



# College of Agricultural Sciences and Natural Resources

*Dr. Jack Britt, Vice President for the Institute of Agriculture and Acting Dean*

*Dr. Mary Lewnes Albrecht, Associate Dean for Academic Programs*

*Dr. Thomas H. Klindt, Associate Dean, Tennessee Agricultural Experiment Station*

*Dr. C. Roland Mote, Assistant Dean, Tennessee Agricultural Experiment Station*

*Dr. Robert H. Orr, Coordinator, International Programs in Agriculture and Natural Resources*

*Ms. Emily Gray, Director of CASNR Student Services*

<http://www.casnr.utk.edu>

The College of Agricultural Sciences and Natural Resources (CASNR) dates back 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. Later, federal legislation provided resources for agricultural research and extension programming for dissemination of research findings to the people of Tennessee. Over time, the College expanded its academic majors from traditional agricultural fields to include natural resources and agribusiness. Today, academic majors represent the breadth of modern natural resources and agricultural sciences. The College, the Agricultural Experiment Station, the Agricultural Extension Service, and the College of Veterinary Medicine constitute the University of Tennessee Institute of Agriculture (<http://www.agriculture.utk.edu>).

The CASNR faculty conduct research using the resources available to them from the Agricultural Experiment Station. They are engaged in significant basic and applied research ranging from biotechnology to wildlife management to agricultural economics to public horticulture. On-campus and field research laboratories are used in the instructional programs of the College, while extension and research activities provide many students excellent opportunities for individualized study with faculty mentors, as well as part-time job opportunities.

## Majors and Minors

The College offers a broad range of majors that prepare students for natural and social sciences based careers in a wide array of opportunities in agricultural sciences and natural resources.

## Majors, Concentrations and Departments

- Agricultural Economics and Business with a concentration in agricultural equipment systems management (Department of Agricultural Economics)
- Agricultural Science with concentrations in agricultural education and agricultural extension education (Interdepartmental unit)
- Animal Science with concentrations in production/business, science/technology, science/technology—pre-veterinary medicine, and pre-veterinary medicine 3+1 (Department of Animal Science)
- Biosystems Engineering with a concentration in food engineering (Department of Biosystems Engineering and Environmental Science)
- Environmental and Soil Sciences with concentrations in agricultural systems technology, environmental science, and soil science (Department of Biosystems Engineering and Environmental Science)
- Food Science and Technology with concentrations in technology/business, pre-professional, and science (Department of Food Science and Technology)
- Forestry with concentrations in forest resources management and wildland recreation (Department of Forestry, Wildlife and Fisheries)
- Plant Sciences and Landscape Systems with concentrations in business/management, horticulture and agronomy, landscape design, public horticulture, and turfgrass management (Department of Plant Sciences and Landscape Systems)
- Wildlife and Fisheries Science (Department of Forestry, Wildlife and Fisheries)

The Department of Entomology and Plant Pathology offers undergraduate courses in support of the above majors. However, it does not have an undergraduate major.

The professional degree program in Biosystems Engineering receives strong support from the College of Engineering and is fully accredited by the Accreditation Board of Engineering and Technology. The forest resources management and wild-land recreation concentrations are fully accredited by the Society of American Foresters. The Food Science and Technology program maintains the standards as established by the Institute of Food Technologists. The agricultural education concentration meets state of Tennessee teacher education standards.

A pre-veterinary medicine curriculum 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. The pre-professional program in Food Science and Technology allows students to be awarded a B.S. degree in agriculture with a major in Food Science after three years and upon successful completion of the first year at UT-Memphis dental, medical or pharmacy programs, or at the UT College of Veterinary Medicine.

Students may have a single or multiple minors in any of the UT colleges recorded on their transcripts without regard to course overlap among majors and minors. Minors offered by departments require a minimum of 16 credit hours in courses numbered 200 and above with the majority of credit hours at the 300 and 400 level. At least 9 of the credit hours required for the minor must be completed at the Knoxville campus. Each department offering a minor lists specific requirements. Minors offered in the CASNR are open to any students of other colleges, who have the approval of their academic advisor and department. Students working on a minor in CASNR should contact the specific department to have an academic advisor assigned.

## Minors and Departments

- Agricultural Economics and Business (Department of Agricultural Economics)
- Animal Science (Department of Animal Science)
- Biosystems Engineering Technology (Department of Biosystems Engineering and Environmental Science)
- Food Science and Technology (Department of Food Science and Technology)
- Forestry (Department of Forestry, Wildlife and Fisheries)
- Plant Sciences and Landscape Systems (Department of Plant Sciences and Landscape Systems)
- Wildlife and Fisheries Science (Department of Forestry, Wildlife and Fisheries)

Specific degree requirements are given under each of the departmental headings in this section of the catalog. A student must meet all degree requirements as outlined by the department in which he/she is majoring in order to receive a degree. In all majors, particular emphasis is placed upon the sciences that are fundamental to agricultural sciences and natural resources; other courses are included to provide a university general education. In all curricula, there is the opportunity to select elective courses appropriate to the educational objectives of the individual students. The choice of electives in each major should be made with the guidance of the faculty academic advisor. However, it is ultimately the responsibility of the student to understand what is required to earn a degree.

All academic and general requirements of the University as stated in the front section of this catalog must be met by students enrolled in CASNR majors and they must complete the requirements in one of the majors. Students transferring into the College of Agricultural Sciences and Natural Resources from other than the UT Knoxville campus must have a grade point average of 2.0.

The use of transfer credit in subject areas appropriate to each organized curriculum will be considered by the student's academic advisor. If deemed appropriate, the petition to apply transfer courses will be processed through departments and submitted to the Dean of the College of Agricultural Sciences and Natural Resources for final approval. All University guidelines and policies must be followed. 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 semester in residence and must be conducted under the supervision of the head of the department in which the course is offered.

A minimum of 18 semester hours of upper-division agriculture and natural resources coursework appropriate to a specified major requirement, and approved by the major advisor, must be completed in residence to fulfill the requirements of baccalaureate degrees offered in the college.

A minimum grade point average of 2.0 for all courses taken in the department offering the major/concentration is required.

## Selection of Major

When registering as freshmen, students who have decided upon their area of study select the major that meets their interests or career goals. A faculty member, from the department that manages the major, will serve as the academic advisor. It is not necessary, however, that freshman students select their major until the end of the first year. Undecided students will be assigned an academic advisor to assist them in exploring CASNR programs and to guide them in the planning of appropriate courses of study for the freshman year. Undecided students are encouraged to enroll in Agriculture and Natural Resources 100, Orientation to Studies in Agriculture and Natural Resources, during the fall semester of their first year of enrollment at The University of Tennessee. When they choose a major, an academic advisor will be assigned from the appropriate department.

Students interested in a career with a state's agricultural extension service should select the agricultural science major and follow the agricultural extension education concentration.

A foundation for advanced study beyond the baccalaureate degree may be established in any major if appropriate electives are included. Most departments offer a science concentration intended for those students who have a strong interest in pursuing graduate studies. A very careful choice of electives enables a student with an excellent academic record to complete a double or triple major by satisfying all the requirements in each major. For this purpose, the academic advisors of each major should be consulted. The academic advisors will work with the student to ensure that degree requirements are met. However, it is ultimately the responsibility of the student to understand what is required to complete multiple majors. Completing multiple majors will normally require more than 124 credit hours for graduation. It is the student's responsibility to keep academic advisors informed about each major and/or minor he/she is pursuing.

## Satisfactory/No Credit Courses

Students may include a maximum of 21 hours in non-directed electives taken on a satisfactory/no credit basis in the total hours required for graduation.

## Graduate Studies

The CASNR faculty participates in both master of science and doctoral graduate student education and training. Master of Science study is available from all academic departments. Graduate programs leading to the Doctor of Philosophy degree in animal sciences, biosystems engineering, food technology and science, and plants, soils and insects are available.

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

## Minimum Requirements for Baccalaureate Degree Programs

All B.S. degree programs offered in the College have the following minimum requirements:

- Communicating through Writing (3 courses that include two English Composition courses and one course designated as writing intensive in the *Undergraduate Catalog*.)
- Communication (1 course from specified list)
- Quantitative Reasoning (2 courses, 6 hours minimum, from two math or statistics courses from approved list)
- Arts and Humanities (2 courses, 6 hours minimum, from approved list)
- Social Sciences (2 courses, 6 hours minimum, from approved list)
- History (2 courses, 6 hours minimum, from approved list)
- Biological Sciences (2 courses, 6 hours minimum, College of Agricultural Sciences and Natural Resources courses included)
- Physical Sciences (2 courses, 6 hours minimum from Chemistry, Physics or Geology)
- Computer Applications (Agriculture and Natural Resources 290 or equivalent)
- Major Courses (24) (These courses are specified within each major)

For a total of 124 hours minimum.

## Independent Study

Independent study, special topics courses, and seminars offered in each department provide exceptional students the opportunity to explore in greater depth subject matter of unusual significance to agriculture and natural resources. Students gain experience and are encouraged to assume responsibilities not available in formally organized courses. Working with students and faculty from all phases of agriculture and natural resources in the study of a common problem provides an exciting experience.

Students may also earn academic credit for faculty-guided international study. Students should consult with their academic advisors, department heads, or the Coordinator of International Programs in Agriculture and Natural Resources about international experiences in agriculture and natural resources.

## CASNR Honors Research and Creative Achievements Program

The CASNR Honors Research and Creative Achievements Program is designed to allow students to expand and improve their critical thinking and analytical skills while pursuing the baccalaureate degree in the college. Students in this program will complete an Honors project, related to research, teaching or extension, under the guidance of a faculty member, and report that work in both written and oral format in a one-hour course, Agriculture and Natural Resources 498. The program objectives are:

- To increase the scope of educational attainment by providing a program with greater breadth and depth,
- To provide special recognition for outstanding scholastic achievement, and
- To foster a sustained interest in advanced education, research and creative achievement.

To be eligible, a student must be a junior, senior or second semester junior transfer student with a minimum grade point average of 3.25. Additionally, once a student is admitted to the program, he/she must maintain a GPA of 3.25 or above. Students will be invited by the College to participate in the program the first semester they are eligible and once per academic year thereafter. Students must apply for the program and be approved by a College Honors Committee. This application includes details of the proposed research, teaching or extension project. Upon admission, the student can enroll in Agriculture and Natural Resources 497, Honors Project (repeatable for a maximum of 6 hours), or departmental independent study credit. The student should enroll during the semester(s) that he/she is actively working on the project. Some departments may elect to allow some or all of this credit to count toward graduation requirements. Upon completion of their work, students must enroll in Agriculture and Natural Resources 498, Honors Presentations (1). Students prepare a written report and give an oral presentation to the Committee and interested individuals.

More detailed information is available from the CASNR Dean's office.

## Course Load

Students desiring to take more than 19 hours per semester must have the approval of their academic advisor and the dean of the college.

## Transfer Students

Students who transfer to the CASNR from another institution or from another college at UT should contact the specific department of the major they wish to follow for assignment to an appropriate advisor. If the student is unsure of the specific major, he/she should contact the Dean's office. Requests for substitutions (application of transfer credit to meet degree requirements if not already assigned through the Degree Audit Report System) or special examinations should be submitted for consideration during the first semester of study in the selected major.

**Department of  
AGRICULTURAL ECONOMICS**

*Professors*

D.L. McLemore (Head), Ph.D. Clemson; J.R. Brooker, Ph.D. Florida; T.L. Cross (Assistant Dean), Ph.D. Oregon State; D.B. Eastwood, Ph.D. Tufts; B.C. English, Ph.D. Iowa State; C.D. Garland, Ph.D. Tennessee; D.G. Gerloff, Ph.D. Texas A&M; C.R. Hall, Ph.D. Mississippi State; K.L. Jensen, Ph.D. Oklahoma State; T.H. Klindt (Associate Dean), Ph.D. Kentucky; R.H. Orr, Ph.D. Illinois; W.M. Park, Ph.D. Virginia Tech; E.L. Rawls, Ph.D. Virginia Tech; D.E. Ray, Ph.D. Iowa State; J.B. Riley, Ph.D. Oklahoma State, R.K. Roberts, Ph.D. Iowa State; G.F. Smith, Ph.D. Tennessee

*Associate Professors*

D.G. De La Torre Ugarte, Ph. D. Oklahoma State; J.A. Larson, Ph.D. Oklahoma State; Steven T. Yen, Ph.D. Minnesota

*Assistant Professors*

E.F. Bazen, Ph.D. Kentucky; C.D. Clark, Ph.D. Vanderbilt; K.H. Tiller, Ph.D. Tennessee

*Emeriti Faculty*

F.O. Leuthold, Ph.D. Wisconsin; S. D. Mundy, Ph.D. Tennessee

**AGRICULTURAL ECONOMICS AND BUSINESS MAJOR**

*Advisors*

Brooker, McLemore, Park, and Riley

Students majoring in Agricultural Economics and Business study the functioning of the agricultural sector of the global economic system and economic principles for decision making by business managers, consumers, policymakers and others within that system. Students complete a curriculum designed to provide them with a broad-based education and the specialized skills necessary for a successful career in the agribusiness industry or with a related organization or public agency. The curriculum builds upon the University-wide general education requirements by adding a set of directed electives from within the College of Agricultural Sciences and Natural Resources, a set of core courses from within the College of Business Administration, and a set of required courses within the Department of Agricultural Economics. Students then are able to customize their program by selecting among upper-division electives within the department. General elective hours in the curriculum also allow flexibility for students to pursue a minor within some area of technical agriculture or another field such as Communications. Students have ample opportunity to develop strong microcomputer skills and gain practical real-world experiences through case study analyses, the NAMA marketing team, internships, and extracurricular activities.

Students graduating with a major in Agricultural Economics and Business are prepared for a wide variety of careers. Many graduates take positions as managers of businesses involved in provision of farm input supplies, production of agricultural commodities, or processing of food products. Other graduates become marketing representatives or serve in a customer or public relations role. Quite a number of graduates establish careers in financial institutions, insurance agencies, or real estate companies. Many industry organizations and government agencies also have employment opportunities for our graduates. It is not uncommon for our graduates to take positions with businesses that are outside the food and agricultural industry. Graduates

also find themselves well prepared for graduate study in agricultural economics or agribusiness management, as well as for professional programs such as law.

