a B.S. in Agriculture with a major in animal science upon successful completion of the first year in the College of Veterinary Medicine (3 and 1 program). See the College of Veterinary Medicine section in the Graduate Catalog for additional information.

A suggested schedule for the Pre-Veterinary Medicine—Animal Science student is given below which will (1) allow for the completion of the above pre-veterinary requirements by the end of the third year, and (2) allow the student to make normal progress toward completing the requirements for a degree in agriculture with a major in animal science and (3) to complete the requirements for the 3 and 1 program. It is strongly recommended that the student carry a normal load of at least 15 to 18 hours per quarter. See College of Veterinary Medicine admissions requirements for minimum course requirements for admission to the professional program in the College of Veterinary Medicine.

**First year**

<table>
<thead>
<tr>
<th>Hours Credit</th>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>12</td>
<td>English 1010 or 1011; 1200; 1031 or 1032 or 1033</td>
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</tr>
<tr>
<td>9</td>
<td>Mathematics 1540-1550, 1560</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Biology 1210-20-30</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Chemistry 1110-20-30</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Agriculture 1130</td>
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</tr>
<tr>
<td>4</td>
<td>Humanities electives</td>
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**Second year**

<table>
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<tbody>
<tr>
<td>9</td>
<td>Chemistry 3211-21-31</td>
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</tr>
<tr>
<td>3</td>
<td>Chemistry 3219-29-39</td>
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</tr>
<tr>
<td>12</td>
<td>Physics 2210-20-30</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Agriculture 1110</td>
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</tr>
<tr>
<td>4</td>
<td>Economics 2510</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Speech 2311</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Animal Science 2610-12, 2810-12, 3320-9 and 3330-9 and 3410-1</td>
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**Third year**

<table>
<thead>
<tr>
<th>Hours Credit</th>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>8</td>
<td>Biochemistry 4110-20</td>
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</tr>
<tr>
<td>5</td>
<td>Microbiology 2910-19</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Economics 2520</td>
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<tr>
<td>4</td>
<td>Social science electives</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Humanities electives</td>
<td></td>
</tr>
</tbody>
</table>

**4**Animal science 3420, 3600 level evaluation (3 hrs), 4800 level production management (4 hrs). 10  
**5**Electives |              |

Total: 155 hours

**ANIMAL SCIENCE CURRICULUM WITH A PRE-VETERINARY MEDICINE OPTION**

This program is designed for students accepted by the UT College of Veterinary Medicine after their third undergraduate year who wish to obtain a B.S. in Agriculture with a major in animal science upon completion of the first year in the College of Veterinary Medicine. The student will need to complete the requirements as established by the College of Veterinary Medicine. In addition, the student needs to complete the courses listed above, including Economics 2510-20 and, under electives, complete Agriculture 1150 or equivalent food technology and science course, Plant and Soil Science 2130, other agriculture outside of animal science 6 hrs. (suggested Agricultural Mechanization 4160, Food Technology and Science 3840, Entomology and Plant Pathology 3210, Plant and Soil Science 3140).

**5**Students wanting to complete pre-vet requirements, but wishing to major in a department other than animal science and veterinary medicine, should consult with the appropriate departmental advisor for a proper selection of electives.

**Entomology and Plant Pathology**

Advisors: Professors Southard, Hilty, Pless.

No undergraduate curriculum exists in the Dept. of Entomology and Plant Pathology, but a program leading to the Master of Science degree with a major in entomology and plant pathology is available (see the Graduate Catalog). Courses in economic entomology, plant pathology, parasitology, microbiology, and plant systemic and pesticidal properties.
are available to agricultural students. The department is currently composed of two major disciplines: economic entomology and plant pathology. The primary objective of offering a major at the graduate level is to provide training in those disciplines which deal with the natural hazards that are the major causes of losses in agricultural production. The training gives such a graduate the foundation necessary for coping with the myriad insect and plant disease problems that constantly threaten Tennessee’s dynamic agriculture.

**Food Technology and Science**

Advisors: Professors Miles, Collins, Jaynes and S. Melton; Associate Professors: Davidson and Mount.

Food technology and science is the application of the sciences and engineering to the manufacture, preservation, storage, transportation, and consumer use of food products. Processing of raw food materials into consumer products by canning, freezing, dehydrating, fermenting, preserving, etc., is taught with emphasis on basic principles rather than on specific commodity procedures. Therefore, man and woman who plan to enter food technology must have an interest in the sciences, particularly chemistry, biology, microbiology, and physics.

This curriculum is designed to prepare students for a professional career in positions in the food industry such as food microbiologist, food chemist, quality evaluation and control supervisor, plant foreman and manager, ingredients specialist, etc. The Model Curriculum of the Institute of Food Technologists was used as a guide in developing this curriculum. A special problem course provides opportunity for practical training in food processing plants and laboratories or federal and state laboratories.

**Minor in Food Technology and Science**

Consists of 25-27 hours as follows: 3810 or 4610, 4130 or 4140, 4200, 4400 and three (3) elective Food Technology and Science courses numbered 2300 or above.

**Freshman**

<table>
<thead>
<tr>
<th>Hours Credit</th>
<th>Agriculture 1110-30-40 (choose two)</th>
<th>8</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Agriculture 2110-20</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Biology 1220</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>English 1010-20-33</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>*Mathematics 1540-50-60</td>
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<tr>
<td></td>
<td>Physics 1210-20</td>
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</tr>
<tr>
<td></td>
<td>*Humanities-social studies elective</td>
<td>4</td>
</tr>
<tr>
<td><strong>Sophomore</strong></td>
<td>Chemistry 1510-20-30</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Economics 2510-20</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Food Technology and Science 2300</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Microbiology 2810-19</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Speech 2311</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Communications electives</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>*Humanities-social studies electives</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>*Computer Science elective</td>
<td>3</td>
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<tr>
<td><strong>Junior</strong></td>
<td>Agricultural Mechanization 3510</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Chemistry 2230 or Nut. and Food Science 3130</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Biochemistry 3110 or Nut. and Food Science 3140</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Food Technology and Science 4130</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Food Technology and Science 3810</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Nut. and Food Science 3120</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Nut. and Food Science 3150</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Plant and Soil Science 3610</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Statistics 3310</td>
<td>3</td>
</tr>
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<td></td>
<td>*Humanities-social studies elective</td>
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<td></td>
<td>*Electives</td>
<td>11</td>
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**Senior**

<table>
<thead>
<tr>
<th>Hours Credit</th>
<th>Food Technology and Science 4010</th>
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<tbody>
<tr>
<td></td>
<td>Food Technology and Science 4140</td>
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</tr>
<tr>
<td></td>
<td>4310, 4400, 4810, 4920</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Nut. and Food Science 4010</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>*Electives</td>
<td>21</td>
</tr>
</tbody>
</table>

**Total: 198 hours**

- *Mathematics 1840-50-60 are desirable alternatives for students with suitable entrance scores.
- *Commodity electives (3 are required): one each in meats (3816, 3840, 4840, 4940), Dairy Products (3620, 3700, 4030); and one from 4140 or 4420.
- *Approved computer science electives are 1410, 1510, 3010, 4310 or equivalent.
- *Those students preparing for employment in commercial food industry should select electives from such areas as agricultural economics, economics, accounting, business law, management, marketing, finance and transportation. Students should consult with advisor before selecting electives.
- *One hour course taken each of last three quarters in school.

**Forestry, Wildlife and Fisheries**

Advisor: G. Schneider

The department offers two majors. The major in forestry leads to the degree Bachelor of Science in Forestry and the major in wildlife and fisheries science leads to the degree Bachelor of Science in Wildlife and Fisheries Science. The forestry major has three options, Forest Resource Management Option, Forest Recreation Option, and Wood Utilization Option.

**FORESTRY**

The profession of forestry is the science, the art, and the practice of managing and using for human benefit the natural resources which occur on and in association with forest lands. Benefits are derived from the multiple resources of the forest: wood, water, wildlife, recreation, forage, and environmental amenities. Foresters are managers of these resources. Thus, our principal instructional objective is to provide the broad education needed to deal effectively with the complex of forest resources.

**FOREST RESOURCE MANAGEMENT OPTION**

The Forest Resource Management Option provides an opportunity to obtain an education related to the management of the broad spectrum of woodland resources. In addition to the core of required courses there are about 30 elective credit hours for broad studies of specialized training in one or more areas of forestry. These areas and examples of related fields of study include:

- **Forest Biology**—plant physiology and morphology, ecology, genetics, tree nutrition, forest soils.
- **Forest Business Management**—economics, accounting, finance, marketing, management science.
- **Forest Economics**—economics, business administration, social science.
- **Forest Engineering**—mathematics, computer science, photogrammetry.
- **Forest Inventory**—mathematics, statistics, computer science, photogrammetry.
- **Forest Recreation**—natural and social sciences.
- **Wildlife Management**—ecology, zoology, botany.

The University has over 21,000 acres of forest land available for teaching, research, and demonstration. The Tennessee Valley Authority, Great Smoky Mountains National Park, and Cherokee National Forest provide additional land and facilities available to the teaching program. Contained within these areas is a wide variety of tree species and forest types ranging from elements of the boreal forest to southern pines and hardwoods.

- Lumber, pulp and paper, and other wood-using industries cooperate in conducting tours and demonstrating industrial processes.

Upon completion of the four-year forestry curriculum the degree of Bachelor of Science in Forestry (B.S.F.) is awarded. A minor in Forestry consists of 24 credit hours from any courses having a Forestry designation. Prerequisites will not be waived.