**Requirements for the Bachelor of Science in Agriculture • Agricultural Economics and Business Major**

Freshman	Hours	Credit
Agricultural Economics 110 .....	1	1
Agriculture and Natural Resources 290 .....	3	3
<sup>1</sup> Biological Science Electives .....	8	8
<sup>2</sup> History Electives .....	6	6
English 101,102 .....	6	6
Mathematics 123,125 .....	6	6
<b>Sophomore</b>		
Accounting 201,202 .....	5	5
Agricultural Economics 212 .....	3	3
Animal Science 280 or 381 .....	3	3
Economics 201 .....	4	4
<sup>2</sup> Humanities Elective .....	3	3
<sup>3</sup> Physical Science Electives .....	8	8
Environmental and Soil Sciences 210 or Integrated Plant Systems 230 .....	3-4	3-4
Statistics 201 .....	3	3
<b>Junior</b>		
Agricultural Economics 310, 320, 342, 350,412 .....	13	13
English 295 or 360 or Journalism 201 .....	3	3
<sup>2</sup> Nondepartmental Agricultural Electives .....	6	6
Rural Sociology 380 .....	3	3
Speech 210 or 240 .....	3	3
Statistics 320 or 365 .....	3	3
Electives .....	3	3
<b>Senior</b>		
Agricultural Economics 410 .....	1	1
<sup>4</sup> Agricultural Economics or Rural Sociology Electives .....	15	15
Economics 313 .....	3	3
<sup>2</sup> Humanities Elective .....	3	3
Electives .....	8-9	8-9
		<b>Total 127</b>

<sup>1</sup>Selected from Biology 101,102,130,140.

<sup>2</sup>See list of acceptable courses after information on minor and concentration.

<sup>3</sup>Selected from Chemistry 100, 110, 120, 130, Geography 131, 132, Geology 101,102,103.

<sup>4</sup>A minimum of 9 credit hours must be taken from the following courses: Agricultural Economics 355, 360, 420, 430, 442, 450, 470. A maximum of 3 credit hours can be used from each of the following courses: Agricultural Economics 356 and 492.

**Minor in Agricultural Economics and Business**

Economics 201 .....	4
Agricultural Economics 212, 342, 350, 412 .....	12
Agricultural Economics Elective .....	3
<b>Total 19</b>	

**Agricultural Equipment Systems Management Concentration**

The Agricultural Equipment Systems Management concentration is a unique interdisciplinary program that combines courses from the Agricultural Economics and Business program and the Biosystems Engineering Technology program. Students develop a high degree of technical expertise with respect to agricultural equipment, as well as the ability to apply sound business and economic principles to management of a business.

Graduates are particularly well prepared for career opportunities in the agricultural machinery industry as dealership managers, as well as with agribusiness firms in operations management.

Students enrolling in the Agricultural Equipment Systems Management Concentration may apply for participation in the John Deere Dealership Management Program. This unique program is a partnership between John Deere and The University of Tennessee for the southern region of the United States. Students participating in the John Deere Dealership Management Program will have a dealership manager as a mentor, spend two summer internships in a dealership, and be considered for additional scholarship assistance.

### Requirements for the Bachelor of Science in Agriculture • Agricultural Economics and Business Major • Agricultural Equipment Systems Management Concentration

Freshman	Hours	Credit
Agricultural Economics 110 .....	1	
Agriculture and Natural Resources 290 .....	3	
Botany 110, 120 .....	8	
History Electives .....	6	
English 101,102 .....	6	
Mathematics 123,125 .....	6	
<b>Sophomore</b>		
Accounting 201, 202 .....	5	
Agricultural Economics 212 .....	3	
Biosystems Engineering Technology 202 .....	3	
Chemistry 120 .....	4	
Economics 201 .....	4	
<sup>1</sup> Humanities Elective .....	3	
Physics 161 .....	3	
Environmental and Soil Sciences 210 .....	4	
Statistics 201 .....	3	
<b>Junior</b>		
Agricultural Economics 310, 320, 342, 350, 412 .....	13	
Biosystems Engineering 315 .....	3	
Biosystems Engineering Technology 452 .....	3	
English 295 or 360 or Journalism 201 .....	3	
<sup>1</sup> Humanities Elective .....	3	
Rural Sociology 380 .....	3	
Speech 210 or 240 .....	3	
Statistics 320 or 365 .....	3	
<b>Senior</b>		
Agricultural Economics 410,442 .....	4	
<sup>2</sup> Agricultural Economics or Rural Sociology Electives .....	9	
Biosystems Engineering Technology 432, 462 .....	6	
Biosystems Engineering Technology Electives .....	6	
Economics 313 .....	3	
<sup>1</sup> Non-departmental Agricultural Elective .....	3	
<b>Total</b>	<b>127</b>	

<sup>1</sup>See list of acceptable courses below.

<sup>2</sup>A minimum of 6 credit hours must be taken from the following list of courses: Agricultural Economics 355, 360, 420, 430, 450, 470. A maximum of 3 credit hours can be used from each of the following courses: Agricultural Economics 356 and 492.

### DIRECTED ELECTIVES LISTS • AGRICULTURAL ECONOMICS AND BUSINESS MAJOR

#### History

History 221-222,241-242,261-262,255-256.

#### Humanities

Art History 172-173; English 201-202,231-232; Music General 110; Philosophy 110, 111, 130, 240, 342; Religious Studies 101, 102; Theatre 100.

#### Non-departmental Agricultural Electives

Animal Science 280, 381; Entomology and Plant Pathology 313, 321; Food Science and Technology 140; Forestry, Wildlife and Fisheries 211, 250; Plant Sciences and Landscape Systems 110, 235; Environmental and Soil Sciences 210.

## AGRICULTURE AND NATURAL RESOURCES (Interdepartmental Unit)

Agriculture and Natural Resources is an interdepartmental unit that offers a general Agricultural Science major with concentrations in Agricultural Education and Agricultural Extension Education. The major is designed for students who want a broad, general background in agriculture and natural resources and wish to pursue careers in non-formal agricultural education, agricultural communications or agriculture public relations. The Agricultural Education concentration leads to teacher licensure in agricultural sciences in the State of Tennessee. The Agricultural Extension concentration is designed for those interested in agricultural extension careers. This major is also designed for students who want an individualized plan of study. Plans need to be submitted before the junior year and approved by the advisor, department head, and the Dean's Office.

Students who are undecided as to their studies in agriculture and natural resources are advised to follow the agricultural science program and explore the different majors available in the college. They should work with their assigned advisor to eventually choose one of the Agricultural Sciences minors. Students in the Agricultural Education and Agricultural Extension Education concentrations or the Communications minor should follow the appropriate concentration and work with faculty in Agricultural and Extension Education housed in Morgan Hall.

## AGRICULTURAL SCIENCE MAJOR

### Requirements for the Bachelor of Science in Agriculture • Agricultural Science Major

Freshman	Hours	Credit
Agriculture and Natural Resources 100 .....	1	
Agriculture and Natural Resources 290 .....	3	
Animal Science 160 .....	3	
Biology 130-140 .....	8	
English 101-102 .....	6	
Mathematics 119 and (123 or 125) .....	6	
Plant Sciences and Landscape System 110 .....	3	
<b>Sophomore</b>		
Agricultural and Extension Education 211 .....	3	
Agricultural Economics 212 .....	3	
Food Sciences and Technology 140 .....	3	
Biosystems Engineering Technology 202 .....	3	
Chemistry 100-110 or 120-130 .....	8	
Environmental and Soil Sciences 210 .....	4	
Plant Sciences and Landscape Systems 235 .....	3	
Economics 201 .....	4	
Speech 210 or 240 .....	3	
<b>Junior</b>		
Agricultural Economics 342 .....	3	
Animal Science 220 .....	3	
Entomology and Plant Pathology 313 or 321 .....	3	
<sup>1</sup> History Elective .....	3	
<sup>1</sup> Humanities Elective .....	3	
Plant Sciences and Landscape Systems 430 .....	3	
<sup>2</sup> Agricultural Sciences and Natural Resources or Communication Minor .....	12	

**Senior**

<sup>2</sup> Agricultural Sciences and Natural Resources or	
Communication Minor .....	9
Agriculture and Natural Resources Electives .....	6
Animal Science 381 .....	3
<sup>1</sup> Humanities Elective .....	3
<sup>1</sup> History Elective .....	3
<sup>1</sup> Social Sciences Elective .....	3
Free Electives .....	3
<b>Total</b>	<b>124</b>

<sup>1</sup>Lists of appropriate electives are available and should be selected in conference with academic advisor. Students are encouraged to take some of the history and humanities courses at the 300 and 400 level. Three hours of the humanities, history, social sciences electives must be a writing-emphasis course.

<sup>2</sup>Students should select one of the minors offered by the College of Agricultural Sciences and Natural Resources: Agricultural Economics, Animal Science, Biosystems Engineering Technology, Food Science and Technology, Forestry, Wildlife and Fisheries Science, Plant Sciences and Landscape Systems. OR one of the minors in the College of Communication and Information (see listing in this catalog), or submit an individualized plan of study before the Junior year, for approval by the advisor, department head, and the Dean's Office. If the minor is less than 21 hours, the excess hours will become free electives.

**Agricultural Education Concentration**

*Professors*

R.G. Waters, Ph.D. Pennsylvania State

*Emeriti Faculty*

R.R. Lessly, Ed.D., Oklahoma State; J.D. Todd, Ed.D., Illinois

The Agricultural Education concentration is designed to prepare students to meet teacher certification requirements for agricultural education in the public schools. Teacher certification is given in collaboration with the College of Education, Health, and Human Sciences. Progression toward completion of a degree and licensure in agricultural education requires acceptance to the Teacher Education Program by a board of admissions. The admissions process begins at the time of matriculation at The University of Tennessee, whether the student enters as a freshman or transfer student.

Students must maintain a 2.7 undergraduate cumulative GPA to be admitted to the Teacher Education Program. It is important to note that all professional education courses must be passed with a minimum letter grade of "C" or better or they must be repeated.

**Requirements for the Bachelor of Science in Agriculture • Agricultural Science Major • Agricultural Education Concentration**

Freshman	Hours Credit
Agriculture and Natural Resources 100 .....	1
Agriculture and Natural Resources 290 .....	3
Animal Science 160 or 280 .....	3
Biology 101-102 or 130-140 .....	8
English 101-102 .....	6
Mathematics 119 and (123 or 125) .....	6
Economics 201 .....	4
<b>Sophomore</b>	
Agricultural Economics 212 .....	3
Agricultural and Extension Education 211 .....	3
Agricultural and Extension Education 201 .....	1
Biosystems Engineering Technology 202 .....	3
Chemistry 100-110 or 120-130 .....	8
Environmental and Soil Sciences 210 .....	4
Food Science and Technology 269 .....	2
<sup>1</sup> Humanities Elective .....	3
Plant Sciences and Landscape Systems 110 and 235 .....	6
Speech 210 .....	3

**Junior**

Agricultural Economics 342 .....	3
Agricultural and Extension Education 345 and 346 .....	6
Educational Psychology 210 .....	3
Cultural Studies 400 .....	2
Educational Psychology 401 .....	2
Special Education 402 .....	2
Entomology and Plant Pathology 313 or 313 .....	3
<sup>1</sup> History Elective .....	3
<sup>1</sup> Health Elective .....	3
Plant Sciences and Landscape Systems 430 .....	3

**Senior**

Agricultural and Extension Education 435 and 436 .....	12
Agricultural and Extension Education 420 .....	2
<sup>1</sup> Agricultural Sciences and Natural Resources Elective .....	3
Animal Science 381 .....	3
Biosystems Engineering Technology 452 .....	3
<sup>1</sup> History Elective .....	3
<sup>1</sup> Humanities Elective .....	3
<b>Total</b>	<b>126</b>

<sup>1</sup>Lists of appropriate electives are available and should be selected in conference with academic advisor. Students are encouraged to take some of the history and humanities courses at the 300- and 400-level. 3 hours of the humanities, history, social sciences electives must be a writing emphasis course.

**Agricultural Extension Education Concentration**

*Professors*

R.G. Waters, Ph.D. Pennsylvania State

*Emeriti Faculty*

R.R. Lessly, Ed.D., Oklahoma State; J.D. Todd, Ed.D., Illinois

The Agricultural Extension Education concentration is designed to prepare students to gain the agricultural and educational skills necessary to work in the national Cooperative Extension System or the Agricultural Extension Service in Tennessee. The agricultural extension agent is a generalist in agriculture who plans and delivers non-formal educational programs for local citizens and community groups. The extension agent has an understanding of community needs, educational program planning and the non-formal learner as well as a broad background in the disciplines of agriculture and natural resources.

Students must maintain a 2.7 undergraduate cumulative GPA to be considered for employment in the Tennessee Agricultural Extension Service. Other states may or may not have established GPA requirements for employment.

**Requirements for the Bachelor of Science in Agriculture • Agricultural Science Major • Agricultural Extension Education Concentration**

Freshman	Hours Credit
Agricultural and Extension Education 211 .....	3
Agriculture and Natural Resources 100 .....	1
Agriculture and Natural Resources 290 .....	3
Animal Science 280 .....	3
Biology 101-102 or 130-140 .....	8
English 101-102 .....	6
Mathematics 119 and (123 or 125) .....	6
<b>Sophomore</b>	
Agricultural and Extension Education 201 .....	1
Agricultural Economics 212 .....	3
Animal Science 220 .....	3
Chemistry 100-110 or 120-130 .....	8
Economics 201 .....	4

Educational Psychology 210 .....	3
Environmental and Soil Sciences 210 .....	4
Plant Sciences and Landscape System 110. ....	3
Speech 210 .....	3
<b>Junior</b>	
Agricultural and Extension Education 345 and 346 .....	6
Agricultural Economics 342 .....	3
Animal Science 330 .....	3
Entomology and Plant Pathology 313 (recommended course) or 321 .....	3
Environmental and Soil Sciences 344 .....	3
Food Science and Technology 269 .....	2
Forestry Wildlife and Fisheries 250 .....	3
<sup>1</sup> History Elective .....	3
<sup>1</sup> Humanities Elective .....	3
Plant Sciences and Landscape System 235 .....	3
<b>Senior</b>	
Agricultural Sciences and Natural Resources Electives .....	6
Animal Science 381 .....	3
Biosystems Engineering Technology 432 .....	3
Biosystems Engineering Technology 442 .....	3
Biosystems Engineering Technology 462 .....	3
Free Electives .....	3
<sup>1</sup> History Elective .....	3
<sup>1</sup> Humanities Elective .....	3
Plant Sciences and Landscape Systems 430 .....	3
<hr/>	
Total	124

<sup>1</sup> Lists of appropriate electives are available and should be selected in conference with academic advisor. Students are encouraged to take some of the history and humanities courses at the 300 and 400 level. Three hours of the humanities, history, social sciences electives must be a writing-emphasis course.