**Freshman**

<table>
<thead>
<tr>
<th>Hours Credit</th>
<th>Botany 1110-20 or Biology 1210-20</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>English 1010 or 1011, 1020, 1031 or 1032</td>
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</tr>
<tr>
<td></td>
<td>Forestry 1620</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Forestry 3080</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Mathematics 1700, 1841-51</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Physics 1210 and 2220 or 2210 and 2220</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Speech 2311</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>*Electives</td>
<td>2-3</td>
</tr>
<tr>
<td><strong>Sophomore</strong></td>
<td>Chemistry 1510-20-30</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Computer Science 1510</td>
<td>4</td>
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<td></td>
<td>Economics 2510-20</td>
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<td>Forestry 3020-40-50</td>
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<td></td>
<td>Plant and Soil Science 2130, 3610</td>
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</tr>
<tr>
<td></td>
<td>*Electives</td>
<td>9-12</td>
</tr>
</tbody>
</table>

Students entering the junior year should check with advisor to assure completion of courses prerequisite to spring quarter junior field session.

**Junior**

<table>
<thead>
<tr>
<th>Hours Credit</th>
<th>Accounting 2110</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Agricultural Mechanization 3140</td>
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<tr>
<td></td>
<td>Forestry 3060, 3110-20, 3230, 3260, 3320</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Forestry 4002-03-04-05-07</td>
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<td></td>
<td>*Electives</td>
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<td><strong>Senior</strong></td>
<td>Forestry 3240</td>
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</tr>
<tr>
<td></td>
<td>Forestry 4150, 4210-20-30, 4230, 4340</td>
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<tr>
<td></td>
<td>Entomology and Plant Pathology 4530 or 4140, or Geography 3510</td>
<td>3-4</td>
</tr>
<tr>
<td></td>
<td>*Electives</td>
<td>20-27</td>
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</tbody>
</table>

**Total: 198 hours**

- *Biology 1210-20 is recommended in lieu of botany for students interested in wildlife management.
- *Equivalent honors courses.
- *Enough electives must be taken to total 198 hours including: a minimum of 6 hours of communications electives selected from a Department of Forestry, Wildlife and Fisheries approved list and a minimum of 11 hours of social sciences and/or humanities.

**FOREST RECREATION OPTION**

The Forest Recreation Option provides students with opportunities to obtain an education in preparation for professional positions in the planning, development, interpretation, and management of private and public forested lands for recreational purposes. Students are also exposed to the basic philosophy and principles associated with leisure time and its use and the relationship of forest amenities to the constructive utilization of leisure time.

**Freshman**

<table>
<thead>
<tr>
<th>Hours Credit</th>
<th>Botany 1110-20 or Biology 1210-20</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>English 1010 or 1011, 1020, 1031 or 1032</td>
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</tr>
<tr>
<td></td>
<td>Forestry 1620</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Forestry 3080</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Mathematics 1700, 1841-51</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Physics 1210 and 2220 or 2210 and 2220</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Speech 2311</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>*Electives</td>
<td>2-3</td>
</tr>
</tbody>
</table>
Mathematics 2840-50 8
Forestry 3040-50 7
Economics 2510-20 8
Chemistry 1510-20-30 12
Speech 2311 4
Forestry 1620, 3000 4
Botany 1110-20 8
1033 9
Accounting 2110 or Political Science 3565 or 3566 3-4
Sociology 1510 4
Sociology 3130 or 3010 or Rural Sociology 3420 or Psychology 3120 3-4
Psychology 2500 4
Plant and Soil Science 2130 4
Journalism 2210 3
Electives 1-2

Sophomore
Chemistry 1510-20 8
Computer Science 1410 3
Economics 2120-20 4
Forestry 3040 4
Forestry 3050
Ornamental Horticulture and Landscape Design 3810 or Botany 3030 3-4
Accounting 2110 or Political Science 3565 or 3566 3-4
Sociology 1510 4
Sociology 3130 or 3010 or Rural Sociology 3420 or Psychology 3120 3-4
Psychology 2500 4
Plant and Soil Science 2130 4
Journalism 2210 3
Electives 1-2

Junior
Forestry 3020, 3110, 3240, 3320, 4440 13
Wildlife and Fisheries Science 3230 3
Plant and Soil Science 3230 3
Forestry 3060 or Entomology and Plant Pathology 4140 or 4320 3-4
Agricultural Engineering 2130 3
Speech 3011 or 3021 or Journalism 3710 3-4
Recreation 3140 3
Electives 3

Senior
Forestry 4150, 4210, 4230, 4240, 4330 16
Planning 4100 3
Ornamental Horticulture and Landscape Design 3610 3
Forestry 4450 4
Electives 16-21

Total: 198 hours

Or equivalent honors courses.
2Twenty hours of electives to be taken from the following courses: Accounting 2110-20, 3510; Agricultural Economics 4330; Anthropology 2510-20-30; Astronomy 2110-20-30; Botany 3030, 3050, 4030, 4310; Business Law 4110; Civil Engineering 4290; Entomology and Plant Pathology 4930; Forestry 4220, 4340; Geology 1410-20, 2410; Ornamental Horticulture and Landscape Design 3210; Philosophy 2510-20, 2610; Plant and Soil Science 3250; Political Science 3655-66, 3656, 4930, 4950, Public Health 3310, Recreation 2100, 3220; Sociology 3910; Wildlife and Fisheries Science 4450, 4460, 4520, Zoology 3640, 4300.

3Computer Science 1310 accepted in lieu of 1410 for those wishing to elect additional courses in this area.

WOOD UTILIZATION OPTION
The wood utilization option trains students for careers in forest products industries such as timber furniture, pulp and paper, or wood composites. Course work is oriented toward the application of wood technology and engineering principles to wood processing. A sound background in basic sciences is required.

Demand for forest products is forecasted to increase. This increased demand should continue to provide excellent employment opportunities for forest products graduates.

Freshman

Hours Credit

English 1010 or 1011; 1020; 1031 or 1032 or 1033 or 1034 or 1035

9
Botany 1110-20

8
Forestry 1620, 3000

4
Mathematics 1840 or 1841; 1850; 1860

12
Physics 1210-20

8
Speech 2311

4
Communications elective

3

Sophomore

Chemistry 1510-20-30

12
Economics 2510

8
Physics 3210

8
Mathematics 2940-50

7
Basic Engineering 1310, 1410

6

Statistics 3450-50

6
Industrial Engineering 2320

3
Computer Science 1510

4
Junior

Entomology and Plant Pathology 4140

3
Forestry 3320, 3020, 3110-20, 3240, 3320

18
Industrial Engineering 3610-20-30; 3430-40

15
Engineering Graphics 1410-20

6
Humanities-social science electives

6

2Electives

9

Senior

Industrial Engineering 4060, 4260, 4520

10
Entomology and Plant Pathology 3210

4
Forestry 4150, 4540-50-60

14
Accounting 2110

3
Humanities-social science electives

6

2Technical electives

12

Electives

6
Total: 202 hours

Or equivalent honors courses.

*For students entering the option with no math credit, (e.g. Freshmen) the engineering math series is required; 1840-60-60. For entering students who have some math credit, through 1841, transfer credit for 1840 will be given.

*Enough electives must be taken to total 202 hours including: a minimum of 6 hours of communications electives and 12 hours of humanities-social science electives. Both must be selected from the Department of Forestry, Wildlife and Fisheries approved list.

*These electives should be selected from a list of approved courses which is available from the Department of Forestry, Wildlife and Fisheries.

WILDLIFE AND FISHERIES SCIENCE
Wildlife and fisheries management is the science and art of maintaining populations of wild animals at levels consistent with the best interests of wild species themselves and of the American public. Management goals may be aesthetic, economic, or ecological. Success depends upon wildlife and fisheries biologists giving assistance in attaining the goals for which they strive; scholarly application of scientific information and methods to these goals; ecological perspective; and execution of programs to maintain past successes, to prevent repetition of past failures, and to prepare for future needs.

Upon completion of the four-year wildlife and fisheries sequence, a degree of Bachelor of Science in Wildlife and Fisheries Science is awarded.

Minor in Wildlife and Fisheries Science consists of 24 hours as follows: 3230, any three (3) courses (with one of the following: 4450, 4460, 4510, 4520, and 9 additional hours taken from a list of approved courses maintained in the Department of Forestry, Wildlife and Fisheries. Prerequisites will not be waived.

Freshman

Hours Credit

Biology 1210-20-30

12
Mathematics 1700, 1841-51

12
*English 1010 or 1011; 1020; 1031 or 1032 or 1033

9
Speech 2311

3
Forestry 1620

3
Physics 1210 or 2120

4
Wildlife and Fisheries Science 3000

1
Electives

9

Sophomore

Chemistry 1510-20-30

12
Economics 2510

8
Biological Science 3120, 3130

8
Forestry 3040

4
Plant and Soil Science 2130, 3610

Animal Science 3210

4
Computer Science 1510

4
Wildlife and Fisheries Science 3000

6
Wildlife and Fisheries Science 2100

2
Electives

9

Senior

Zoology 3060

4
Wildlife and Fisheries Science 3230

4
Forestry 3110

4
Forestry 3320 or 4020

3
Forestry 3280

3
Plant and Soil Science 3020, 3120, or 3140

3-4
Botany 3030

4
Zoology 4200, 4190, 4290, or 4300 (choose two)

9-9

Biology 3110

4
Wildlife and Fisheries Science 3830

3
Electives

6-9

Senior

Zoology 4660

4
Wildlife and Fisheries Science 4450, 4600

8
Wildlife and Fisheries Science 4510, 4620

8
Forestry 4210

3
Electives

22-27

Total: 198 hours

Or equivalent honors courses.

*Enough hours must be completed to total 198, including: 6 hours of communications electives with Journalism 2210, Classics 2710 and 2720, and English 4140 highly recommended. Twelve hours of social science or humanities and 13 hours of science electives are required from the following departments: Animal Science, Botany, Entomology and Plant Pathology, Forestry, Wildlife and Fisheries Science, Plant and Soil Science, or Zoology.

*Wildlife and Fisheries Science 3000 must be taken at least twice and can be taken for a maximum of 4 credits.

Ornamental Horticulture and Landscape Design
Advisor: Professor Crater

Human needs go beyond food, clothing, and shelter. We require a degree of control over environment, especially immediate surroundings. Ornamental plants and their uses are recognized as part of the environment, hence a curriculum in ornamental horticulture and landscape design. The four areas of study within this curriculum are floriculture, nursery management, turfgrass management, and landscape design.

The area of floriculture includes the science of producing flowering plants in field and greenhouse, and the art and science of using these plants for the benefit of humans. Opportunities are available as greenhouse managers, floral designers, retail salespersons, garden writers, research workers, teachers, and related commercial areas.

Nursery management deals with the growing of trees, shrubs, and other ornamental plants for sale. Skills necessary to be a nursery manager include horticultural knowledge and a business sense. Students in this area are prepared to work in nurseries, garden centers, botanical gardens, and arboretums. They may find opportunities also in research, teaching, writing, sales, and landscape maintenance and installation.

Turfgrass management includes all aspects of growing and caring for turfgrass, whether it be golf greens or home lawns. The increasing number of golf courses and home lawns and the emphasis on better quality make new opportunities for turfgrass managers. Such opportunities include golf course superintendents, park and recreational turf managers, operation of a lawn or grounds maintenance business, producer and seller of sod, research, teaching, and sales.

Landscaping means modifying the outdoor surroundings.
environment for the greatest use, comfort, and enjoyment. It not only means the use of trees, shrubs, and other plant material to accomplish this goal, but it also means having an understanding of the requirements for working, recreation, and housing.

Emphasis in the area of landscape design is on plant material and design courses. Opportunities in this area include landscape nursery operation, landscape design, landscape maintenance, garden center operation, allied sales, highway landscaping, park development, research, teaching, and writing.

Minor in Ornamental Horticulture and Landscape Design consists of 27 hours as follows: required courses: 3030, 3110, 3210, 3810, and at least 13 hours of upper-division OHLD electives. Prerequisites will not be waived.

**Freshman**

<table>
<thead>
<tr>
<th>Hours Credit</th>
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<tbody>
<tr>
<td>Agriculture 1140; 1110 or 1130 or 1150</td>
</tr>
<tr>
<td>Botany or Chemistry 3130 or Chemistry 2230 or Chemistry 3211 or 3219</td>
</tr>
<tr>
<td>Entomology and Plant Pathology 3130, 3210</td>
</tr>
<tr>
<td>Plant and Soil Science 3140, 3210</td>
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</table>

**Sophomore**

<table>
<thead>
<tr>
<th>Hours Credit</th>
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<tbody>
<tr>
<td>English 1010; 1020; 1031 or 1032 or 1033</td>
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<tr>
<td>Mathematics 140-50-60</td>
</tr>
<tr>
<td>Physics 1210 or 2210 or Geology 1410</td>
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<tr>
<td>Social science or humanities electives</td>
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**Junior**

<table>
<thead>
<tr>
<th>Hours Credit</th>
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<tbody>
<tr>
<td>Agriculture 2120</td>
</tr>
<tr>
<td>Orn. Hort. and Landscape Design 2230, 3610, 3810</td>
</tr>
<tr>
<td>Chemistry 1110-20-50 or 1110-20-30</td>
</tr>
<tr>
<td>Economics 2510</td>
</tr>
<tr>
<td>Speech 2311</td>
</tr>
<tr>
<td>English or communications electives</td>
</tr>
<tr>
<td>Social science or humanities electives</td>
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<tr>
<td>Plant and Soil Science 2130</td>
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</table>

**Senior**

<table>
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<tr>
<th>Hours Credit</th>
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<tbody>
<tr>
<td>Social science or humanities electives</td>
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<tr>
<td>Nutrition 3130 or Chemistry 2230 or Chemistry 3211 and 3219</td>
</tr>
<tr>
<td>Entomology and Plant Pathology 3130, 3210</td>
</tr>
<tr>
<td>Plant and Soil Science 3140</td>
</tr>
<tr>
<td>Orn. Hort. and Landscape Design 3030, 3110, 3210, 3810</td>
</tr>
<tr>
<td>Orn. Hort. and landscape design electives</td>
</tr>
<tr>
<td>Directed Agricultural Electives</td>
</tr>
<tr>
<td>Botany 3210</td>
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<tr>
<td>Agriculture</td>
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</table>

**Plant and Soil Science**

**Advisors:** Professors Coffey, Parks, Reynolds; Seatz: Associate Professors Allen, Lessman, and Reich.

Plant and soil science deals with field and vegetable crops and soils. Plant science includes crop breeding and genetics for crop improvement, and the introduction of new varieties, crop management for high quality products, and weed control for efficient crop production.

Soil science includes studies in soil formation and classification for better understanding of soil resources; soil management for optimum crop production and conservation; soil fertility for utilizing fertilizers efficiently; and basic studies in chemistry, physics, and biology as they apply to the soil and to a better understanding of its properties and proper use.

The plant and soil scientist must have a knowledge of the basic physical and biological sciences and, in addition, be trained in communication skills. The scientist may be broadly trained or may specialize in a more specific phase of the subject. Regardless of interest, many good jobs are available for the well-trained plant and soil scientist.

Employment opportunities differ depending upon the individual's type of training and interest. For the person who is scientifically inclined, positions are available in research with both public and private agencies. For those who wish to apply their knowledge to the solution of practical problems, positions are available with the Agricultural Extension Service as extension agents or as specialists, with the Forest Service, Forest Service, Farmers Home Administration, Production Credit Association, and other public agencies. Many plant and soil scientists are employed in private industry as technical specialists, supervisors, and salespersons. Banks and other financial institutions employ plant and soil scientists as appraisers and farm managers. Others may farm on their own, manage farms for others, or work in foreign agricultural programs. Certainly, plant and soil science is basic to all agriculture, and people trained in this important field will find many opportunities to serve in modern agriculture.

A minor in Plant and Soil Science consists of 24 credit hours including 2130, 4410, and at least 16 elective hours to be taken by electing two (2) courses from Group A and two (2) courses from Group B. 3510 will not be accepted as a course to meet minor requirements.

Each student selecting this major must complete the basic curriculum for agriculture and fulfill the major group requirements. The curriculum in plant and soil science showing the manner in which the required courses may be taken by years is as follows:

**Freshman**

<table>
<thead>
<tr>
<th>Hours Credit</th>
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<tbody>
<tr>
<td>Agriculture 1130, 1140</td>
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<tr>
<td>Agriculture 1110 or 2120 or 1150</td>
</tr>
<tr>
<td>Lower-division biological sciences</td>
</tr>
<tr>
<td>Mathematics 140-50-60</td>
</tr>
<tr>
<td>Mathematics 1540-50-60</td>
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<tr>
<td>Mathematics 1840-50-60</td>
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<tr>
<td>Plant and Soil Science electives</td>
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**Sophomore**

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<tr>
<th>Hours Credit</th>
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<tbody>
<tr>
<td>Chemistry 1110-20-50 or 1110-20-30</td>
</tr>
<tr>
<td>Mathematics 140-50-60 or 1840-50-60</td>
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<tr>
<td>Social science or humanities electives</td>
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**Junior**

<table>
<thead>
<tr>
<th>Hours Credit</th>
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<tbody>
<tr>
<td>Plant and Soil Science 3140</td>
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<tr>
<td>Botany 3210</td>
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<tr>
<td>Agriculture</td>
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**Senior**

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<th>Hours Credit</th>
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<tbody>
<tr>
<td>Agriculture 1110 or 2120 or 1150</td>
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<tr>
<td>Mathematics 140-50-60</td>
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<tr>
<td>Mathematics 1840-50-60</td>
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<tr>
<td>Plant and Soil Science electives</td>
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**Agriculture**

<table>
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<tr>
<th>Hours Credit</th>
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<tbody>
<tr>
<td>Agriculture 1130, 1140</td>
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<tr>
<td>Agriculture 2120 or 1150</td>
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<tr>
<td>Mathematics 140-50-60</td>
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<tr>
<td>Mathematics 1840-50-60</td>
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<tr>
<td>Plant and Soil Science electives</td>
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**Soil Science**

<table>
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<tr>
<th>Hours Credit</th>
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<tbody>
<tr>
<td>Agricultural Economics 4120, 4140, 4330</td>
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<tr>
<td>Agronomy 3210, 4210</td>
</tr>
<tr>
<td>Animal Science 2810, 3140, 3510</td>
</tr>
<tr>
<td>Food Technology and Science 3840</td>
</tr>
<tr>
<td>Business Administration 3410-20</td>
</tr>
<tr>
<td>Plant and Soil Science 3140, 3140, 3160, 3170, 3170, 3220, 3410</td>
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</tbody>
</table>

**Credit for Cooperative Work**

A maximum of nine quarter hours of credit may be earned by supervised employment on approved jobs. To receive credit, the student must receive the recommendation of the employer, must present a satisfactory written report, and must receive a passing grade from the University professor in charge. Employment periods shall be no less than 12 weeks. At least one quarter must be spent in study on the campus.
between periods of employment. Prerequisites: Junior classification, with grade point average of 2.2 or above, and permission of the department head and the dean of the College of Agriculture to register. Three credit hours each quarter.