## Department of ANIMAL SCIENCE

### Professors

A.G. Mathew (Head), Ph.D. Purdue; G.E. Conaster, M.S. Kentucky; W.W. Gill, Ph.D. Kentucky; H.C. Goan, Ph.D. Michigan State; J.D. Godkin, Ph.D. Massachusetts; H.G. Kattesh, Ph.D. Virginia Tech; F.D. Kirkpatrick, Ph.D. Tennessee; C.D. Lane, Ph.D. Tennessee; D.G. Meadows, Ph.D. Texas A&M; J.B. Neel, Ph.D. Tennessee; S.P. Oliver, Ph.D. Ohio State; K.R. Robbins, Ph.D. Iowa State; G.W. Rogers, Ph.D. North Carolina State; A. Saxton, Ph.D. North Carolina State

### Associate Professors

J.M. Grizzle, Ph.D. Florida; F. Harper, Ph.D. Rutgers; R.N. Heitmann, Ph.D. Maine; F. N. Schrick, Ph.D. Clemson; M.O. Smith, Ph.D. Oklahoma State; K.J. Stalder, Ph.D. Iowa State; J.C. Waller, Ph.D. Nebraska

### Assistant Professors

J.L. Edwards, Ph.D. Florida; G. Pighetti, Ph.D. Penn State; C.J. Richards, Ph.D. Kentucky

### Instructor

W.G. Upchurch, M.S. Tennessee

### Advisors

Godkin, Grizzle, Heitmann, Kattesh, Pighetti, Richards, Robbins, Schrick, Smith, Upchurch, Waller

The curriculum is designed to prepare students for leadership careers in livestock production and related industries. Courses in horse, swine, poultry, sheep, dairy and beef cattle production and management may be elected, providing the opportunity for special or additional training in the dynamic

livestock and husbandry technology (production) areas. Through course selection, students may prepare for general or livestock farming, management, business, or science, 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.

Further information on the Animal Science Department may be found at <http://www.agriculture.utk.edu/ansci/>. For a complete list of accepted directed electives appearing in the showcases below see the departmental Undergraduate Advising Guide at [http://www.agriculture.utk.edu/ansci/undr\\_guide.htm](http://www.agriculture.utk.edu/ansci/undr_guide.htm).

## ANIMAL SCIENCE MAJOR

### Production/Business Concentration

#### Requirements for the Bachelor of Science in Animal Science • Animal Science Major • Production/Business Concentration

Freshman	Hours	Credit
Animal Science 160 .....	3	
Biology 130-140 or 101-102 .....	8	
English 101-102 .....	6	
Mathematics 123-125 141-142 or 151-152 .....	6-8	
Chemistry 100-110 or 120-130 .....	8	
<b>Sophomore</b>		
Animal Science 220, 280 .....	6	
Agriculture and Natural Resources 290 .....	3	
Environmental and Soil Sciences 210 .....	4	
Speech 210 or 240 .....	3	
Humanities Writing-Intensive Elective .....	3	
Economics 201 .....	4	
Humanities .....	3	
<sup>1</sup> Business Minor or Agricultural Economics and Business Minor .....	3	
Social Science Elective .....	3	
<b>Junior</b>		
Animal Science 320, 330, 340, 380, 395 .....	13	
Biological Science Restricted Elective .....	3	
History .....	6	
Animal Science 361, 362, or 364 (select one course) .....	2	
<sup>1</sup> Business Minor* or <sup>2</sup> Agricultural Economics and Business Minor* * .....	5*-6**	
<b>Senior</b>		
Animal Science 430,495 .....	4	
Animal Science 481, 482, 483, 484, 485, or 489 (select two courses) .....	6	
<sup>1</sup> Business Minor* or <sup>2</sup> Agricultural Economics and Business Minor** (plus 6 hours of any Agricultural Economics or Business courses) .....	12**-13*	
Free Electives .....	7-9	
<hr/>		
Total		124

<sup>1</sup>Requirements for a Business minor: Accounting 201, 202 (5); Economics 201 (4); Statistics 201 (3); Business Administration 201 (4); Finance 301 (3); Marketing 300 (3); Management 300 (3).

<sup>2</sup>Requirements for an Agricultural Economics and Business minor: Economics 201; Agricultural Economics 212, 342, 360, 412; Agricultural Economics Elective (3); Total 19 credits.

## Science/Technology Concentration

### Requirements for the Bachelor of Science in Animal Science • Animal Science Major • Science/Technology Concentration

Freshman	Hours	Credit
Animal Science 160	3	3
Biology 130-140	8	8
English 101-102	6	6
Mathematics 123-125,141-142 or 151-152	6-8	6-8
Chemistry 120-130	8	8
<b>Sophomore</b>		
Animal Science 220,280	6	6
Agriculture and Natural Resources 290	3	3
Speech 210 or 240	3	3
Humanities Writing Intensive Elective	3	3
Economics 201	4	4
Physical Science and Mathematics Restricted Elective	8	8
Biological Science Restricted Elective	3	3
<b>Junior</b>		
Animal Science 320, 330, 340, 380, 395	13	13
Biological Science Restricted Elective	8	8
Physical Science and Mathematics Restricted Elective	6	6
History Elective	3	3
<b>Senior</b>		
Animal Science 495	1	1
Animal Science 481, 482, 483, 484, 485, or 489 (select one course)	3	3
Humanities Elective	3	3
Biological Science Restricted Elective	3	3
History Elective	3	3
Social Science Elective	3	3
Business Elective	6	6
Free Electives	9-11	9-11
<b>Total</b>		<b>124</b>

## Science/Technology—Pre-Veterinary Medicine Concentration

### Requirements for the Bachelor of Science in Animal Science • Animal Science Major • Science/Technology-Pre-Veterinary Medicine Concentration

Freshman	Hours	Credit
Animal Science 160	3	3
Biology 130-140	8	8
English 101-102	6	6
Mathematics 123-125,141-142 or 151-152	6-8	6-8
Chemistry 120-130	8	8
<b>Sophomore</b>		
Animal Science 220,280	6	6
Agriculture and Natural Resources 290	3	3
Speech 210 or 240	3	3
Humanities Writing-Intensive Elective	3	3
Economics 201	4	4
Chemistry 350,360 and 369	8	8
Biological Science Restricted Elective	3	3
<b>Junior</b>		
Animal Science 320, 330, 340, 380, 395	13	13
Biological Science Restricted Elective	4	4
Physics 221-222	8	8
Humanities Elective	3	3
History Elective	3	3

### Senior

Animal Science 495	1	
Animal Science 481, 482, 483, 484, 485, or 489 (select one course)	3	
Biological Science Restricted Elective	3	
Biochemistry 410	4	
History Elective	3	
Social Science Elective	3	
Business Elective	6	
Free Electives	7-9	
<b>Total</b>		<b>124</b>

## Pre-Veterinary Medicine Program (3+1)

This program allows students to be awarded a Bachelor of Science degree in Animal Science after the successful completion of the first two semesters in the College of Veterinary Medicine (CVM). Students must begin this program early in the pre-veterinary curriculum. The specific requirements are:

- Completion of all pre-veterinary requirements.

English Composition 101-102 (3,3) – 6 hours; Humanities and Social Sciences – 18 hours; Elements of Physics 221-222 (4,4) – 8 hours; General Chemistry 120-130 (4,4) – 8 hours; Organic Chemistry 350-360 and Laboratory 369 (3,3,2) – 8 hours; Cellular and Comparative Biochemistry 410 (4) – 4 hours; General Biology 130-140 (4,4) – 8 hours; Biology 240–4 hours or Animal Science 340–3 hours; Biology Elective–4 hours.

- The last 30 hours of the three-year pre-veterinary curriculum must have been taken at UT.
- At least 12 hours of upper division (300- and 400-level courses) technical agriculture courses must be taken at UT.
- In addition to all the required pre-veterinary medical courses, the following (or approved equivalents) must be completed before entering the College of Veterinary Medicine:

Mathematics 123-125 or 141-142 or 151-152; Animal Science 160–3 hours; Animal Science 220–3 hours; Animal Science 280–3 hours; Animal Science 320–3 hours; Animal Science 330–3 hours; Animal Science 340–3 hours; Animal Science 380–3 hours; Agriculture and Natural Resources 290–3 hours; Economics 201–4 hours; Speech 210 or 240–3 hours.

NOTE: Economics 201 and Speech 210 or 240 will be accepted by the CVM as meeting requirements in the Humanities/Social Science category. The remainder must be a Social Science elective, a Humanities elective, and a Humanities elective described as writing intensive. Writing intensive History courses may also be used.

- Satisfactory completion of the first two semesters in the College of Veterinary Medicine professional program.
- No later than the first day of the first semester of the student's first year in the CVM (s)he should contact the Animal Science Department in order to check on graduation procedures for this program.
- A total of 124 hours must be completed by the end of the first year in the CVM.

## Requirements for the Bachelor of Science in Animal Science • Animal Science Major • Pre-Veterinary Medicine Program (3+1)

Freshman	Hours	Credit
Animal Science 160	3	3
Biology 130-140	8	8
English 101-102	6	6
Mathematics 123-125,141-142 or 151-152	6-8	6-8
Chemistry 120-130	8	8
<b>Sophomore</b>		
Animal Science 220,280	6	6
Biological Science Restricted Elective	4	4

Agriculture and Natural Resources 290 .....	3
Speech 210 or 240 .....	3
Chemistry 350, 360, 369 .....	8
Physics 221-222 .....	8
<b>Junior</b>	
Animal Science 320, 330, 340, 380, 395 .....	13
Biochemistry 410 .....	4
Humanities Elective .....	3
Humanities Writing Elective .....	3
Economics 201 .....	4
History Elective .....	3
Social Science Elective .....	3
Total	96-98

This curriculum meets the requirements for entrance to the College of Veterinary Medicine and after the first successful year in the College of Veterinary Medicine, the student will be awarded a Bachelor of Science in Animal Science. Should the student not gain admittance to the College of Veterinary Medicine after the Junior year, the student could complete the requirements for a major in Animal Science during the Senior year.

### Minor in Animal Science

Animal Science 220 .....	3
Animal Science 280 .....	3
Animal Science 381 .....	3
Animal Science 480 Series .....	3
Eight credits from: Animal Science 320, 330, 340, no more than one of the 360 Series, 380, 420, 430, and the 480 Series .....	8
Total	20

NOTE: The core courses give the minor student a broad background in physiology, nutrition, and management. Careful selection of the directed electives allows the minor student to emphasize physiological reproduction, nutrition, or management.

## Department of BIOSYSTEMS ENGINEERING AND ENVIRONMENTAL SCIENCE

<http://bioengr.ag.utk.edu>

### Professors

R.E. Yoder (Head), Ph.D. Colorado State, P.E.; J.T. Ammons, Ph.D. West Virginia; P.D. Ayers, Ph.D. North Carolina State, P.E.; M.J. Bushermohle, Ph.D. Clemson; H.P. Denton, Ph.D. North Carolina State; M.E. Essington, Ph.D. California (Riverside); R.S. Freeland, Ph.D. Tennessee, P.E.; C.R. Mote (Assistant Dean, Tennessee Agricultural Experiment Station), Ph.D. Ohio State, P.E.; F.D. Tompkins (Interim Dean, College of Engineering), Ph.D. Tennessee, P.E.; D.D. Tyler, Ph.D. Kentucky; L.R. Wilhelm (Interim Associate Dean, College of Engineering), Ph.D. Tennessee, P.E.; J.B. Wills, M.S. Tennessee; D.C. Yoder, Ph.D. Purdue

### Associate Professors

R.T. Burns, Ph.D. Tennessee; G.F. Grandle, Ph.D. Tennessee; W.E. Hart, Ph.D. Purdue; J. Logan, Ph.D. Nebraska; L.O. Pordesimo, Ph.D. Pennsylvania State; M. Radosevich, Ph.D. Ohio State; D.R. Raman, Ph.D. Cornell, P.E.; H.J. Savoy, Ph.D. Louisiana State; J.B. Wilkerson, Ph.D. Purdue; A.R. Womac, Ph.D. Tennessee, P.E.

### Assistant Professors

J.R. Buchanan, Ph.D. Tennessee, P.E.; N. Eash, Ph.D. Iowa State; J. Lee, Ph.D. Iowa State; J. S. Tyner, Ph.D. Oklahoma State; F. R. Walker, Ph.D. North Carolina State

## Programs Available

The Department of Biosystems Engineering and Environmental Science offers two undergraduate degree programs: Bachelor of Science in Biosystems Engineering and Bachelor of Science in Environmental and Soil Sciences. The Biosystems Engineering program is a four-year, ABET-accredited engineering program emphasizing engineering applications to biological systems. The Environmental and Soil Sciences program is a strong science-based program for students interested in the environmental sciences, soil science, and agricultural systems technology. Minors in either Environmental and Soil Sciences or in Biosystems Engineering Technology are also available. More detailed descriptions of each program are included with the curriculum material that follows.

## BIOSYSTEMS ENGINEERING MAJOR

### Advisors

Ayers, Freeland, Hart, Pordesimo, Raman, Wilkerson, Womac, D. Yoder

The College of Agricultural Sciences and Natural Resources, in cooperation with the College of Engineering, offers a four-year curriculum leading to the degree of Bachelor of Science in Biosystems Engineering. The curriculum is accredited by the Engineering Commission of the Accreditation Board for Engineering and Technology (ABET). Overall goals of the program are emphasized in the Vision, Educational Objectives, and Program Outcomes statements listed below. Program details are given in the showcase curricula and the individual course descriptions provided.

Career opportunities for graduates include the design, the development, or the management of: practices that minimize soil erosion and conserve water resources; biological waste treatment systems; safer machinery systems with lower environmental impact; or improved food and bio-processing systems. Employment opportunities are available in a wide variety of industries, government agencies, research and testing organizations, and educational and non-profit institutions.

The mathematics requirement for freshman admission to the Biosystems Engineering program is 3 1/2 units, including trigonometry and geometry. Otherwise, the general admission requirements of the University apply.

The curriculum provides instruction in the analytical and design skills needed to solve engineering problems related to biological and agricultural systems. Comprehensive design of systems and their components is emphasized in the senior year. In addition to the standard Biosystems Engineering curriculum, a concentration in Food Engineering is available. The degree program has provisions for elective courses to be taken in specified subject areas. Students should outline a plan for all such electives not later than their second year of study. Proper scheduling of courses is very important, since prerequisite requirements must be met. Thus, students must consult with their advisors each semester to review their scheduling plan.