Short Courses and Special Events
Practical short courses in agriculture are offered for those who desire special training in certain fields. Some of these short courses are held on the Knoxville campus, others at the Buford Ellington 4-H Club Training Center, Milan, Tennessee, or appropriate research stations. The Resident Instruction, Research, and Extension staffs join in teaching these special courses annually, and others are offered to meet immediate needs for special instruction. These are service courses and do not carry college credit.

In-service training is provided special groups, such as the teachers of vocational agriculture, through short-term courses which are offered at convenient locations in the state.

A special occasion known as Varsity Visit is held during the year. Delegates from all Future Farmers of America chapters are invited to spend a day on the agricultural campus with their advisors. Approximately 500 attend and inspect each department of the College.

**Departments of Instruction**

**Interdepartmental Offerings**

**Agriculture (088)**

1110 Introduction to Social Sciences for Agriculture (4) Social sciences as they relate to agriculture—agriculture in the economy; tools of social science analysis applied to agricultural problems; agriculture, its development, relation to man, industry, and government. 4 hrs. and 1 lab. F, W.

1130 Animal Science for Agriculture (4) Animals in agriculture: Body systems and development, principles of feeding, and control of farm animals. Animal sanitation, animal products, and the relationship to public health. 3 hrs. and 2 labs. F, W.

1140 Plant Science for Agriculture (4) Plant structure, physiology, heredity, and environment in relation to growth, adaptation, and management of crops. 2 hrs. and 2 labs. S.

1150 Food Technology and Science in Agriculture (4) Utilization, processing, and distribution of food products. 3 hrs. and 1 lab. W, S.

2120 Introduction to Agricultural Engineering (4) Agricultural power and machinery fundamentals, agricultural structures, soil and water conservation controls, and agricultural uses of electricity. Prereq: Math 1550 or equivalent. 3 hrs. and 1 lab. F.

3000 Microcomputer Applications in Agriculture (3) Introduction of microcomputer technology as related to agricultural applications; microcomputer terminology and architecture; number system; input/output devices; operating systems and languages; applications software; communication with peripherals and other systems. Prereq: A basic course in computer programming. 2 hrs. and 1 lab.

4018 Honors: Seminar (3) Selected topics. Offered alternate years. Open to seniors by invitation. F.

**GRADUATE Consult the Graduate Catalog for listing of graduate level courses.**

**Departmental Programs**

**Agricultural Economics and Rural Sociology**

Professors: J. A. Martin (Head), Ph.D. Minnesota; W. B. Badenhop, Ph.D. Purdue; J. R. Brooker, Ph.D. Florida; C. L. Cleland, Ph.D. Wisconsin; Irving Dubov, Ph.D. California (Berkeley); H. H. Kerler, Ph.D. Kentucky; T. H. Klinck, Ph.D. Kantucky; F. O. Leutjohl, Ph.D. Wisconsin; D. L. Lemons, Ph.D. Clemson; B. R. McMahan, Ph.D. Purdue; S. D. Mundy, Ph.D. Tennessee; B. H. Peneoost, J. D. Tennessee; W. P. Ranney (Emeritus), Ph.D. Minnesota; C. B. Sappington, Ph.D. Illinois; T. J. Whatley, Ph.D. Purdue.


Assistant Professor: D. M. Markley, Ph.D. V.P.I. & S.U.

**Agricultural Economics (047)**

2410 Economics of Food and Rural Resources (3) Analysis of contemporary problems and issues of public concern relating to food, agriculture, and rural areas using fundamental economic concepts. Farm income, food prices, world food problems, natural resources, environment, rural development. F, S.

3120 Agricultural Prices (3) Factors affecting prices in agricultural production; processing/distribution; prices in an enterprise economy; competitive, monoply, and oligopoly pricing; space, form and time price differences; tools to measure price; farm price programs. Prereq: Agriculture 1110 and Economics 2520 or consent of instructor. W.

3320 Marketing Farm Products (3) Survey of the U.S. farm and fiber marketing systems; marketing options of farmers and agribusinesses; industry structure in marketing channels for agribusinesses; basic concepts to analyze marketing problems. Prereq: Agriculture 1110 and Economics 2520, or consent of instructor. F.

3410 Farm Business Analysis (3) Techniques of analyzing economic and physical performance of farm businesses. Farm records and accounts. Measures of farm income, cash flow, net worth, and production efficiency. Analysis of performance of actual farm businesses. Prereq: Agric. 1110 and Econ. 2520. S.

3430 Agricultural Law (4) Survey of law and applicable to the farmer, his family, and agricultural industry. Property, contracts, torts, drainage and water rights, landlord-tenant relationships, taxation and insurance, forms of business organization, estate planning, regulatory laws, and other selected topics. W.

3440 Farm Income Tax Management (3) Legal and economic concepts and problems in organizing and managing a farm business within the framework of federal income tax laws. Emphasis is on recognizing problem areas, utilizing tax planning incentives, and avoiding tax traps that may be encountered in organizing the business and operating and transferring the farm. Prereq: Junior standing. 3 hrs. W.

3510 Commodity Futures Markets (3) Futures market as an instrument for hedging of primary industry products; process of passing to others the risk of adverse price change; price analysis from two viewpoints; supply and demand and history (fundamentalist and chartist). Prereq: Junior standing. 3 hrs. F, S.

4120 Farm Management (3) Principles of farm organization and operation; the nature of managerial processes; economic aspects of crop, livestock, labor and machinery planning; use of budgeting techniques for planning field trips arranged. Prereq: Agriculture 1110 and Economics 2510. F, S.

4140 Agricultural Production Economics I (3) Application of Micro-economic concepts to problems of location, product selection, scale of operation of agricultural firms; economic interpretation of technical agricultural production relationships. Prereq: Agriculture 1110 and Economics 2510. W.

4210 Problems in Agricultural Economics (1-3) Directed individual or team research and report writing. Off-campus intern experience and reporting. Special courses in specific topics. Student must arrange with instructor before registering. Graduate credit for non-majors only. May be repeated up to 9 credit hours. E.

4240 World Agriculture and Trade (3) Economic bases of world agricultural production and trade; resource location, land tenure systems, international trade, and commercial policy. Prereq: Agriculture 1110 and Economics 2520, or consent of instructor. F.

4250 Agricultural and Rural Planning (3) Decision-making concepts applied to design and implementation of research action programs from the U.S. and other countries. Prereq: Agriculture 1110 and Economics 2510, or consent of instructor.

4310 Agricultural Finance (3) Nature and source of capital; credit problems of farmers; kinds and source of farm credit; Agricultural insurance and taxation. Prereq: Agriculture 1110 and Economics 2510. W.

4320 Agricultural Policy (3) Meaning of agricultural policy in democratic society; relationship of farm groups to public policy; problems giving rise to policy; types of agricultural policy and appraisal of results; current policy problems. Prereq: Agriculture 1110 and Economics 2520. W.

4330 Land Economics (3) Problems and policies of land use, conservation, development, taxation, and tenure; population growth and demand for land; principles and theories of rent, property, value, and income. Prereq: Agriculture 1110 and Economics 2510. S.

4610 Management of Farm Supply and Marketing Firms (3) Operations of firms selling farm supplies and merchandising agricultural products. Emphasis on accounting data and the economic theories for decision making. Prereq: Agriculture 1110 and Economics 2510. F.

4630 Advanced Agricultural Accounting (3) Economics of market location and pricing; perfect market model; spatial equilibrium and demand for goods and services; perfect location and transfer costs; processing and storage costs; maximizing returns; institutions and market flows; measuring efficiency. Prereq: 3120 or 3320 or consent of instructor. W.

GRADUATE Consult the Graduate Catalog for listing of graduate level courses.
Agricultural Engineering

Professors: H. Luttrel (Head), Ph.D. Iowa State; B. L. Bledsoe, Ph.D. Oklahoma State; Z. A. Henry, Ph.D. North Carolina State; J. J. McDow, Ph.D. Michigan State; J. E. Sewell (Assistant Dean, Ag Experiment Station), Ph.D. North Carolina State; C. H. Shelton, M.S. Virginia Polytechnic; F. D. Truett, M.S. Tennessee; L. R. Wilhelm, Ph.D. Tennessee, P.E.

Associate Professors: C. Roland Mote, Ohio State, P.E.; Robert Von Berrnuth, Ph.D. Nebraska.

Assistant Professor: D. O. Baxter, M. S. Missouri.

Instructors: W. E. Hart, M.S. Tennessee; J. B. Wilkerson, M.S. Tennessee.

Agricultural Engineering (066)

1130 Introductory Agricultural Engineering (3) Basic engineering principles, field of agricultural engineering, and research. Prereq: Open only to freshman and sophomore students in agricultural engineering. F.

3100 Seminar (1) Presentations, discussions, reports on research techniques. Prereq: Consent of department head. F.

3610 Soil and Water Conservation Engineering (4) Integration of hydrologic, agronomic, and engineering principles in solving agricultural water management problems. Involves water, sediment and erosion control, drainage, irrigation, and water quality. Coreq: Plant and Soil Science, 2130; Engr. Sci. and Mech. 3110. 3 hrs. and 1 lab. Graduate credit for non-majors only. F.

3620 Structures for Production, Environmental Control, and Waste Management (4) Analysis of loads and stresses; design of wood, steel, and concrete members; structural and environmental requirements of facilities for livestock and crop production and storage; physiological requirements; heat loads; insulation; moisture relationships; ventilation and waste management. 3 hrs. and 1 lab. Graduate credit for non-majors only. W.