Students majoring in Biosystems Engineering are eligible to participate in the Engineering Cooperative Scholarship program

and other student activities in the College of Engineering. Biosystems Engineering majors interested in the Cooperative Engineering Scholarship program should consult with their faculty advisor or the head of the Biosystems Engineering and Environmental Science Department [phone (865) 974-7266; e-mail: bees@utk.edu].

**Vision**

The Biosystems Engineering program at The University of Tennessee is committed to linking engineering sciences and mathematics to real-world problems involving natural and man-made biologically-based systems. We strive to educate students to become engineers with the ability to serve humanity by applying engineering knowledge to solve problems facing society. This education is accomplished by providing a strong grounding in engineering fundamentals and incorporating hands-on, real-world design scenarios throughout the curriculum. Our graduates are technically competent in engineering design. They

- understand the steps in the engineering process;
- can define a problem;
- can gather the information required to solve a problem;
- can critically evaluate information from various sources;
- are creative and can synthesize solutions to a problem;
- can perform engineering analyses;
- can design components, machines, or systems to solve a problem;
- understand the importance of social, environmental, economic, and safety issues;
- appreciate the role of uncertainty and risk in engineering analyses.

Our graduates have the skills needed by professional engineers. Our program strives to instill

- an understanding of the engineering profession;
- the thrill of rewarding engineering accomplishments;
- a knowledge of the responsibilities of a practicing engineer;
- an ability to work effectively in teams of diverse makeup;
- an understanding of the importance of ethical conduct in a professional practice;
- effective oral, written, and graphical communications skills;
- the importance of taking initiative on projects;
- confidence in technical capabilities;
- strong personal time management skills;
- strong project management skills.

**Educational Objectives**

Specific educational objectives have been established for the Biosystems Engineering program. Consistent with the vision outlined above, the program objectives are that graduates have a mastery of:

- the mathematical tools normally required of junior engineers.
- the basic sciences relevant to engineering applications to biological systems;
- the engineering sciences required by their chosen concentration, and application of engineering principles to biological systems;

- the design process, including collection and analysis of information, identification of problems, formulation and selection of a solution, application of the solution, and effective communication of the results;
- teamwork skills, communication skills, and an understanding of professional, social, environmental, safety, and ethical considerations;
- the reasons for and importance of lifelong learning and of developing an appreciation for cultural and social expression beyond the realm of engineering.

**Program Outcomes**

To achieve the educational objectives listed above, a series of program outcomes have been adopted. These program outcomes provide specific measures to determine the degree of success in meeting each of the educational objectives. These outcomes are as follows:

- an ability to apply knowledge of mathematics, science, and engineering;
- an ability to design and conduct experiments, as well as to analyze and interpret data;
- an ability to design a system, component, or process to meet desired needs;
- an ability to function on multi-disciplinary teams;
- an ability to identify, formulate, and solve engineering problems;
- an understanding of professional and ethical responsibility;
- an ability to communicate effectively;
- the broad education necessary to understand the impact of engineering solutions in a global and societal context;
- a recognition of the need for, and an ability to engage in, life-long learning
- a knowledge of contemporary issues
- an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
- an understanding of the complexity of biological systems, and the ability to apply engineering principles to those systems.

**BIOSYSTEMS ENGINEERING MAJOR**

**Requirements for the Bachelor of Science in Biosystems Engineering • Biosystems Engineering Major**

<b>Freshman</b>	<b>Hours</b>	<b>Credit</b>
Engineering Fundamentals 101,102 .....	12	
Biosystems Engineering 104 .....	1	
<sup>1</sup> Chemistry 120 .....	4	
<sup>1</sup> English 101, 102 .....	6	
<sup>1,2</sup> Mathematics 141, 142 .....	8	
<sup>3</sup> General Education Elective (Contemporary Issues Cluster) .....	3	
<b>Sophomore</b>		
Biosystems Engineering 201, 221, 321 .....	7	
Mechanical Engineering 231,321 .....	6	
Nuclear Engineering 203 .....	3	
Environmental and Soil Sciences 210 .....	4	
<sup>1</sup> Chemistry 130 .....	4	
Mathematics 200, 231, 241 .....	8	
Microbiology 210 .....	3	

**Junior**

Biosystems Engineering 411, 421, 431, 441, 451 .....	16
Electrical and Computer Engineering 301 .....	3
<sup>4</sup> Fluid Science Elective .....	3
<sup>3</sup> General Education Electives (Humanities or Arts Clusters) .....	6
Economics 201 .....	4

**Senior**

Biosystems Engineering 401, 402, 444 .....	12
<sup>3</sup> General Education Elective (Engineering Practice in a Global Societal Context Cluster) .....	3
Speech 210 or 240 .....	3
English 360 .....	3
Industrial Engineering 405 .....	3
<sup>3</sup> General Education Electives (Multicultural Studies Cluster) .....	3
<sup>5</sup> Technical Elective .....	3
<b>Total</b>	<b>131</b>

<sup>1</sup>Or equivalent Honors course.

<sup>2</sup>If mathematics placement test does not indicate placement into Mathematics 141, please discuss mathematics option with advisor.

<sup>3</sup>Select from the appropriate cluster in the College of Engineering listing of General Education Electives. In some instances, a single course may meet requirements of more than one cluster. When this occurs, a course from another cluster may be used to meet the total hour requirement. These electives must be approved in advance by advisor to insure that they meet University and ABET criteria.

<sup>4</sup>Select from Civil and Environmental Engineering 390 Hydraulics or Aerospace Engineering 341 Fluid Mechanics.

<sup>5</sup>Typically, upper-division courses in engineering or related areas. Must be approved in advance a by advisor.

**Food Engineering Concentration**

The concentration in Food Engineering emphasizes topics relevant to understanding and engineering food and bioprocessing operations. Students graduating with this emphasis are qualified for engineering positions in a variety of food and other biobased industries.

**Requirements for the Bachelor of Science in Biosystems Engineering • Biosystems Engineering Major • Food Engineering Concentration**

Freshman	Hours Credit
Engineering Fundamentals 101,102 .....	12
Biosystems Engineering 104 .....	1
<sup>1</sup> Chemistry 120 .....	4
<sup>1</sup> English 101, 102 .....	6
<sup>1,2</sup> Mathematics 141,142 .....	8
<sup>3</sup> General Education Elective (Contemporary Issues Cluster) .....	3
<b>Sophomore</b>	
Biosystems Engineering 201, 221, 321 .....	7
Mechanical Engineering 231, 321 .....	6
Nuclear Engineering 203 .....	3
Economics 201 .....	4
<sup>1</sup> Chemistry 130 .....	4
Mathematics 200, 231, 241 .....	8
Microbiology 210 .....	3
<b>Junior</b>	
Biosystems Engineering 451 .....	4
Electrical and Computer Engineering 301 .....	3
<sup>4</sup> Fluid Science Elective .....	3
Food Science and Technology 310, 320, 329, 340 .....	12
<sup>3</sup> General Education Electives (Humanities or Arts Cluster) .....	6
Speech 210 or 240 .....	3
<b>Senior</b>	
Biosystems Engineering 401, 402, 411, 431 .....	15
General Education Elective (Engineering Practice in a Global Societal Context Cluster) .....	3
English 360 .....	3

Industrial Engineering 405 .....	3
<sup>3</sup> General Education Elective (Multicultural Studies Cluster) .....	3
Food Science and Technology 495 .....	3
<b>Total</b>	<b>130</b>

<sup>1</sup>Or equivalent honors course.

<sup>2</sup>If mathematics placement test does not indicate placement into Mathematics 141, please discuss mathematics options with advisor.

<sup>3</sup>Select from the appropriate cluster in the College of Engineering listing of General Education Electives. In some instances, a single course may meet requirements of more than one cluster. When this occurs, a course from another cluster may be used to meet the total hour requirement. These electives must be approved in advance by advisor to insure that they meet University and ABET criteria.

<sup>4</sup>Select from Civil and Environmental Engineering 390 Hydraulics or Aerospace Engineering 341 Fluid Mechanics.

**Biosystems Engineering Technology Minor**

**Advisors**

Ayers, Freeland, Hart, Wilkerson, Womac, D. Yoder

No baccalaureate degree program is offered in biosystems engineering technology; however, seven undergraduate courses are offered to prepare students in other disciplines to apply elementary principles, techniques, and systems of engineering to the broad industry of agriculture.

**Minor in Biosystems Engineering Technology**

Biosystems Engineering Technology 202 or 212, 326, and 432 .....	9
3 of the following: 414, 422,442, 452, 462, 474 .....	9
<b>Total</b>	<b>18</b>

**ENVIRONMENTAL AND SOIL SCIENCES MAJOR**

**Advisors**

Eash, Essington, Hart, Lee, Logan, Radosevich

Many human activities adversely impact soil, water, and environmental quality. The Bachelor of Science degree in Environmental and Soil Sciences provides students with a strong grounding in basic sciences and technology to prepare them for careers in environmental and natural resource management. Students in this program study basic natural sciences as well as applied areas such as ecology, soil sciences, and natural resource policy. Students also build expertise with modern technologies such as geographical information systems, global positioning systems, and computer applications in natural resource management. Graduates are prepared to work in a wide variety of interesting and challenging career paths and to work with a broad variety of other professionals to solve complex problems. Examples of potential careers include: soil and environmental specialists and scientists; state and federal regulatory agency work; private consulting in environmental and agricultural areas; and working with non-governmental organizations with interests in agriculture, environment and natural resources. Students receiving this Bachelor of Science degree are also very competitive for placement in graduate programs in environmental and agricultural sciences and technology, as well as law school.

The core program provides a strong grounding in the sciences and technology, while concentrations within the Bachelor of Science degree permit a focus on either science or technology. There are three concentrations in this degree program—Soil Science, Environmental Science, and Agricultural Systems Technology.

### Environmental Science Concentration

The Environmental Science concentration is a blended program of science and technology that provides a strong, broad background in the natural sciences. The plan of study emphasizes human impacts on the long-term use and productivity of land and water resources. Emphasis is also placed on the tools used in the management of these resources. The curriculum provides a good foundation in the collection and analysis of the information required to characterize resource conservation problems and to make good resource use decisions. Directed technical electives allow the students to concentrate in an area of interest. Students in this program will gain the practical knowledge necessary to compete for career opportunities in government, environmental consulting firms, public health services, environmental research laboratories, and agricultural production, while also gaining the theoretical training necessary for continuing on for advanced degrees in a variety of environmentally related fields.

#### Requirements for the Bachelor of Science in Environmental and Soil Sciences • Environmental and Soil Sciences Major • Environmental Science Concentration

Freshman	Hours	Credit
Biology 130,140	8	8
Chemistry 120,130	8	8
English 101,102	6	6
Environmental and Soil Sciences 110	1	1
Mathematics 151,152	6	6
<sup>1</sup> Arts and Humanities Elective	3	3
<b>Sophomore</b>		
Agriculture and Natural Resources 290	3	3
Biology 250	4	4
Biosystems Engineering Technology 212	3	3
Economics 201	4	4
Environmental and Soil Sciences 210	4	4
Geology 101	4	4
Microbiology 210	3	3
Physics 221	4	4
Statistics 201	3	3
<b>Junior</b>		
Chemistry 350 or 110	3-4	3-4
Environmental and Soil Sciences 301, 324, 355	7	7
Biosystems Engineering Technology 326	3	3
English 360	3	3
<sup>1</sup> History Electives	6	6
Speech 210 or 240	3	3
<sup>1</sup> Technical electives	9	9
<b>Senior</b>		
Agricultural Economics 470 or Economics 462 or Sociology 360	3	3
Environmental and Soil Sciences 434, 442, 444, 462, 481	12	12
<sup>1</sup> Technical Electives	9	9
Unrestricted Electives	5-6	5-6
<b>Total</b>		<b>131-132</b>

<sup>1</sup>Consult the list of approved electives for these courses. If you wish to take a course not on the list, consult your advisor first.

### Soil Science Concentration

This concentration is a rigorous, science-based program for students interested in the field of soil science. The curriculum emphasizes soils and their long-term use and productivity, as well as surface and sub-surface water resources. Students will understand natural resource problems and their management, including soil and water conservation issues, land use problems, waste disposal, and reclamation of disturbed lands. Other areas of interest can be addressed through the appropriate selection of technical electives in the program. Students in this program will gain the practical knowledge necessary to compete for career opportunities in government, environmental consulting firms, public health services, environmental research laboratories, and agricultural production, while also gaining the theoretical training necessary for continuing on for advanced degrees in a number of environmentally related fields.

#### Requirements for the Bachelor of Science in Environmental and Soil Sciences • Environmental and Soil Sciences Major • Soil Science Concentration

Freshman	Hours	Credit
Botany 110, 120 or Biology 130, 140	8	8
Chemistry 120,130	8	8
English 101,102	6	6
Environmental and Soil Sciences 110	1	1
Mathematics 151,152	6	6
<sup>1</sup> Arts and Humanities Elective	3	3
<b>Sophomore</b>		
Agriculture and Natural Resources 290	3	3
Chemistry 350 or 110	3-4	3-4
Economics 201	4	4
Environmental and Soil Sciences 210	4	4
Geology 101	4	4
Microbiology 210	3	3
Physics 221	4	4
Statistics 201	3	3
Speech 210 or 240	3	3
<b>Junior</b>		
Botany 321	3	3
Chemistry 310 and 319	4	4
Environmental and Soil Sciences 301, 324	4	4
Environmental and Soil Sciences 334 or 355	3	3
Biosystems Engineering Technology 326	3	3
Philosophy 346	3	3
<sup>1</sup> History Electives	6	6
<sup>1</sup> Technical Electives	3	3
English 295 or 360 or Journalism 450 or 451	3	3
<b>Senior</b>		
Agricultural Economics 470 or Economics 462 or Sociology 360	3	3
Environmental and Soil Sciences 434,442,444, 462, 481	15	15
<sup>1</sup> Technical Electives	9	9
Unrestricted Electives	5-6	5-6
<b>Total</b>		<b>128</b>

<sup>1</sup>Consult the list of approved electives for these courses. If you wish to take a course not on the list, consult your advisor first.

### Agricultural Systems Technology Concentration

The Agricultural Systems Technology concentration emphasizes the skills needed to manage the sophisticated technological systems that are increasingly essential to modern agricultural production. The program starts with a basic science foundation, adds courses in crop production, pest control, and

protection of soil and water resources, then introduces the technologies and control systems available to make production more efficient and environmentally sound. It rounds out the curriculum with analysis and management courses to tie all the information together and to most effectively use it in making and carrying out management decisions. Directed technical electives allow the student to concentrate in a particular area of agricultural production or to develop increased skills with particular technologies or management tools. Students from this program will have the skills and understanding to be successful in agribusiness, agricultural consulting, or employment with agricultural equipment and material suppliers

**Requirements for the Bachelor of Science in Environmental and Soil Sciences • Environmental and Soil Sciences Major • Agricultural Systems Technology Concentration**

	<b>Hours</b>	<b>Credit</b>
<b>Freshman</b>		
Botany 110, 120.....	8	8
Chemistry 120, 130.....	8	8
English 101, 102.....	6	6
Environmental and Soil Sciences 110.....	1	1
History Elective.....	3	3
Mathematics 151, 152.....	6	6
<b>Sophomore</b>		
Agricultural Economics 212.....	3	3
Agriculture and Natural Resources 290.....	3	3
Biosystems Engineering Technology 212.....	3	3
Economics 201.....	4	4
Environmental and Soil Sciences 210.....	4	4
Environmental and Soil Sciences 334.....	3	3
Plant Sciences and Landscape Systems 235.....	3	3
Plant Sciences and Landscape Systems 334.....	3	3
Physics 221.....	4	4
Statistics 201.....	3	3
<b>Junior</b>		
Agricultural Economics 350 or 355.....	3	3
Biosystems Engineering Technology 326.....	3	3
English 360.....	3	3
Entomology and Plant Pathology 313.....	3	3
Entomology and Plant Pathology 321.....	3	3
Environmental and Soil Sciences 301.....	1	1
Environmental and Soil Sciences 324.....	3	3
History Elective.....	3	3
Humanities Elective.....	3	3
Speech Communication 210 or 240.....	3	3
Technical Electives.....	6	6
<b>Senior</b>		
Agricultural Economics 470 or Economics 462.....	3	3
Biosystems Engineering Technology 414.....	3	3
Biosystems Engineering Technology 432.....	3	3
Biosystems Engineering Technology 434.....	3	3
Biosystems Engineering Technology 462.....	3	3
Biosystems Engineering Technology 474.....	3	3
Environmental and Soil Sciences 481.....	3	3
Humanities Elective.....	3	3
Industrial Engineering 405.....	3	3
Technical Electives.....	6	6
<b>Total</b>	<b>132</b>	

**Minor in Environmental and Soil Sciences**

Environmental and Soil Sciences 210.....	4
Environmental and Soil Sciences 324.....	3
Biosystems Engineering Technology 326.....	3
Electives in Environmental and Soil Sciences and/or Biosystems Engineering Technology at the 300 level or higher.....	9
<b>Total</b>	<b>19</b>

**ELECTIVE LIST FOR ALL CONCENTRATIONS • BACHELOR OF SCIENCE DEGREE IN ENVIRONMENTAL AND SOIL SCIENCES**

**Arts and Humanities Electives**

Any course listed under the College of Arts and Sciences Humanities requirements; (all courses of instruction—art, ceramics, design/graphic, drawing, education, History, media arts, painting, printmaking, sculpture); Asian Studies 101, 102; Classics (all courses); Dance (all courses); Music (all courses of instruction—education, ensemble, general, history, instrument, jazz, keyboard, performance, technology, theory); Philosophy 120, 130, 135; Religious Studies (all courses); Theatre (all courses); Women’s Studies 210, 215, 320, 330, 332, 382, 383, 422, 433, 483.

**History Electives**

Anthropology 120,130; History (all courses); Any course listed under the College of Arts and Sciences Non-US History requirements or any courses listed under the College of Arts and Sciences Upper Level Distribution Requirements.

**Technical Electives for Soil Science and Environmental Science Concentrations**

*Note that some electives have required prerequisites. The prerequisites are either required in the major or are listed below. See individual course descriptions in the catalog for specific information.*

Agriculture and Natural Resources 333; Animal Science 220, 260, 280, 320, 330, 380, 381; Biochemistry and Cellular and Molecular Biology 310, 401, 402, 410, 471, 481; Biology 240,250; Biosystems Engineering Technology (any course not required for the major); Botany 305, 306, 310, 321, 330, 404, 412, 431, 451, 499; Chemistry 230, 310, 319, 320, 329, 350, 360, 369, 430, 439, 471,481; Ecology and Evolutionary Biology 240, 305, 370, 380, 431, 470, 474, 484; Entomology and Plant Pathology 313, 321; Environmental and Soil Sciences (any course not required for the major); Food Science and Technology 420, 429; Forestry 314, 315, 321; Forestry, Wildlife and Fisheries 250, 311, 312, 313, 317, 410, 412; Geography 101, 102, 131, 132, 310, 334, 410, 411, 412, 413, 415, 434, 436, 439; Geology 102,103, 201, 202, 310, 345, 370, 420, 450, 455, 485, 486; History 346; Planning 401; Plant Sciences and Landscape Systems 235, 334, 340, 431, 433, 434, 435,440, 453 ; Management 301, 321, 431; Microbiology 310, 319, 410, 411, 470; Physics 222; Political Science 300, 330, 340, 430, 431, 440, 442,470; Public Health 310; Sociology 360,462,464,465; Statistics (any course above 201); University Studies 322.

**Technical Electives for Agricultural Systems Technology Concentration**

Accounting 201, 202; Agricultural Economics 342, 350, 355; Biosystems Engineering Technology 202, 442, 452; Business Administration 201, 361; Environmental and Soil Sciences 442, 444, 462; Geography 413; Industrial Engineering 304, 423; Plant Sciences and Landscape Systems 340, 434, 440, 445; Management 410, 411, 471.

**Department of ENTOMOLOGY AND PLANT PATHOLOGY**

**Professors**

C.J. Jones (Head), Ph.D. Wyoming; E.C. Bernard, Ph.D. Georgia; S.C. Bost, Ph.D. North Carolina State; E.E. Burgess, Ph.D. Tennessee; R.R. Gerhardt, Ph.D. North Carolina State; J.F. Grant, Ph.D. Clemson; P.L. Lambdin, Ph.D. VPI and SU; M.A. Newman, Ph.D. Texas A&M; C.R. Patrick, Ph.D. Mississippi State; R.N. Trigiano, Ph.D. North Carolina State; A.S. Windham, Ph.D. North Carolina State; M.T. Windham, Ph.D. North Carolina State

**Associate Professors**

C.H. Canaday, Ph.D. Ohio State; K.D. Gwinn, Ph.D. North Carolina State; F.A. Hale, Ph.D. Ohio State; G. Lentz, Ph.D. Iowa State; B.H. Ownley, Ph.D. North Carolina State; J.A. Skinner, Ph.D. California (Davis); K.M. Vail, Ph.D. Florida

**Assistant Professors**

K. Lamour, Ph.D. Michigan State; J.K. Moulton, Ph.D. Arizona State

**Advisor**

Gerhardt

Courses in economic entomology, diseases and insect of ornamental plants, forest protection, plant pathology, and veterinary entomology are available to undergraduate students. No undergraduate degree exists in the Department of Entomology and Plant Pathology, but a program leading to the Master of Science degree with a major in entomology and plant pathology and a Ph.D. degree in Plants, Soils and Insects with concentrations in entomology, plant pathology, integrated pest management, and bioactive natural products are available (see *Graduate Catalog*). Instruction and training is provided in those disciplines which deal with the natural hazards that are major causes of losses in agricultural production, namely, insects and plant diseases. Courses of study in entomology or plant pathology should give the student an appreciation of insects and microorganisms, their ecology, population dynamics, potential damage to plants and their products, and various considerations in control alternatives.

**Department of FOODSCIENCE AND TECHNOLOGY**

**Professors**

C.J. Brekke (Head), Ph.D. Wisconsin; P.M. Davidson, Ph.D. Washington State; F.A. Draughon, Ph.D. Georgia; W.C. Morris, Ph.D. Iowa State; M.P. Penfield, Ph.D. Tennessee

**Associate Professors**

D.A. Golden, Ph.D. Georgia; H.D. Loveday, Ph.D. Kansas State; J.R. Mount, Ph.D. Ohio State

**Assistant Professors**

J. Weiss, Ph.D. Massachusetts; S. Zivanovic, Ph.D. Arkansas

**Advisors**

Davidson, Draughon, Golden, Loveday, Mount, and Penfield

The curriculum concentrations in Food Science and Technology include a science concentration, a technology/business concentration, and a pre-professional concentration. They prepare students to apply basic scientific and business principles to manufacturing, processing, distribution, and utilization of food products that meet the needs and desires of consumers. Coursework emphasizes the basic principles of converting raw food materials into safe acceptable consumer products. Selected commodity courses detail processing of specific types of food materials. Students entering the program should have an interest in the sciences, such as chemistry, microbiology, and biology.

Career opportunities include positions in the food industry in quality assurance, production management, marketing, governmental inspection, etc. The science concentration of coursework conforms to the guidelines in the model curriculum of the Institute of Food Technologists. The technology/

business concentration allows students to obtain an agribusiness or business minor or specialization in an area that strengthens the food science and technology major. A special problems course provides opportunity for practical training in food processing plants and laboratories or federal and state laboratories. The pre-professional concentration provides the science background necessary for Medical, Pharmacy, Dental or Veterinary Medicine school and also allows the student to develop an understanding of food science principles that will apply to their chosen profession.

**FOODSCIENCE AND TECHNOLOGY MAJOR**

**Science Concentration**

**Requirements for the Bachelor of Science in Agriculture • Food Science and Technology Major • Science Concentration**

Freshman	Hours	Credit
<sup>1</sup> English .....	6	
<sup>2</sup> Mathematics .....	6-7	
<sup>3</sup> Biological Sciences .....	4	
Chemistry 120-130 .....	8	
Food Science and Technology 140 .....	3	
Agriculture and Natural Resources 290 .....	3	
<b>Sophomore</b>		
Chemistry 350,360-369 .....	8	
Microbiology 210 or higher .....	3	
<sup>4</sup> Physics .....	3	
<sup>5</sup> Social Science Electives .....	6	
<sup>5</sup> Humanities Elective .....	3	
Food Science and Technology 340 .....	3	
Nutrition 100 or 300 .....	3	
<b>Junior</b>		
Food Science and Technology 301 .....	1	
Food Science and Technology 410 and 430 .....	7	
Biochemistry and Cellular and Molecular Biology 310 or 410 .....	4	
Biosystems Engineering Technology 422 .....	3	
Plant Sciences and Landscape Systems 471 or Statistics 201 .....	3	
<sup>5</sup> Humanities Elective .....	3	
<sup>6</sup> Writing-Intensive course		
<sup>6</sup> History Electives .....	6	
<sup>7</sup> Oral Communication .....	3	
Electives .....	3	
<b>Senior</b>		
Food Science and Technology 401 .....	1	
Food Science and Technology 420-429 .....	5	
Food Science and Technology 445, 460, 490, 495 .....	13	
Nutrition 420 .....	4	
Food Science and Technology 493 .....	3	
Electives .....	5-6	
	<b>Total</b>	<b>124</b>

<sup>1</sup>May select either English 101 and 102 or English 118 and 102. (Students who obtain a grade of A or B in 118 may complete their freshman requirement with 102, 355, or with a 200-level course in the English department. The 200-level course may, if so listed, also be used toward the Humanities requirement.)

<sup>2</sup>Mathematics placement depends on high school courses and grades and ACT scores.

Mathematics 119 or higher is required and Mathematics 125 or 141 or 151.

<sup>3</sup>May be chosen from Biology or Botany course.

<sup>4</sup>May be chosen from a Physics course.

<sup>5</sup>Lists of appropriate courses are available and should be selected in conference with academic advisor.

<sup>6</sup>One course other than English requirements must be designated as writing-intensive in the *Undergraduate Catalog*.

<sup>7</sup>May be chosen from Speech Communication 210, 220 or 240.

## Technology/Business Concentration

### Requirements for the Bachelor of Science in Agriculture • Food Science and Technology Major • Technology/ Business Concentration

Freshman	Hours	Credit
<sup>1</sup> English .....	6	6
<sup>2</sup> Mathematics .....	6	6
<sup>3</sup> Biological Sciences .....	4	4
Chemistry 100 or 120 .....	4	4
<sup>4</sup> Humanities Elective .....	3	3
Food Science and Technology 140 .....	3	3
Agriculture and Natural Resources 290 .....	3	3
<b>Sophomore</b>		
Chemistry 110 .....	4	4
Microbiology 210 or higher .....	3	3
Food Science and Technology 240 .....	2	2
<sup>4</sup> Social Science Electives .....	6	6
<sup>5</sup> Writing-Intensive Course .....	6	6
<sup>4</sup> Directed Technology/Business Electives .....	6	6
Food Science and Technology 340 .....	3	3
Nutrition 100 or 300 or Animal Science 381 .....	3	3
<b>Junior</b>		
Food Science and Technology 301, 410 and 430 .....	8	8
<sup>4</sup> Humanities Elective .....	3	3
<sup>4</sup> History Electives .....	6	6
<sup>6</sup> Oral Communication .....	3	3
<sup>4</sup> Directed Technology/Business Electives .....	9	9
Statistics 201 or Plant Sciences and Landscape Systems 471 .....	3	3
Statistics 365 .....	3	3
Electives .....	3	3
<b>Senior</b>		
Food Science and Technology 401 .....	1	1
Food Science and Technology 420, 429 .....	5	5
Food Science and Technology 445, 460, 490 and 495 .....	13	13
<sup>4</sup> Directed Technology/Business Electives .....	3	3
Food Science and Technology 493 .....	3	3
Electives .....	5	5
<b>Total</b>		<b>124</b>

<sup>1</sup>May select either English 101 and 102 or English 118 and 102. (Students who obtain a grade of A or B in 118 may complete their freshman requirement with 102, 355, or with a 200-level course in the English department. The 200-level course may, if so listed, also be used toward the Humanities requirement.)

<sup>2</sup>Mathematics placement depends on high school courses and grades and ACT scores. Mathematics 110 or higher is required and Mathematics 119 or higher.

<sup>3</sup>May be chosen from Biology or Botany course.

<sup>4</sup>Lists of appropriate courses are available and should be selected in conference with academic advisor.

<sup>5</sup>One course other than English requirements must be designated as writing-intensive in the *Undergraduate Catalog*.

<sup>6</sup>May be chosen from Speech Communication 210, 220 or 240.