3640 Power Units and Machinery (4) Components and operating characteristics of internal combustion engines and tractor systems; functional analyses and capabilities of agricultural machines; machinery system components; operational characteristics; safety considerations; calibration; selection and management of facilities for livestock and crop production and storage; physiological requirements; heat loads; insulation; moisture relationships; ventilation and waste management. 3 hrs. and 1 lab. Graduate credit for non-majors only. W.

2110 Agricultural Drawing and Mapping (3) Fundamentals of graphics and mapping, with emphasis on applications of agriculture and forestry. 1 hr. and 2 labs. F, W, S.

2130 Agricultural Surveying (3) Measurement of horizontal distances and angles; differential and profile leveling; topographic surveying and mapping; area computation. Prereq: Math 1550 or consent of instructor. 1 hr. and 2 labs. F.

2300 Seminar (1) Presentations, discussions, reports on research techniques. Prereq: Consent of department head. F.

3110 Agricultural Mechanics (3) Organizing, equipping, and managing school farm shops; techniques, materials, and procedures in design and construction of shop projects; metal work and welding. 1 hr. and 2 labs. W.

3120 Forest Surveying and Mapping (3) Use of low-cost surveying equipment; theorems and trigonometric computations. Prereq: Math 1841. 2 hrs. and 1 lab. W.

3140 Forest Surveying and Mapping (3) Use of low-cost surveying equipment; theorems and trigonometric computations. Prereq: Math 1841. 2 hrs. and 1 lab. W.

2610 Fundamentals of Food Animal Evaluation (4) Selection, analysis, solution, and report of research problem. May be repeated for maximum of nine credit hrs. when engaged in approved industry work. Prereq: 2130 or 2140. 3 hrs. and 1 lab. E.

2710 Agricultural Waste Utilization and Disposal (3) Techniques, equipment, and structures for utilizing, treating, and disposing of agricultural wastes by land spreading, leaching, and processing. Prereq: Senior standing. 2 hrs. and 1 lab. F.

2170 Small Engines (3) Concepts and mechanics of small gasoline engines; selection, operation, adjustment, and repair of single cylinder engines. 2 hrs. and 1 lab. W.

2180 Equipment and Techniques for Application of Agricultural Chemicals (3) Equipment for application of solid, liquid, and gaseous chemicals; selection of components; operational characteristics; safety considerations; calibration; selection and management of facilities for livestock and crop production and storage. 2 hrs. and 1 lab. S.

4120 Agricultural Machinery and Tractors (4) Agricultural machinery and power units: adaptation to agricultural practices; field efficiencies, capacities, adjustment, and servicing. Prereq: Math 1550, 3 hrs. and 1 lab. W.

4220 Special Problems in Agricultural Mechanization (3) Selection, analysis, solution, and report of research problem. May be repeated for maximum of 9 credit hrs. when engaged in approved industry work. Prereq: 2130 or 2140. 3 hrs. and 1 lab. E.

GRADUATE Consult the Graduate Catalog for listing of graduate level courses.

Agricultural Mechanization (080)

2110 Agricultural Drawing and Mapping (3) Fundamentals of graphics and mapping, with emphasis on applications of agriculture and forestry. 1 hr. and 2 labs. F, W, S.

2130 Agricultural Surveying (3) Measurement of horizontal distances and angles; differential and profile leveling; topographic surveying and mapping; area computation. Prereq: Math 1550 or consent of instructor. 1 hr. and 2 labs. F.

2300 Seminar (1) Presentations, discussions, reports on research techniques. Prereq: Consent of department head. F.

3110 Agricultural Mechanics (3) Organizing, equipping, and managing school farm shops; techniques, materials, and procedures in design and construction of shop projects; metal work and welding. 1 hr. and 2 labs. W.

3120 Forest Surveying and Mapping (3) Use of low-cost surveying equipment; theorems and trigonometric computations. Prereq: Math 1841. 2 hrs. and 1 lab. W.

3140 Forest Surveying and Mapping (3) Use of low-cost surveying equipment; theorems and trigonometric computations. Prereq: Math 1841. 2 hrs. and 1 lab. W.

Consult the Graduate Catalog for listing of graduate level courses.

Agricultural Extension Education (075)

Professors: R. S. Dotson (Head), Ph.D. Pennsylvania State; L. H. Dickson, Ed.D. Cornell; C. E. Carter, Jr., Ph.D. Ohio State.

3110 Introduction to Agricultural Extension (3) History, philosophy, organization, teaching methods, relationships with other educational agencies. S, F.

4110-20 Field Studies (3,3) Supervised work experience with county extension agents in a designated county. For senior and graduate students. Prereq: 3110 and consent of instructor. Requires living off campus for a specified time. S.

GRADUATE Consult the Graduate Catalog for listing of graduate level courses.

Animal Science (113)

Professors: D. O. Richardson (Head), Ph.D. Ohio State; K. M. Barth, Ph.D. Rutgers; M. C. Bell, Ph.D. Oklahoma State; J. K. Bleiter (Emeritus), Ph.D. Ohio State; C. C. Chamberlain (Emeritus), Ph.D. Iowa State; B. H. Erickson, Ph.D. Kansas State; O. G. Hall, Ph.D. (Dean, College of Agriculture) Ph.D. Iowa State; S. L. Hansard (Emeritus), Ph.D. Florida; E. R. Lidvall, M.S. Tennessee; T. P. McDonald, Ph.D. Tennesse; J. D. McLaren, Ph.D. Auburn; J. D. Meier, Ph.D. Georgia; J. M. Montgomery, Ph.D. Wisconsin; G. M. Millerman (Emeritus); D. V. Michigan; A. D. Stein, Ph.D. Wisconsin; H. V. Shirley, Ph.D. Illinois; R. R. Shrode, Ph.D. Iowa State; R. L. Tugwell (Emeritus), Ph.D. Kansas State.


Assistant Professors: B. R. Bell, Ph.D. N.C. State; J. A. Corrick, Jr. (Emeritus), Ph.D. Tennessee; W. C. Cullen, Ph.D. Minnesota; J. D. Godkin, Ph.D. Massachusetts; R. N. Heitmann, Ph.D. Maine; S. P. Oliver, Ph.D. Ohio State; T. D. Smith, Ph.D. Tennessee; J. D. Small, Ph.D. Texas A & M.


2610 Fundamentals of Food Animal Evaluation (4)
Criteria for animal evaluation; market classes and grades of cattle, poultry and poultry products, lamb and wool, and swine; subjective and objective techniques for evaluation of beef cattle, dairy cattle, poultry, sheep, and swine.

3710 Introduction to Biometrical Aspects of Animal Science (3) Biometrical concepts for optimum comprehension of material presented in upper-division animal science courses. Basic ideas in probability as introduction to concept of distributions. Expected values of variables as most probable values. Binomial and normal distributions and their prevalence in biological material. Planning effective experiments. Association or relationship of variables. Assumptions of validity of hypotheses. 2 hrs. and 1 lab.

2810 Farm Animal Management Practices (3) Integration of management practices and skills into cattle, horse, sheep, poultry, and swine enterprises. Practices and skills include dehorning, castrating, docking, food care, shearing, age determination, identification, preparing for show and sale, vaccinating and immunizing, controlling parasites. Facilities needed in livestock raising. Treatment programs for disease and pests in various kinds of causative differences such as basis of variation. Partitioning of variation according to quantitative inheritance. Illustrations of principles of selection, nutrition, breeding, physiology, and marketing into complete pork production and management program. Topics will include structure of industry, enterprise establishment, systems of production, production practices, and herd improvement programs. Alternatives evaluated in terms of production responses and economic returns. Prereq: Completion of animal science sophomore and junior core courses or consent of instructor. 3 hrs. and 1 lab.

4830 Pork Production and Management (4) Integration of principles of nutrition, physiology, and breeding into complete pork production and management program. Topics will include structure of industry, enterprise establishment, systems of production, production practices, and herd improvement programs. Alternatives evaluated in terms of production responses and economic returns. Prereq: Completion of animal science sophomore and junior core courses or consent of instructor. 3 hrs. and 1 lab.

2820 Introduction to Light Horses (3) Scope and role of light horse industry; breeds—development, function, and use; miniature horses; introduction to management problems. May not be used by animal science majors to meet graduation requirements. 2 hrs. and 1 lab.

3210 Anatomy and Physiology of Farm Animals (4) Skeleton and joints, skeletal muscles, blood and microcirculation, and nervous cardiovascular, respiratory, digestive, renal, and endocrine systems; dental structures; reproduction and endocrine systems; principles of animal nutrition; principles of laboratory animals. Prereq: Biology 1210 or Agriculture 1130. 3 hrs. and 1 lab.

3220 Physiology of Reproduction (3) Comparative anatomy and physiology of reproductive systems of higher vertebrates; gametogenesis, fertilization, implantation, prenatal growth, parturition, and initiation of lactation; endocrine regulation of reproductive phenomena. 2 hrs. and 1 lab. (Same as Zoology 3220.)

3310 Introduction to Animal Nutrition and Feeding (3) Nutrient utilization, function, and requirements of farm animals; animal feeds, nutrient content, and factors affecting feeding value; balancing rations for beef and dairy cattle, swine, and poultry. Not available to students with credit in 3320. Prereq: Agriculture 1130, Chemistry 1130 or 1530. 2 hrs. and 1 lab.

3320 Animal Nutrition (3) Properties, functions, utilization, and requirements of essential nutrients; nutritive value determinations and their use. Prereq: Agriculture 1130 and one quarter of organic chemistry.