## Pre-Professional Concentration

These programs in Pre-Dental, Pre-Medicine, Pre-Pharmacy and Pre-Veterinary Medicine allow students to be awarded a Bachelor of Science degree in Agriculture with a major in Food Science and Technology, after three years and the successful completion of the first year (two semesters) in UT-Memphis Dental, Medical, or Pharmacy programs or The University of Tennessee College of Veterinary Medicine, Knoxville. The last 30 hours of the three-year curriculum must have been taken at The University of Tennessee, Knoxville. A total of 124 hours must be completed by the end of the first year in professional school. No later than December 31 of the student's first year in professional school (s)he should contact the Department Food Science and Technology in order to check on graduation procedures for this program.

Although a Bachelor of Science degree is not required for admission to the Colleges of Dentistry or Medicine, most of the students accepted into these programs have the baccalaureate degree before admission. Therefore students are encouraged to plan to complete all requirements for Bachelor of Science degree before enrolling in either of these colleges. A Bachelor of Science degree can be obtained before enrolling in the Doctor of Pharmacy (Pharm.D.) program.

### Requirements for the Bachelor of Science in Agriculture • Food Science and Technology Major • Pre-Professional Concentration

Freshman	Hours	Credit
<sup>1</sup> English .....	6	6
<sup>2</sup> Mathematics .....	6-7	6-7
Biology 130-140 .....	8	8
Chemistry 120-130 .....	8	8
Food Science and Technology 140 .....	3	3
<b>Sophomore</b>		
Chemistry 350, 360-369 .....	8	8
Microbiology 210 or higher .....	3	3
<sup>3</sup> Physics 221 .....	4	4
<sup>4</sup> Social Science Electives .....	6	6
Agriculture and Natural Resources 290 .....	3	3
Food Science and Technology 340 .....	3	3
Nutrition 100 or 300 .....	3	3
<b>Junior</b>		
Food Science and Technology 301, 410, 420, 429 .....	10	10
<sup>3</sup> Biochemistry and Cellular and Molecular Biology 310 or 410 .....	4	4
<sup>4</sup> Humanities Elective .....	6	6
Plant Sciences and Landscape Systems 471 or Statistics 201 .....	3	3
<sup>6</sup> Writing intensive course .....	6	6
<sup>4</sup> History Electives .....	6	6
<sup>7</sup> Oral Communication .....	3	3
Electives .....	3	3

This curriculum meets the requirements for entrance to the College of Veterinary Medicine or UT Medical, Dental, or Pharmacy schools. After the first successful year in the professional school, the student will be awarded a Bachelor of Science in Agriculture with a major in Food Science and Technology. Should the student not gain admittance after the Junior year, the student could complete the following requirements during the Senior year for a major in Food Science and Technology with a Pre-Professional concentration.

Senior	Hours	Credit
Food Science and Technology 401, 430, 445, 490 and 495 .....	14	14
Nutrition 420 .....	4	4
<sup>8</sup> Food Science and Technology Electives .....	4	4
Electives .....	5-6	5-6
<b>Total</b>		<b>124</b>

<sup>1</sup>May select either English 101 and 102 or English 118 and 102 (Students who obtain a grade of A or B in 118 may complete their freshman requirement with 102, 355, or with a 200-level course in the English department. The 200-level course may, if so listed, also be used toward the Humanities requirement.)

<sup>2</sup>Mathematics placement depends on high school courses and grades and ACT scores. Mathematics 119 or higher is required and Mathematics 125 or 141 or 151.

<sup>3</sup>Pre-Med and Pre-Vet require Physics 222 also.

<sup>4</sup>Lists of appropriate courses are available and should be selected in conference with academic advisor.

<sup>5</sup>Biochemistry and Cellular and Molecular Biology 230 required for Pre-Dental, Biochemistry and Cellular and Molecular Biology 310 required for Pre-Pharmacy, Biochemistry and Cellular and Molecular Biology 410 required for Pre-Med and Pre-Vet.

<sup>6</sup>One course other than English requirements must be designated as "writing intensive" in the *Undergraduate Catalog*.

<sup>7</sup>May be chosen from Speech Communication 210, 220 or 240

<sup>8</sup>May be chosen from Food Science and Technology 442, 460, 469, 493

## Minor in Food Science and Technology

Food Science and Technology 140 .....	3
Food Science and Technology 340 .....	3
Food Science and Technology 410 .....	4
Food Science and Technology 420 .....	2
Food Science and Technology 429 .....	3
Food Science and Technology Elective .....	2

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Total 17

## Department of FORESTRY, WILDLIFE AND FISHERIES

### Professors

G.M. Hopper (Head), Ph.D. Virginia Tech; B.L. Dearden, Ph.D. Colorado State; T.K. Hill, Sr., Ph.D. Auburn; D.M. Ostermeier, Ph.D. Syracuse; M.R. Pelton, Ph.D. Georgia; T.G. Rials, Ph.D. Virginia Tech; S.E. Schlarbaum, Ph.D. Colorado State; C.A. Speer, Ph.D. Utah State; R.J. Strange, Ph.D. Oregon State; J.L. Wilson, Ph.D. Tennessee

### Associate Professors

D.A. Buehler, Ph.D. Va Tech; J.D. Clark, Ph.D. Arkansas; W.W. Clatterbuck, Ph.D. Mississippi State; J.M. Fly, Ph.D. Michigan; R.L. Hay, Ph.D. Duke; D.G. Hodges, Ph.D. Georgia

### Assistant Professors

B.H. Bond, Ph.D. Va Tech; D.S. Buckley, Ph.D. Michigan Tech; C.A. Harper, Ph.D. Clemson; S.L. King, Ph.D. Texas A&M; S.A. Knowe, Georgia; L.I. Muller, Georgia; S. Wang, Ph.D. Nanjing Forestry (China); T.M. Young, M.S. Tennessee

### Instructor

W.G. Minser, M.S. Tennessee

### Forestry Advisors

Buckley, Fly, Hay, Hodges, Knowe, Ostermeier, and Schlarbaum

### Wildlife and Fisheries Advisors

Buehler, King, Minser, Muller, Strange, and Wilson

### Emeriti Faculty

E.R. Buckner, Ph.D. North Carolina State; R.W. Dimmick, Ph.D. Wyoming; J.C. Rennie, Ph.D. North Carolina State; G. Schneider, Ph.D. Michigan State; D.A. Stumbo, Ph.D. Minnesota

For curricular details, faculty biographies, and other departmental information, please check the departmental website: <http://fwf.ag.utk.edu>

The mission of the Department of Forestry, Wildlife and Fisheries is to advance the management, utilization, and appreciation of natural resources in Tennessee, the region, and beyond through programs in teaching, research, and extension.

The department offers two majors. The major in Forestry leads to the Bachelor of Science in Forestry and the major in Wildlife and Fisheries Science leads to the Bachelor of Science in Wildlife and Fisheries Science. The Forestry major has two concentrations: Forest Resources Management and Wildland Recreation.

## Enrollment Management Plan

All majors in the Department of Forestry, Wildlife and Fisheries must submit an application for progression with relevant career goals, names of three references, work experience (both

volunteer and paid positions) related to natural resources and service and professional activities, and a transcript, before registering for junior classes.

To be considered for progression into the upper division of the program, applicants must have submitted all required documents (application form, resume, and transcript) by a March 15 deadline, late in the spring semester.

Those students who have met all preliminary requirements for progression, including having relevant career goals, will be ranked based on the combined score of their cumulative grade point average (GPA) and GPA in core courses. The combined score will be 50% cumulative GPA (minimum 2.2) and 50% cumulative GPA (minimum 2.2) in core courses. Applicants with the highest scores will be accepted into the programs. The number of applicants accepted into each program will be determined based on resources available. Applicants will be notified of their acceptance by the start of registration for summer semester. Applicants who are not accepted into the program and who believe that extenuating circumstances prevented their acceptance into the program may appeal the decision to a faculty committee (i.e., S.A.C.). A written statement in which the case is made for acceptance is required for all applicants. It must be submitted within one week of the rejection notice.

Appellants receiving a positive response from the appeals committee will be accepted into programs on a provisional basis through the first semester of their junior year. The progress of provisional students will be reviewed at the end of the fall semester. At that time, they will either be fully admitted or released from the program.

## Core Courses

Students must have completed or be enrolled in all core courses by the end of the semester in which they apply for acceptance into upper-division courses. They must complete all core courses before entering upper-division courses. They will also need the prerequisites to the individual upper-division courses.

## Forestry

Two courses in English composition (English 101 and 102 or equivalent); college algebra and calculus (Mathematics 119 and 125 or equivalent); general chemistry (Chemistry 100 or equivalent); two courses in general botany (Botany 110 and 120 or equivalent); general economics (Economics 201 or equivalent); public speaking (Speech Communication 210 or 240 or equivalent) and statistics (Statistics 201 or equivalent); soil sciences (Environmental and Soil Sciences 210 or equivalent); Introduction to Microcomputers (Agriculture and Natural Resources 290 or equivalent); general ecology (Biology 250 or equivalent).

## Wildlife and Fisheries Science

Wildlife and Fisheries Science Majors: two courses in English composition (English 101 and 102 or equivalent); college algebra and calculus (Mathematics 119 and 125 or equivalent); two courses in chemistry (Chemistry 120/130 or 100/110 or equivalent); two courses in general biology (Biology 130/140 or 101/102 or equivalent); general economics (Economics 201 or equivalent); public speaking (Speech 210 or 240 or equivalent); and statistics (Statistics 201 or equivalent); soils science (Environmental and Soil Sciences 210 or equivalent); Introduction to Microcomputers (Agriculture and Natural Resources 290 or equivalent); general ecology (Biology 250 or equivalent).

## FORESTRY MAJOR

The profession of forestry is the science, the art, and the practice of managing and using for human benefit the natural resources that 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 Resources Management Concentration

The Forest Resources Management concentration provides an opportunity to obtain an education related to the management of the broad spectrum of wildland resources. In addition to the core of required courses, there are about 18 elective credit hours for broad studies or specialized training in one or more areas of forestry. These areas and examples of related fields of study are: Forest Biology including plant physiology and morphology, ecology, genetics, tree nutrition, forest soils; Forest Business Management including economics, accounting, finance, marketing, management science; Forest Economics including economics, business administration, social science; Forest Inventory including mathematics, statistics, computer science; Wildland Recreation including natural and social sciences; and Wildlife Management including ecology and 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.

### Requirements for the Bachelor of Science in Forestry • Forestry Major • Forest Resource Management Concentration

Freshman	Hours Credit
English 101,102 .....	6
Mathematics 119,125 .....	6
Botany 110,120 .....	8
Forestry, Wildlife and Fisheries 100, 211 .....	4
Forestry 100 .....	3
<sup>1</sup> Social Sciences Elective .....	3
<sup>2</sup> Electives .....	3-4
<b>Sophomore</b>	
Economics 201 .....	4
Statistics 201 .....	3
Agriculture and Natural Resources 290 .....	3
Forestry, Wildlife and Fisheries 311 .....	3
Forestry 315 .....	3
Speech 210 or 240 .....	3
Chemistry 100 .....	4
Environmental and Soil Sciences 210 .....	4
English 295 .....	3
<sup>2</sup> Electives .....	3-4
<b>Junior</b>	
Forestry, Wildlife and Fisheries 312, 313, 317 .....	8
Forestry 305, 306, 314, 321, 322, 323, 324, 326, 329, 330 .....	24
<sup>1</sup> Humanities Elective .....	3
<sup>2</sup> Electives .....	4

### Senior

Forestry, Wildlife and Fisheries 410, 412, 416 .....	9
Forestry 331, 332, 420, 422 .....	8
<sup>3</sup> Ethics Elective .....	3
<sup>1</sup> History Elective .....	3
<sup>1</sup> Communications Elective .....	3
<sup>2</sup> Electives .....	2-4
<b>Total</b>	<b>135</b>

<sup>1</sup>Lists of appropriate courses in Social Sciences, Humanities, History, and Communications are available at the Department of Forestry, Wildlife and Fisheries Office.

<sup>2</sup>Electives are chosen in conference with advisor. Lists of courses for specializations and minors to compliment the Forest Resources Management Concentration are available at the Department of Forestry, Wildlife and Fisheries Office.

<sup>3</sup>Students will choose one course from Philosophy 110, 130, 240, 290, 342, 346.

### Wildland Recreation Concentration

The Wildland Recreation concentration is an interdisciplinary program that prepares students to work in natural resource based recreation settings on private and public lands, including local, state, and national parks, and other state and federal agencies and private or non-profit organizations providing outdoor recreational opportunities.

Students prepare for professional positions in the planning, development, interpretation, and management of private and public lands for recreational purposes. Students also learn the basic philosophy and principles associated with the use of leisure time and the relationship of natural resources to the constructive use of leisure time.

Elective credits may be used to obtain specializations in complementary areas such as education, cultural and natural history interpretation, forestry, wildlife, fisheries, communication and public relations, agricultural extension education, ornamental horticulture and landscape design, business and public administration, and the natural sciences, including ecology, botany, and geology as well as recreation and leisure studies, such as private/commercial and therapeutic recreation.

Ten weeks of professional internship experience (6 credits) are required during the final 45 hours of credit in the program. The internship is a highly structured field experience guided by specific learning objectives pre-approved by the instructor and the field supervisor. The student receives one credit per two weeks of full-time field experience. Preparations for the internship should be made well in advance of actual placement. Summer employment or volunteer work in a related field prior to the internship is highly encouraged.

### Requirements for the Bachelor of Science in Forestry • Forestry Major • Wildland Recreation Concentration

Freshman	Hours Credit
English 101,102 .....	6
Mathematics 119,125 .....	6
Botany 110,120 .....	8
Psychology 110 or Sociology 120 or Lower-Division Psychology or Lower-Division Sociology or Urban Studies 200 or Anthropology 130 ...	3
Forestry 100 .....	3
Forestry, Wildlife and Fisheries 100, 211 .....	4
<sup>1</sup> Electives .....	3-4
<b>Sophomore</b>	
Forestry, Wildlife and Fisheries 311 .....	3
Economics 201 .....	4
Statistics 201 or Psychology 385 .....	3
Agriculture and Natural Resources 290 .....	3

Chemistry 100 .....	4
Speech 210 or 240 .....	3
Environmental and Soil Sciences 210 .....	3
Forestry 315 or Biology 250 .....	3-4
3 hours from: Sociology 360 or 456, or Sociology 345, 363, 370, 380, or 464 or Geography 320, 323, or 345 .....	3
<sup>1</sup> Electives .....	2
<b>Junior</b>	
Forestry, Wildlife and Fisheries 312, 313, 317 .....	8
Forestry 321,423 .....	6
Forestry 314 or Political Science 440 or 441 or Management 301 or 440 .....	2-3
Recreation 310, 410, 415, 430, or 470 .....	3
3 hours from: Biosystems Engineering Technology 326, Geography 411, Planning 402 , Biosystems Engineering Technology 212, or Geography 310 or 410 or 413 .....	3
3 hours from: Plant Sciences and Landscape Systems 280, 326, 350, 370, 421 .....	3
3 hours from: Philosophy 346 or 110, 130, 240, 290, 342 .....	3
<sup>1</sup> Electives .....	5
<b>Senior</b>	
Forestry, Wildlife and Fisheries 412, 416 .....	6
Forestry 422 .....	3
Forestry, Wildlife and Fisheries 410 or Wildlife and Fisheries Science 443 or 444 or 445 .....	3
Forestry 495 .....	6
3 hours from: Journalism 451, 290, Communication 450, Art Media Arts 231, 236, Journalism 201, 310, 412, 450, English 295 .....	3
3 hours from: Speech Communication 330,440, 220, 230, 270, 310, 320, 420 .....	3
<sup>3</sup> Humanities Elective .....	3
<sup>2</sup> History Elective .....	3
<sup>1</sup> Electives .....	5-8
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Total	135

<sup>1</sup>Electives are chosen in conference with advisor.

<sup>2</sup>Lists of appropriate courses in Humanities and History are available at the Department of Forestry, Wildlife and Fisheries Office.

## Minor in Forestry

Forestry Wildlife and Fisheries 211 or 250 .....	3
Forestry Wildlife and Fisheries 311 .....	3
Select from Forestry Wildlife and Fisheries 100, 312, 313, 412, or 416 .....	10
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Total	16

NOTE: Prerequisites will not be waived

## APPROVED ELECTIVE COURSES • FOREST RESOURCE MANAGEMENT CONCENTRATION • WILDLAND RECREATION CONCENTRATION

The two concentrations require courses in a number of General Education areas. Below are specific courses that meet the requirements in each of the areas. Courses listed for social science, humanities, and history are from a University-wide list, while those for communications have been developed within the Department of Forestry, Wildlife and Fisheries. Other courses may satisfy the requirements. If you are interested in an unlisted course, see the description of each area under General Education in this catalog and then discuss it with your advisor.

### Social Sciences

African and African-American Studies 315, 319, 343, 373, 379, 442,452, 473, 480, 483; American Studies 310, 410, 423; Anthropology 110, 120, 130, 302, 305, 306, 310-321, 360, 361, 363, 373, 410, 412, 413, 462, 463, 495; Botany 305, 306; Business Administration 311; Child and Family Studies 220,240; Cinema Studies 312; Geography 101, 102, 320, 323, 340, 351, 361, 363, 365, 371, 372, 373, 375, 379, 421, 423, 441,443, 449; Geology 201, 202; Latin American Studies 251, 252, 313, 314, 319, 331, 372, 373, 401,456; Medieval Studies 475; Political Science 101, 102, 311-312, 315, 320, 330, 340, 350, 361, 365, 366, 374, 411, 412, 420, 430, 431, 440-442, 452,

454, 456, 459, 461, 463, 470, 471, 472, 475, 476; Psychology 110, 210, 300, 310, 320, 330, 360, 370, 415, 424, 434, 440, 470, 480; Religious Studies 232, 302, 319, 373-384; Rural Sociology 380; Sociology 110, 232, 291, 310, 311, 321, 340, 343-345, 350-352, 360, 363, 370, 375, 380, 405, 415, 442, 446, 451, 455, 459, 462, 464, 465; Speech Communication 466, 469; University Honors 347; Urban Studies 321, 323, 441, 454, 464; Woman’s Studies 220, 230, 310, 340, 375, 434, 466, 483.

### Humanities

African and African-American Studies 429\*; Art (all courses of instruction—art, ceramics, design/graphic, drawing, education, history, media arts, painting, printmaking, sculpture); Asian Languages (all courses except 199—see catalog for writing-emphasis courses); Asian Studies 101\*, 102\*; Classics (all courses—see catalog for writing-emphasis courses); Comparative Literature 202\*, 203\*; Dance (all courses—see catalog for writing-emphasis courses); English 201-351 and 401-454,480,482 (see catalog for writing-emphasis courses); French (all courses except 199—see catalog for writing- emphasis courses); German (all courses except 199—see catalog for writing-emphasis courses); Greek (all courses—see catalog for writing-emphasis courses); Hebrew (all courses—(see catalog for writing-emphasis courses); Italian (all courses except 199—see catalog for writing-emphasis courses); Latin (all courses—see catalog for writing-emphasis courses); Medieval Studies (all courses—see catalog for writing-emphasis courses); Music (all courses of instruction—education, ensemble, general, history, instrument, jazz, keyboard, performance, technology, theory, voice—see catalog for writing-emphasis courses); Philosophy (all courses—see catalog for writing-emphasis courses); Persian (all courses—see catalog for writing-emphasis courses); Portuguese (all courses except 199—see catalog for writing-emphasis courses); Religious Studies (all courses—see catalog for writing-emphasis courses); Russian (all courses except 199—see catalog for writing-emphasis courses); Spanish (all courses except 199—see catalog for writing-emphasis courses); Theatre (all courses—see catalog for writing-emphasis courses); Women’s Studies 210\*\*, 215\*\*, 320,330\*\*, 332\*\*, 382\*\*, 383\*\*, 422, 433\*\*, 483\*\*.

### History

African and African-American Studies 201, 202,350,371,372,445; American Studies 456; Anthropology 361; Architecture 211, 212,406,412,413,415; Art History 162, 183,403,411,415,419,425,431,441,442,451,452,453,454,461,463; Asian Studies 101, 102; Classics 381, 382; Dance 480,490; English 301, 302; History (all courses); Latin-American Studies 360, 361; Medieval Studies 312, 313; Military Science and Leadership 430; Music History 115, 120, 125, 310; Philosophy 120, 121; Religious Studies 101, 310, 330; Theatre 411, 412; Woman’s Studies 432, 453.

### Communications

English 263, 355,360,363-365,455,460,462,463,464; Journalism 201, 310, 412,414,450,451,456; Speech Communication 210\*, 220, 240\*, 270, 310,320, 340, 420.

\*All concentrations require 210 or 240; taking both would satisfy the speech requirement and the communications elective .

\*\* Writing-emphasis course.

## WILDLIFE AND FISHERIES SCIENCE MAJOR

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 and of the public. Management goals may be aesthetic, economic, or ecological. Success depends upon wildlife and fisheries biologists providing assistance; 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.

### Requirements for the Bachelor of Science in Wildlife and Fisheries Science • Wildlife and Fisheries Science Major

Freshman	Hours	Credit
English 101, 102 .....	6	
Mathematics 119 .....	3	
Biology 130-140 or 101-102 .....	8	
Chemistry 120-130 or 100-110 .....	8	
<sup>1</sup> History or Humanities Elective .....	3	
Forestry, Wildlife and Fisheries 100, 211 .....	4	
<b>Sophomore</b>		
Mathematics 125 .....	3	
Statistics 201 or Plant Sciences and Landscape Systems 471 .....	3	
Agriculture and Natural Resources 290 .....	3	

Speech 210 or 240 .....	3
Animal Science 220 or Ecology and Evolutionary Biology 350 or Biochemistry and Cellular and Molecular Biology 330 .....	3-4
Environmental and Soil Sciences 210 .....	3
Economics 201 .....	4
Biology 250 .....	4
<sup>1</sup> History or Humanities Elective .....	6
<b>Junior</b>	
Forestry, Wildlife and Fisheries 311, 312, 313, 317 .....	11
Wildlife and Fisheries Science 303, 305, 323, 330, 340, 341, 440, 442 .....	17
Ecology and Evolutionary Biology 470 or 446 or Environmental and Soil Sciences 324 .....	3-4
<b>Senior</b>	
Forestry, Wildlife and Fisheries 410, 416 .....	6
Wildlife and Fisheries Science 443, 444, 445 .....	9
Ecology and Evolutionary Biology 474 .....	4
Forestry, Wildlife and Fisheries 412, or Forestry 321 or 422 .....	3
<sup>1</sup> Science Elective .....	6
General Elective .....	5-7
Total	130

<sup>1</sup>Lists of appropriate courses in Humanities and History are available at the Department of Forestry, Wildlife and Fisheries Office. Students are encouraged to take some of the history and humanities courses at the 300- and 400- level. Three hours of the Humanities or History electives must be a writing-intensive course.

## Minor in Wildlife and Fisheries Science

Choose from Forestry, Wildlife and Fisheries 100, 211 or 250, 317, 410, 416; Wildlife and Fisheries Science 341, 440, 442, 443, 444, 445 .....	16
Total	16

## APPROVED ELECTIVES

The asterisk (\*) indicates a writing emphasis course. Check with your advisor if you have any questions about these electives.

### History

African and African-American Studies 202-202, 235-236, 371-372\*, 381\*, 429\*, 445, 473, 480\*, 483\*; American Studies 310\*, 456; Anthropology 120, 310\*-311\*, 360\*, 361, 363\*, 462\*; Architecture 211, 212, 406, 412, 413, 415; Art History 162, 183, 403, 411\*, 415\*, 419\*, 425\*, 431\*, 441\*, 442\*, 451\*, 452\*, 453\*, 454\*, 461\*, 463\*, 471\*, 472\*, 475\*, 476\*; Asian Studies 101\*, 102\*; Classics 381\*, 382\*; Dance 480, 490; Economics 415\*; English 301\*, 302\*; French 431\*; History (all courses - see catalog for writing emphasis courses); Italian 311, 312; Latin-American Studies 360, 361; Medieval Studies 312, 313; Military Science and Leadership 430; Music History 115\*, 120\*, 125, 310; Philosophy 120\*, 121\*; Religious Studies 101\*, 352\*; Theatre 411, 412; Woman's Studies 432\*, 453\*.

### Humanities

African and African-American Studies 429\*; Art (all courses of instruction—art, ceramics, design/graphic, drawing, education, history, media arts, painting, printmaking, sculpture); Asian Languages (all courses except 199—see catalog for writing emphasis courses); Asian Studies 101\*, 102\*; Classics (all courses—see catalog for writing emphasis courses); Comparative Literature 202\*, 203\*; Dance (all courses—see catalog for writing emphasis courses); English 201-351 and 401-454, 480, 482 (see catalog for writing emphasis courses); French (all courses except 199—see catalog for writing emphasis courses); German (all courses except 199—see catalog for writing emphasis courses); Greek (all courses—see catalog for writing emphasis courses); Hebrew (all courses—see catalog for writing emphasis courses); Italian (all courses except 199—see catalog for writing emphasis courses); Latin (all courses—see catalog for writing emphasis courses); Medieval Studies (all courses—see catalog for writing emphasis courses); Music (all courses of instruction—education, ensemble, general, history, instrument, jazz, keyboard; performance, technology, theory, voice - see catalog for writing emphasis courses); Philosophy (all courses—see catalog for writing emphasis courses); Persian (all courses—see catalog for writing emphasis courses); Portuguese (all courses except 199—see catalog for writing emphasis courses); Religious Studies (all courses—see catalog for writing emphasis courses); Russian (all courses except 199—see catalog for writing emphasis courses); Spanish (all courses except 199—see catalog for writing emphasis courses); Theatre (all courses—see

catalog for writing emphasis courses); Women's Studies 210\*, 215\*, 320, 330\*, 332\*, 382\*, 383\*, 422, 433\*, 483\*.

## Department of PLANT SCIENCES

<http://psls.ag.utk.edu/>

### Professors

G.N. Rhodes (Head), Ph.D. North Carolina State; M.L. Albrecht (Associate Dean, College of Agricultural Sciences and Natural Resources), Ph.D. Ohio State; F.L. Allen, Ph.D. Minnesota; R.M. Augé, Ph.D. Washington State; D.E. Deyton, Ph.D. North Carolina State; R.M. Hayes, Ph.D. Illinois; D.W. Lockwood, Ph.D. Purdue; G.L. McDaniel, Ph.D. Iowa State; T.J. Samples, Ph.D., Oklahoma State; C.E. Sams, Ph.D. Michigan State; C.N. Stewart, Ph.D. (Racheff Chair) Virginia Tech; D.R. West, Ph.D. Nebraska

### Associate Professors

G.E. Bates, Ph.D. Georgia; Z. M. (Max) Cheng, Ph.D. Cornell; C.O. Gwathmay, Ph.D. U.C. Davis; S.L. Hamilton, Ed.D. Tennessee; G. L. Menendez, M.S. Tennessee; T.C. Mueller, Ph.D. Georgia; D.K. Robinson, Ph.D. North Carolina State; S.M. Rogers, M.L.A. Georgia; J.E. Wyatt, Ph.D. Florida; R. J. Ott, MBA Tennessee (Adjunct)

### Assistant Professors

C.C. Craig, Ph.D. Louisiana State; S. Garton, Ph.D. Minnesota; W. E. Klingeman, Ph.D. Georgia; V.R. Pantalone, Ph.D. North Carolina State; J. Sorochan, Ph.D. Michigan State; A.R. Straw, Ph.D. Tennessee; M.A. Thompson, Ph.D. Tennessee

### Emeriti Faculty

E. L. Ashburn, Ph.D. Tennessee; B.V. Conger, Ph.D. Washington State; D.L. Coffey, Ph.D. Purdue; H.A. Fribourg, Ph.D. Iowa State; D. W. Sams, Ph.D. Minnesota; P. P. Shelby, M.S. Tennessee

### Advisors

Hamilton, McDaniel, Menendez, Rogers, and Sorochan

The mission of the Department of Plant Sciences is to serve the teaching, extension and outreach, and research needs of clients, stakeholders and peers in the areas of agronomic and horticultural crops, and landscape design. A robust teaching program is at the center of this mission.

The department provides quality academic instruction to undergraduate and graduate students. Experienced instructors who are committed to the success of their students staff the department. Advisors give students sound advice in the selection of career specialties, elective courses, and provide students the best education possible. Professors want their students to be successful and enjoy positive student-teacher relationships. They keep track of job openings and assist students during the job selection process. Since most Plant Sciences and Landscape Systems faculty are also research scientists, undergraduate students interested in advanced studies are directed into appropriate courses necessary for admission to graduate school. Students are also encouraged to work with faculty researchers in a variety of laboratory, greenhouse, or field experiments.

The department offers a major leading to a Bachelor of Science degree in Plant Sciences and Landscape Systems with five concentrations: Business Management, Horticulture and Agronomy, Landscape Design, Public Horticulture, and Turfgrass Management.