3330 Feeds and Ration Formulation (4) Feedstuffs, additives, feeding standards, nutrient requirements, and ration formulation for beef and dairy cattle, sheep, horses, swine, poultry, and laboratory animals. Prereq: 3320. 2 hrs. and 2 labs.

3410 Herdity in Animals (3) Basic chromosomal mechanism of heredity with emphasis on Mendelian principles; linkage and cytoplasmic inheritance; association and linkage; basic ideas in probability as introduction to concept of distributions. Expected values of variables as most probable values. Binomial and normal distributions and their prevalence in biological material. Planning effective experiments. Association or relationship of variables. Assumptions of validity of hypotheses. 2 hrs. and 1 lab.

3510 Animal Hygiene and Sanitation (4) Parasitic, viral, and bacterial organisms in farm animals; immune response and action against disease; vitamins, minerals, and water relations; health care programs. Prereq: Microbiology 2910-11 or 2910-19 or consent of instructor. 3 hrs. and 1 lab.

3520 Avian Diseases (3) Major diseases; characteristics, prevention and treatment, management practices, and systems in poultry enterprises. Prereq: Agriculture 1130 and consent of instructor. 2 hrs. and 1 lab.

3530 Judging Poultry Products (3) Grading of poultry and poultry products, according to USDA standards; factors influencing quality. Prereq: 2610 or consent of instructor. 1 hr. and 2 labs.

3540 Horse Selection and Judging (3) Selection, judging, evaluation of soundness and scoring of working and pleasure horses for functional efficiency. Prereq: Consent of instructor. 1 hr. and 2 labs.

3560 Nutrition and Management of Laboratory Animals (3) Principles of feeding, breeding, and handling of animals in scientific investigations; specific species' requirements; feeding of best fitted; laws governing use and handling of laboratory animals. Prereq: Agriculture 1130 and consent of instructor. 2 hrs. and 1 lab.

4110 Special Problems in Animal Science (1-4) Special research and/or special reports based on supervised independent study or review of literature dealing with subjects applicable to field of animal science; approved supervised work experiences in state-federal laboratories or in private industry. May be repeated for a maximum of 8 credit hrs. Prereq: Senior standing and consent of instructor and department head.

4210 Physiology of Lactation (3) Development, anatomy, and function of mammary glands; endocrine interactions for mammary development and milk secretion; factors affecting yield and composition of milk. Prereq: 3210.

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

4230 Applied Reproduction in Farm Animals (3) Application of principles of genetics to problems of reproduction, processing, and preserving semen; insemination of females; pregnancy determination; gestation and parturition. Male and female infertility. Prereq: 3220 and permission of instructor.

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

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

4610 Advanced Beef Cattle, Dairy Cattle, Horse Poul- try, Sheep, and Swine Judging (2) Specialization in beef cattle, dairy cattle, horses, poultry, sheep, and swine. May not be repeated for credit. Prereq: Consent of instructor. 2 labs.

4810 Beef Cattle Production and Management (4) Integration of principles of nutrition, physiology, and breeding into complete beef cattle management program. Topics will include structure of industry, enterprise establishment, systems of production, production practices, and herd improvement programs. Alternatives evaluated in terms of production responses and economic returns. Prereq: Completion of animal science sophomore and junior core courses or consent of instructor. 3 hrs. and 1 lab.
### Food Technology and Science (390)

**Professors:**
- J. T. Miles (Head), Ph.D. Wisconsin; L. J. Collins, Ph.D. Maryland; H. O. Jaynes, Ph.D. Illinois; L. S. Melton, Ph.D. Tennessee; W. W. Overcast (Emeritus), Ph.D. Iowa State.

**Instructor:**
- O. G. Sanders, M.S. Tennessee.

#### 2300 Food Laws and Regulations (3) State and federal laws concerning food industry. Organization and operation of regulatory agencies. Food grades and standards. W.

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

#### 3570 Evaluation and Grading Dairy Products (3) Market standards and grades of dairy products with practice in grading milk, ice cream, butter, cheese, and other specialized dairy products. 1 hr. and 2 labs. S.

#### 3610 Meat Evaluation and Grading (3) Grading standards for quality and quantity principles of evaluating beef, pork, and lamb. Practice in grading and judging carcasses and cuts. 1 hr. and 2 labs. F.

#### 3810 Food Microbiology I (4) General methods for the enumeration of microorganisms in foods. Factors which affect the growth of microorganisms in foods and methods for controlling their growth. Prereq: Microbiology 2910-15 or equivalent. 2 hrs. and 1 lab. F.

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

#### 4000 Problems in Food Technology (1-4) Research problems in student's area of interest. Required written report. Supervised experience in state or federal laboratories or approved industries encouraged. May be repeated. Maximum 9 credit hrs. Prereq: Consent of department head. E.

#### 4010 Food Technology and Science Seminar (1-3) Review of literature and oral and written reports. May be repeated for a maximum of 3 credit hrs. Prereq: Junior standing and consent of instructor. F, W, S.

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

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

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

#### 4200 Food Processing I (4) Prevention of spoilage and deterioration of foods. Methods of preservation. Prereq: Agriculture Mechanization 3510. 3 hrs. and 1 lab. F.

#### 4210 Food Additives (3) Substances used in food manufacturing with emphasis on properties and functions. Prereq: Nutrition and Food Sciences 3150 or equivalent. F.

#### 4310 Food Packaging (3) Characteristics and application of materials and containers to packaging requirements and methods of packaging foods. Prereq: 2300. 2 hrs. and 1 lab. S.

#### 4420 Bakery Products (3) Baking ingredients and their interactions during production and storage of bakery products. Prereq: 4130 and Chemistry 2230 or equivalent. 2 hrs. and 1 lab. A, S.

#### 4810 Food Microbiology II (4) Design of food quality assurance programs with emphasis on sanitation. Application of general analytical techniques, regulations and unit operations to quality control in the food industry. Prereq: 3810. 3 hrs. and 2 labs. W.

#### 4910 Food Microbiology III (4) Standard methods for the examination, cultivation, and identification of bacteria associated with food processing, food spoilage, and food poisoning. Prereq: 3810. 2 hrs. and 2 labs. W.

#### 4920 Analysis of Physical Properties of Foods (4) Colloid chemistry, color, colloids, gels, foams, crystals, color. Quantitation and changes induced by processing. Prereq: 4200 and Agricultural Science 3510 or consent of instructor. 3 hrs. and 1 lab. W.

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

**GRADUATE Consult the Graduate Catalog for listing of graduate level courses.**

### Forestry, Wildlife and Fisheries

**Professors:**

**Associate Professors:**

**Assistant Professor:**
- S. E. Scharlbaum, Ph.D. Colorado State.

### Forestry (396)

**1620 Introduction to Forestry (3) History of forestry; establishment, care, protection, and use of forest stands; forest products industries; organization and agencies for establishment of forest policies; forest resources. F.**

### Conservation of Renewable Natural Resources (3) Land, water, plants, and animals and their interrelations which form the biological and ecological basis for decisions about utilization of renewable natural resources; uses and abuses of forest, recreation, wildlife, and fisheries resources, including management alternatives and aspects of pollution. S.

### Forest Environment and Ecology (3) Environments and ecology of forests and associated lands; emphasis on the application of ecological principles to contemporary problems in forest management. Available for graduate credit for non-forestry majors only. Prereq: 8 hrs. of biology, botany, or zoology. 3 hrs. F.

### Forests and Trees of Eastern North America (4) Forest formations and associations of North America east of the Great Plains; dendrology and silvics of the trees that comprise eastern forests. Literature and field work. Course implications: principles of forest fire including behavior, weather influence, prevention, control organizations, and ecological impacts of forest fires. 3 hrs. and 1 lab. (Same as Entomology and Plant Path. 3060.) W.

### Forestry and Trees of Western North America (3) Forest formations and associations of North America west of the Great Plains; dendrology and silvics of the trees that comprise western forests. Literature and field work. Course implications: principles of forest fire including behavior, weather influence, prevention, control organizations, and ecological impacts of forest fires. 3 hrs. and 1 lab. W.

### Introduction to Forest Protection (4) Biology of forest insects and diseases, including impact on forest ecosystems, control principles and techniques silvicultural implications: principles of forest fire including behavior, weather influence, prevention, control organizations, and ecological impacts of forest fires. 3 hrs. and 1 lab. (Same as Entomology and Plant Path. 3060.) W.

### Forest Measurements and Biometry (4) Measurements of individuals in animal and plant populations; linear regression, sampling of forest populations; growth and potential production. Prereq: Plant and Soil Sciences 3610. 3 hrs. and 1 lab. Available for graduate credit for non-forestry majors only. W.

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

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

### Introduction to Forest Recreation (3) Concepts of leisure time in recreation. Historical development
4230 Forest Resource Management Plans (4) Field problems and case studies in forest-resource management; the forest as a system; management of forest enterprises as a producer of timber, recreation, wildlife and water; water quality, forest land tenure, analysis of public forest lands. Prereq: 3620 or Biology 2130; 3040; Plant and Soil Science 2130. 2 hrs. and 1 lab. W.

3260 Forest Land Use and Society (3) Past and present overviews of forest utilization in the U.S. from socio-economic and institutional perspectives. Implications of forest management policies on society, forest economics, forest policies, socio-economic and institutional perspectives. Prereq: 2130; 3040; Plant and Soil Science 2130. 3 hrs. W.

4002 Utilization (3) Wood-using industries; processing forest products-sawmills, tree-log-kiln grading; pulpwood operations, flooring plants, treating plants; plant layout, flow diagrams. Prereq: 3120 or permission of instructor. S.

4003 Field Methods of Timber Inventory (4) Field measurements of forest trees; timber cruising; determination of optimal harvest age; site and stand development; effect of site development on forest stand growth; site evaluation; field problems. Prereq: 3110 and Agricultural Mechanization 3120. S.

4004 Forest Practice (3) Management of forest lands by public and private organizations; multiple-use concept as it influences management decisions; impact of public private forest recreation or management decisions; management prescriptions. Prereq: 3260, 4006. S/C/N. S.

4006 Silvicultural Methods (4) Methods and application of intermediate and regeneration cuttings; site preparation, planting and seeding, modifications of cutting methods to obtain desired goods and benefits. Prereq: 3090, 3320, 4002, 4003. S.

4007 Applied Forest Surveying, Road Construction, and Timber Harvesting (3) Application of surveying and road layout and construction techniques to forest problems. Interpretation and use of maps and aerial photographs in forest field work. Discussion of portable logging equipment and practices. Considerations in logging equipment selection and use. Prereq: Ag. Mech. 3120. S.

4200 Forest Watershed Management (3) Water as a forest resource; role of forests in the hydrologic cycle; control of water quantity, quality, and regimen; watershed planning. Prereq: 3320 or consent of instructor. 2 hrs. two overnight field trips. W.

4110-20 Problems in Forestry (1-4, 1-6, 1-8) Special research or individual problems in forestry. Prereq: Senior standing. Total not more than 9 hrs. E.

4150 Forest Resource Economics (3) Application of economic analysis to forest resource utilization. Principles of micro-economic analysis; timber production economics and forest plan economics of public forest projects. Prereq: Econ. 2520 and senior standing, or permission of instructor. F.

4210 Forestry Organization and Administration (3) Planning, organizing, and leadership; concepts and cases; problem analyses and decision making in forest resource management. Prereq: Senior standing in forestry with 2 credits in lower division or consent of instructor. 2 hrs. and 1 lab. W.

4220 Forest Resource Management (3) Decision-making principles, emphasizing forestry as an integral resource utilization. Models of forestry as a system; introduction to forest finance and valuation; taxation of the forest firm. Prereq. 4150. W.

4230 Forest Resource Management Plans (4) Field problems and case studies in forest-resource management; the forest as a system; management of forest enterprises as a producer of timber, recreation, wildlife and water; water quality, forest land tenure, analysis of public forest lands. Prereq: 3620 or Biology 2130; 3040; Plant and Soil Science 2130. 2 hrs. and 1 lab. W.

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

4230 Forest Policy (3) History of forestry in the United States with emphasis on development of forest resource policies; current policies influencing development and management of forest resources; brief survey of policy implications of forest resource organizations in public and private sectors. Prereq: 4004. W.

4240 Aerial Photography in Forest-Resource Management (3) Use of conventional aerial photographs in forest-resource management; interpretation of aerial inventories, preparation of cover-type maps, uses of other remotely sensed imagery. Prereq: 3110 or equivalent. 1 hr. and 2 labs. S.

4240 Forest Tree Improvement (3) Forest tree improvement relative to selection, hybridization, and the use of hybridization in forest genetics; principles of tree cytology and population genetics; importance of seed sources, variation, selection of superior phenotypes, and development of seed orchards; hybridization; seed production and seed certification. Prereq: 4008 or consent of instructor. 2 hrs. and 1 lab. S.

4430 Regional Silviculture of the United States (3) Factors that influence silvicultural management of important tree species in North America. Importance of forested and non-forested landscapes; regard in forested landscapes for the effect of climate, geology, soils, climate and weather, sites and site types, ecology, problems of protection, and silvical characteristics of the more important species. Prereq: 4006 or consent of instructor. F.

4440 Forest Recreation (3) Forest lands as a recreation resource; relationships of forest recreation and other management activities; development and management of forest recreation areas; socio-economic and political determinants of recreation development and management. Possible overnight field trips required. Prereq: 4 credits in sociology and/or economics. Junior standing. 2 hrs. and 1 lab. S.

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

4540 Wood Drying and Preservation (4) Concepts of wood drying. Discussion of specific factors affecting moisture content, density, and shrinkage. Discussion of commercial drying practices. Relationship of wood moisture content to attack by wood-destroying organisms. Methods and materials used in commercial drying systems. Prereq: 3120, Math 1651, Physics 1250 or consent of instructor. 3 hrs. and 1 lab.

4550 Wood Composites and Gluing (4) Fundamentals of plywood and composite product manufacturing. Wood adhesives; properties of gluing in the manufacturing processes of plywood and composite products. 3 hrs. and 1 lab. Over night weekend plant trips may be required. W.

4560 Forest Products Marketing and Measurement (3) Discussion of market structure for various sectors of the forest products industry including including standing timber, lumber, pulp and paper, wood composites, and forest resource products used by industry for the sale and transfer of these products. Prereq: 3220, 4150, or consent of instructor. S.

GRADUATE Consult the Graduate Catalog for listing of graduate level courses.

Wildlife and Fisheries Science (933)

2100 Introduction to Wildlife and Fisheries Science (1-3) History and philosophy of wildlife and fisheries management including the value of wild animals in the modern world; roles of research, management, public relation, and law enforcement in the conservation of wildlife and fisheries resources. Prereq: Forestry 1620, 6 hrs. of Botany/Biology.

3000 Current Events in Renewable Natural Resources (1) Current events influencing forestry, wildlife, and fisheries management. Perspectives from other disciplines and professions which are affected by wildlife and fisheries management. Reading assignment. Possible overnight field trips. Prereq: Forestry 1620, 6 hrs of Botany/Biology.

3200 Wildlife Resources and Their Conservation (3) Wild animal resources of the United States; their interrelationships with soil, water, forests, and other plant life; contribution to economic and social development; importance and methods of conserving wildlife. General course for nonwildlife and fisheries science majors. W.

3230 Wildlife Management (3) Lives and ecological relationships of wild animals; biological, social and economic aspects of their management. Available for graduate credit for non-forestry and non-wildlife and fisheries science majors only. F.

3320 Law Enforcement in the Natural Resources (3) Law Enforcement as an integral part of natural resource management; fundamentals and general principles of state and federal laws and regulations governing natural resource management. Prereq: 3230.

4450 Game Mammals (4) Classification, identification, distribution, natural history, and management principles of game mammals. Prereq: 3230 or one year of zoology. 2 hrs. and 2 labs. F.

4460 Game Birds (4) Biology, classification, identification, distribution, and management of game birds in North America. Prereq: 3230 or one year of zoology. 3 hrs. and 1 lab plus one weekend field trip. W.

4500 Problems in Wildlife and Fisheries Sciences (1-6) Special research or individual problem in wildlife and fisheries science. May be repeated. Maximum 9 credits total. E.

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

4520 Fisheries Management (4) Methods of warm and cold water fisheries management including techniques of biological assessment, public relations, fish manipulation, and stocking. Prereq: Biology 3130 or consent of instructor. 3 hrs. and 1 lab or field period. S.

4770 Field Techniques in Wildlife Management (3) Capturing and handling wildlife, wildlife restoration, controlling wildlife damage, and habitat management for wildlife. Prereq: 4450, 4460 or consent of instructor. 1 hr. and 2 labs.

GRADUATE Consult the Graduate Catalog for listing of graduate level courses.
Ornamental Horticulture and Landscape Design (740)

Professors:
G. D. Crater (Head), Ph.D., Ohio State; L. M. Calihan, Ph.D., Rutgers; N. D. Peacock (Emeritus), Ph.D., Michigan State; H. van de Werken, GAVST, Horticulture College (Frederiksoord, Holland); D. B. Williams, Ph.D., Pennsylvania State.

Associate Professors:
J. W. Day, Ph.D., Mississippi State; E. T. Graham, Ph.D., Pennsylvania State; G. L. McDaniel, Ph.D., Iowa State.

Assistant Professor:
S. M. Rogers, M.L.A., University of Georgia.

2230 Environmental Horticulture (3) An introduction to awareness of and appreciation for ornamental plants around and in the home. Design and management of home landscapes including selection, buying, effectively using, planting, managing, and controlling, nurseries, shrubs, turgiferns, herbaceous landscape plants and house plants. 3 hrs.

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

3040 Floral Design (3) Principles and techniques in flower arranging with emphasis on arrangements for home, church, and special occasions. 1 hr. and 2 labs.

3110 Greenhouse Management (3) Factors involved in management of greenhouse for production and research. Structures, soils, pest control measures, heating, ventilating, lighting, water supply, crop success. Prereq: Junior standing and consent of instructor. 2 hrs. and 1 lab.

3210 Turgifern Management (4) Practical turgifern management; cultivar selection, identification, and establishment; basic applied fertility programs, mowing and irrigation practices, and frost control; pest identification and control. Prereq: Plant and Soil Science 2130 and 8 hrs. biological sciences. 3 hrs. and 1 lab.

3210 Professional Practices in Ornamental Horticulture (3) Application of management and marketing practices for greenhouses, nurseries, flower shops, garden centers, plant stores, and landscaping firms. Investigation of practices and the solution of problems as they relate to the students' areas of interest in the establishment and operation of floricultural, nursery, landscape planning and maintenance enterprises, including compliance with governmental regulations and other operational practices specific to the ornamental horticulture industry. 3 hrs.

3410 Basic Floriculture (3) Principles and practices employed in producing major cut flowers and potted plant crops. Application of principles of plant physiology as they relate to the control of flowering, harvesting schedule, and post-harvest quality. Prereq: 3110, and Plant and Soil Science 3040 or equivalent. 2 hrs. and 1 lab.

3510 Grounds Maintenance and Management (4) Identification of landscape maintenance tasks; growth control, irrigation, soil amendments, transplanting, climate protection, pest control; calibration, maintenance, and application of equipment; schedules and management practices. Prereq: 2230. 2 hrs. and 2 labs.

3610 Fundamentals of Landscape Design (4) Development of basic graphic skills and techniques of plan delineation. Fundamentals of the process theory of design, site analysis, program development, design synthesis. Introduction to site layout, topographic interpretation, soil classification, and landscape materials, and landscape structures. Development of awareness and sensitivity to landscape elements. 1 hr. and 2-3 hr. labs.

3620 Intermediate Landscape Design (4) Application of skills and knowledge acquired in 3610 to a variety of landscape projects. Refinement of graphic skills. History of landscape design as it relates to contemporary graphic design. Technical aspects of planning and design and implementation. Use of plant materials in design of small and moderate scale landscape situations. Prereq: 3610, 3810 or equivalent. 1 hr. and 2-3 hr. labs.

3630 Landscape Construction and Contracting (4) Application of construction methods, materials and practice concerned with landscape installation and contracting. Site layout procedures, earthwork and drainage, landscape construction materials; application through detail design drawings and small scale projects. Prereq: Landscape 3810, 2 hrs. and 2 labs.

3810 Basic Landscape Plants (4) Identification, classification, adaptation, culture, and landscape design uses for ornamental trees, shrubs, and vines. Prereq: 8 hrs. of botany or biological science and Agriculture 1140. 2 hrs. and 2 labs.

3820 Supplementary Landscape Plants (3) Identification, classification, adaptation, culture, and landscape design uses for ornamental trees, shrubs, and vines. Prereq: 3610. 1 hr. and 2 labs.

3830 Interior Plants (3) Identification, classification, adaptation, culture and interior uses for foliage and flowering plants. Prereq: 3360. 1 hr. and 2 labs.


4160 Nursery Management (3) Modern management methods for wholesale and retail nurseries, garden centers, and landscape contractors. Prereq: 3510. 2 hrs. and 1 lab.

4180 Park Design (4) Design criteria for parks and outdoor recreation systems. Park site selection, analysis, planning, and management as related to needs and natural and economic resources. Evaluation of aesthetic and functional quality of parks and their impact on environmental quality of rural and suburban communities. Prereq: 3810, 2 hrs. and 2 labs.

4190 Advanced Landscape Design (4) Comprehensive application of landscape design skills and knowledge through the development of a major project. Analysis, programming, planning design, construction detailing, estimating, specifications, contracts and bidding included in total package project. Prereq: 3510, 3820, 3830, 1 hr. and 2-3 hr. labs.

4220 Advanced Turfgrass Management (4) Principles and technical aspects of turfgrass culture, adaptation, ecology, physiology, soil fertility, and grass nutrition; climatic influences on grass growth; physiology of clipping and turf characteristics; effects of water and fertilizer; and the physiological influences of pest infestations and control measures. Prereq: 3210. 3 hrs. and 1 lab.

4320 Specialty Floriculture (3) Specific practices in the production of minor cut flowers and potted plant crops. Production methods for scheduling flowering or vegetative growth of specialty florist crops in controlled environments. Prereq: 4410. 2 hrs. and 1 lab.

4400 Individual Problem Study (1-5) May be repeated to a maximum of 10 credit hrs.

4610 Seminar (1) Current problems in ornamental horticulture and landscape design. Prereq: Junior standing and consent of instructor.

GRADUATE Consult the Graduate Catalog for listing of graduate level courses.

Plant and Soil Science (792)

Professors:
W. L. Parks (Acting Head), Ph.D., Purdue; F. F. Bell (Emeritus), Ph.D., Iowa State; L. D. Coffey, Ph.D., Purdue; D. V. Conger, Ph.D., Washington State; H. A. Fribourg, Ph.D., Iowa State; L. S. Jeffery, Ph.D., North Dakota State; L. M. Josephson (Emeritus), Ph.D., Washington State; J. H. Reynolds, Ph.D., Wisconsin; L. F. Seutz (Emeritus), Ph.D., North Carolina State; L. N. Springer (Emeritus), M.S. Kansas State; M. E. Williams, Ph.D., California (Berkeley); H. D. Swingle (Emeritus), Ph.D., Louisiana State.

Associate Professors:
R. W. Allard, Ph.D., Minnesota; D. E. Dayton, Ph.D., North Carolina State; W. A. Krueger, Ph.D., Illinois; D. A. Lietzke, Ph.D., Michigan State; G. M. Linsman, Ph.D., Ohio State; W. C. McCrory, Ph.D., North Carolina State; V. H. Reich, Ph.D., Iowa State; D. R. West, Ph.D., Nebraska; J. D. Wott, Ph.D., Auburn.

Assistant Professors:
J. G. Graveel, Ph.D., Purdue; C. E. Sams, Ph.D., Michigan State.

2120 World Food Production and Cropping Systems (3) Introduction to world crop plants and cropping systems with emphasis on origin and development, current technology and practices, and future (role, challenges, demands, functions, problems) of agriculture. F.

2130 Soils (4) Nature and properties of soils. Physical, chemical, and biological properties of soils as they relate to crop growth. Prereq: Chemistry 1120 or 1520 or 1620. 3 hrs. and 1 lab. F, S.

3110 Soil Fertility and Fertilizers (4) Properties of soil in relation to plant nutrient availability and uptake. Methodology, soil testing, effects of fertility use; manufacture and properties of fertilizers. Prereq: 2130. 3 hrs. and 1 lab. W.

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

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

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

3170 Vegetable Crops (4) Characteristics, economic importance, adaptability and production of vegeta
tables for fresh and processed consumption. Prereq: emphasis on both warm and cool season crops. May be taken for graduate credit by non-majors only. Prereq: 2130; 8 hrs. biological science. 1 hr. and 5 labs. S.

3180 Fruit Crops Management (4) Soils, planting, cultivation, development of fruit crops plantations: pest control, harvesting, packing, storage and pruning. Prereq: 2130. 8 hrs. biological sciences. May be taken for graduate credit by non-majors only. W.

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

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

3410 Soil and Plant Analysis (3) Applied methods of soil and plant analysis as they relate to crop nutrition and soil evaluation including sampling procedures, sample preparation, soil physical and chemical analysis, and plant mineral content. Prereq: 3310. 1 hr. and 2 labs. W. Not for graduate credit.

3510 Statistics for Agricultural Research (3) Application of statistics to interpretation of agricultural research. Notation, descriptive statistics, probability, distributions, confidence intervals, students' t and
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<tr>
<th>Course</th>
<th>Title</th>
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<tr>
<td>4250 Agricultural Pesticides</td>
<td>(4) Regulation of pesticide development, manufacture, transportation, marketing and use. Structure, use, mode of action, degradation and environmental impact of pesticides used in agriculture, forestry and related areas.</td>
<td>Prereq: Math 1550 or 1850 or equivalent. 3 hrs. and 1 rec. F, W.</td>
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<td>3 hrs.</td>
<td>1 rec.</td>
<td>F, W.</td>
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<tr>
<td>3810 Practicum in Plant and Soil Science</td>
<td>(3-6) Spend one quarter working with agricultural related enterprises with area of work being related to a student's career interest. Requires consent of 3-person faculty administering committee and of academic advisor. May not be used as a 3000-level prerequisite for any course in Plant and Soil Science. May not be taken for graduate credit. PSS majors only.</td>
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<td>3-6</td>
<td>S, rec.</td>
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<tr>
<td>4110 Soil Chemistry</td>
<td>(4) Colloidal systems; properties and behavior of colloidal soil materials; relations of chemical properties to plant nutrient availability.</td>
<td>Prereq: 2130; Physics 1210. 3 hrs. and 1 lab. F.</td>
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<td>4 hrs.</td>
<td>1 lab.</td>
<td>F.</td>
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<td>4120 Principles of Crop Breeding</td>
<td>(4) Genetic principles and techniques used in crop improvement.</td>
<td>Prereq: Biology 3110 or equivalent. W.</td>
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<td>4 hrs.</td>
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<td>4200 Problems in Plant and Soil Science</td>
<td>(1-6) Special research or library problems in some phase of plant and soil science. May be repeated. Maximum credit 9 hrs. E.</td>
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<tr>
<td>4410 Crop Physiology and Ecology</td>
<td>(4) Application of the principles of plant physiology and ecology to crop production. Effects of environmental factors (light, heat, water, soil, etc.) on physiological processes (respiration, photosynthesis, germination, flowering, etc.).</td>
<td>Prereq: Botany 3210; 2130 and any PSS course at 3000-level except 3610. 3 hrs. and 1 lab. W.</td>
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<td>4 hrs.</td>
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<tr>
<td>4710 Principles of Weed Science</td>
<td>(4) Principles of cultural, biological, and chemical control of weeds, effects on environment, principles of herbicide selectivity and activity, types of herbicides and specific recommendations for various crop and non-crop uses.</td>
<td>Prereq: Agric. 1140 or 1120; Organic Chem. 2130 and any PSS course at 3000-level except 3610. 3 hrs. and 1 lab. S.</td>
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<td>4 hrs.</td>
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<td>4910 Seminar</td>
<td>(1) Review of literature. Oral and written reports.</td>
<td>W.</td>
<td></td>
<td>1 hr.</td>
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GRADUATE Consult the Graduate Catalog for listing of graduate level courses.