Each concentration offers a different approach to address the breadth of opportunities available to Plant Sciences and Landscape Systems undergraduate students. A minimum of 124 credit hours including internship is required for each concentration. Full-time summer internships are available at selected local, regional, and national companies or institutions. Part-time summer or semester internships are available from Plant Sciences and Landscape Systems, other university departments and laboratories and local commercial firms. For more information about undergraduate and other departmental programs, please contact our web site at: <http://ppls.ag.utk.edu/>.

## Enrollment Management Plan

All students in the Department of Plant Sciences must meet certain requirements before registering for upper-division Plant Sciences and Landscape Systems classes. Admittance to each of the departmental concentrations will be determined by completion of core courses with a "C" or better for an individual concentration, completion of a minimum of 65 credit hours toward the degree, and a minimum cumulative grade point average (GPA) of 2.25.

To be considered for progression into the upper division of the program, majors must submit an application of intent for progression prior to class registration for the next semester. Faculty members will review students' transcripts for completion of all core courses and meeting the minimum GPA. Students must have completed all but 3 core courses for their concentration by the end of the semester in which they apply for acceptance into upper-division courses. They must complete all core courses before entering upper-division courses. They will also need the prerequisites to these individual upper-division courses.

Once admitted for progression to upper-division programs, students must maintain a cumulative GPA of 2.25. Junior and senior majors in Plant Sciences and Landscape Systems whose cumulative GPA falls below the minimum of 2.25 will not be allowed to register in departmental upper division classes until they again meet the required GPA for progression. This enrollment management plan is effective for all students enrolling in Plant Sciences and Landscape Systems on or after Fall semester 2001.

## PLANT SCIENCES AND LANDSCAPE SYSTEMS MAJOR

### Core Courses

Majors must have completed the core courses for their respective Plant Sciences and Landscape Systems concentration. Students must declare a concentration early in their undergraduate program and strictly follow the curriculum described for it. Students who transfer into Plant Sciences and Landscape Systems from other colleges or programs must meet the same requirements as those entering the department as freshmen. The core courses for the Plant Sciences and Landscape Systems concentrations are:

**Business Management Concentration:** two courses in English composition (English 101 and 102 or equivalent); college algebra and calculus (Mathematics 119 and 125 or equivalent); general chemistry (Chemistry 100-110 or 120-130 or

equivalent); general botany (Botany 110 and 120 or equivalent); general accounting (Accounting 201 and 202 or equivalent); soil science (Environmental and Soil Sciences 210 or equivalent).

**Horticulture and Agronomy Concentration:** two courses in English composition (English 101 and 102 or equivalent); college algebra and either precalculus or calculus (Mathematics 119 and 125 or 130) or completion of Mathematics 151 and 152 or equivalent; general chemistry (Chemistry 100-110 or 120-130 or equivalent); general botany (Botany 110 and 120 or equivalent); soil science (Environmental and Soil Sciences 210 or equivalent); either Introduction to Ornamental Horticulture (Plant Sciences and Landscape Systems 110 or equivalent) or Introduction to Crop Science (Plant Sciences and Landscape Systems 235 or equivalent).

**Landscape Design:** two courses in English composition (English 101 and 102 or equivalent); college algebra and finite math or calculus (Mathematics 119 and 123 or 125 or equivalent); general chemistry (Chemistry 100 or 120 or equivalent) and one natural science elective; general botany (Botany 110 and 120 or equivalent); soil science (Environmental and Soil Sciences 210 or equivalent); Basic Landscape Plants (Plant Sciences and Landscape Systems 220 or equivalent); Fundamentals of Landscape Design (Plant Sciences and Landscape Systems 280 or equivalent).

**Public Horticulture Concentration:** two courses in English composition (English 101 and 102 or equivalent); college algebra and finite math or calculus (Mathematics 119 and 123 or 125 or equivalent); general chemistry (Chemistry 100 or 120 or equivalent) and one natural science elective; general botany (Botany 110 and 120 or equivalent); soil science (Environmental and Soil Sciences 210 or equivalent); Computer Applications to Problem Solving (Agriculture and Natural Resources 290 or equivalent); Introduction to Ornamental Horticulture (Plant Sciences and Landscape Systems 110 or equivalent).

**Turfgrass Management Concentration:** two courses in English composition (English 101 and 102 or equivalent); college algebra and finite math or calculus (Mathematics 119 and 123 or 125 or equivalent); general chemistry (Chemistry 100-110 or 120-130 or equivalent); general botany (Botany 110 and 120 or equivalent); soil science (Environmental and Soil Sciences 210 or equivalent); either Introduction to Ornamental Horticulture (Plant Sciences and Landscape Systems 110 or equivalent) or Introduction to Crop Science (Plant Sciences and Landscape Systems 235 or equivalent); Computer Applications to Problem Solving (Agriculture and Natural Resources 290 or equivalent).

### Business Management Concentration

The Business Management Concentration is fundamental to those interested in starting their own companies. Students receive a minor in either Business Administration or Agricultural Economics and Business allowing easier access to management positions as well as graduate programs such as the Master of Business Administration (MBA) should they want to continue their education in the future.

### Requirements for the Bachelor of Science in Plant Sciences and Landscape Systems • Plant Sciences and Landscape Systems Major • Business Management Concentration

Freshman	Hours	Credit
Botany 110-120 .....	8	8
Chemistry 100-110 or 120-130 .....	8	8
English 101-102 .....	6	6
Mathematics 119 and 125 .....	6	6
Plant Sciences and Landscape Systems 110 or 235 .....	3	3
<sup>1</sup> Humanities Elective .....	3	3
<b>Sophomore</b>		
Select 2 from Plant Sciences and Landscape Systems 220, 230, 231, or 280 .....	6	6
Agriculture and Natural Resources 290 .....	3	3
Accounting 201-202 .....	5	5
Economics 201 .....	4	4
Environmental and Soil Sciences 210 .....	4	4
Speech Communication 210 or 240 .....	3	3
Select Statistics 201 for Business Minor or Agricultural Economics 212 for Agricultural Economics Minor .....	3	3
<sup>1</sup> History Elective .....	3	3
<b>Junior</b>		
Select 3 from Plant Sciences and Landscape Systems 326, 330, 334, 340, 350, 360, 370, 380, 390, or 391 .....	9	9
Plant Sciences and Landscape Systems 492 .....	3	3
Select Business Administration 201 and Management 300 for Business Minor or Agricultural Economics 342 and 350 for Agricultural Economics Minor .....	6-7	6-7
Select 2 from Technical Electives .....	6	6
<sup>1</sup> History Elective .....	3	3
<sup>1</sup> Humanities Elective .....	3	3
<b>Senior</b>		
Select 3 Plant Sciences and Landscape Systems 410, 421, 427, 429, 430, 431, 433,434, 435, 436, 440, 446, 450, 451, 453, 460, 471, 480, 485, or 493 .....	7-10	7-10
Plant Sciences and Landscape Systems 490 .....	1	1
Select Finance 301 and Marketing 300 for Business Minor or Agricultural Economics 412 and an Agricultural Economics Elective for Agricultural Economics Minor .....	6	6
<sup>1</sup> Social Science Elective .....	3	3
Unrestricted Electives .....	8-12	8-12
Total	124	124

<sup>1</sup>Lists of appropriate electives are available and should be selected in conference with academic advisor. Students are encouraged to take some of the history and humanities courses at the 300 and 400 level. Three hours of the humanities or history electives must be a writing emphasis course.

### Horticulture and Agronomy Concentration

The Horticulture and Agronomy concentration is designed for the student desiring to pursue professions that include graduate studies, research and commercial production of agronomic and horticultural crops. Careful selection of departmental courses and other electives in consultation with an academic advisor will prepare graduates for the career of their choice. The concentration consists of two tracks of study: (1) emphasis in agronomy and (2) emphasis in horticulture.

### Requirements for the Bachelor of Science in Plant Sciences and Landscape Systems • Plant Sciences and Landscape Systems Major • Horticulture and Agronomy Concentration

Freshman	Hours	Credit
Botany 110-120 .....	8	8
Chemistry 100-110 or 120-130 .....	8	8
English 101-102 .....	6	6
Mathematics 119 and (125 or 130) or Mathematics 151-152 for Agronomy Track or Mathematics 119 and (123 or 125) for Horticulture Track .....	6	6
Select Plant and Soil Sciences 235 for Agronomy Track or Plant and Soil Sciences 110 for Horticulture Track .....	3	3
<b>Sophomore</b>		
<sup>1</sup> Directed Electives .....	6	6
Agriculture and Natural Resources 290 .....	3	3
<sup>1</sup> Humanities Elective .....	3	3
<sup>1</sup> Social Science Electives .....	3-4	3-4
Environmental and Soil Sciences 210 .....	4	4
Speech Communication 210 or 240 .....	3	3
Economics 201 .....	4	4
<sup>1</sup> History Elective .....	3	3
<b>Junior</b>		
Plant Sciences and Landscape Systems 330 .....	3	3
Select Plant Sciences and Landscape Systems 334 for Agronomy Track or select Plant Sciences and Landscape Systems 370 for Horticulture Track .....	3	3
Select 2 from Plant Sciences and Landscape Systems 340, 370, 390 or 391 for Agronomy Track or select 2 from Plant Sciences and Landscape Systems 334, 340, 350, 360, 390 or 391 for Horticulture Track .....	6	6
Plant Sciences and Landscape Systems 492 .....	3	3
Environmental and Soil Science 334 .....	3	3
<sup>1</sup> Directed Elective .....	3	3
Select 1 from Entomology and Plant Pathology 313, 321, or 410 .....	3	3
Technical Elective .....	3-4	3-4
<sup>1</sup> History Elective .....	3	3
<b>Senior</b>		
Plant Sciences and Landscape Systems 471 and 490 .....	4	4
Botany 321 .....	4	4
Chemistry 350 .....	4	4
Technical Elective .....	3-4	3-4
<sup>1</sup> Directed Electives .....	12-13	12-13
<sup>1</sup> Humanities Elective .....	3	3
Unrestricted Electives .....	1-4	1-4
Total	124	124

<sup>1</sup>Lists of appropriate electives are available and should be selected in conference with academic advisor. Students are encouraged to take some of the history and humanities courses at the 300 and 400 level. 3 hours of the humanities or history electives must be a writing-emphasis course.

### Landscape Design Concentration

Landscape designers create aesthetic concepts and practical plans for improved outdoor living. Students study fundamental and advanced landscape design, landscape design graphics, computer aided landscape design, surveying, art, socio-economic impact of plants, field botany, professional practices, basic woody plant identification, landscape construction and maintenance methods. The development of comprehensive design projects helps students prepare for careers in landscape design or advanced studies in landscape architecture. Graduates in design have access to a large segment of the ornamental horticulture commodity areas of employment.

**Requirements for the Bachelor of Science in Plant Sciences and Landscape Systems • Plant Sciences and Landscape Systems Major • Landscape Design Concentration**

Freshman	Hours	Credit
Botany 110-120 .....	8	8
Chemistry 100 or 120 .....	4	4
English 101-102 .....	6	6
Mathematics 119 and (123 or 125) .....	6	6
Plant Sciences and Landscape Systems 110 .....	3	3
<sup>1</sup> Social Science Elective .....	3	3
<b>Sophomore</b>		
Plant Sciences and Landscape Systems 220, 280 .....	6	6
Agriculture and Natural Resources 290 .....	3	3
<sup>1</sup> Natural Science Elective .....	4	4
Environmental/Technical Elective .....	3	3
Environmental and Soil Sciences 210 .....	4	4
Speech Communication 210 or 240 .....	3	3
<sup>1</sup> Humanities Elective .....	3	3
Unrestricted Electives .....	6	6
<b>Junior</b>		
Plant Sciences and Landscape Systems 350, 380 .....	6	6
Select 2 from Plant Sciences and Landscape Systems 230, 231, 330, 334, 340, or 370 .....	6	6
Plant Sciences and Landscape Systems 390 or 391 .....	3	3
Environmental/Technical Elective .....	3	3
<sup>1</sup> History Elective .....	3	3
<sup>1</sup> Social Science Elective .....	3	3
Unrestricted Electives .....	7	7
<b>Senior</b>		
Plant Sciences and Landscape Systems 460, 480, 485 .....	9	9
Select 2 from Plant Sciences and Landscape Systems 410, 427, 430, 434, 440, 446, 450 or 493 .....	6	6
Plant Sciences and Landscape Systems 490, 492 .....	4	4
Botany 330 or Plant Sciences and Landscape Systems 421 .....	3	3
Environmental/Technical Elective .....	3	3
<sup>1</sup> History Elective .....	3	3
<sup>1</sup> Humanities Elective .....	3	3
<b>Total</b>	<b>124</b>	

<sup>1</sup>Lists of appropriate electives are available and should be selected in conference with academic advisor. Students are encouraged to take some of the history and humanities courses at the 300- and 400-level. Three hours of the humanities or history electives must be a writing-emphasis course.

**Public Horticulture Concentration**

The Public Horticulture concentration is intended for students interested in professional careers which promote horticulture and emphasize people and their education and enjoyment of plants. Such careers include director of a botanical garden or park; city or urban horticulturist; extension agent, teacher, educational director, or program coordinator; professional garden writer/editor or publication manager; horticulture therapist; public garden curator; and plant collections manager. Directed technical electives allow the student to concentrate in an area of their interest while encouraging the development of good people skills. Students are required internship training in the area of their interest.

**Requirements for the Bachelor of Science in Plant Sciences and Landscape Systems • Plant Sciences and Landscape Systems Major • Public Horticulture Concentration**

Freshman	Hours	Credit
Botany 110-120 .....	8	8
Chemistry 100 or 120 .....	4	4
English 101-102 .....	6	6
Mathematics 119 and 123 or 125 .....	6	6
Plant Sciences and Landscape Systems 110 .....	3	3
<sup>1</sup> Natural Science Electives .....	4	4
<b>Sophomore</b>		
Select 2 from Plant Sciences and Landscape Systems 220, 230, 231, or 280 .....	6	6
Agriculture and Natural Resources 290 .....	3	3
Select 1 from Educational Psychology 210; Public Relations 270; Recreational and Tourism Management 201; Forestry Wildlife and Fisheries 211 or 250 .....	3	3
<sup>1</sup> Social Science Elective .....	3-4	3-4
Environmental and Soil Sciences 210 .....	4	4
Speech Communication 210 or 240 .....	3	3
<sup>1</sup> Humanities Elective .....	3	3
<sup>1</sup> History Elective .....	3	3
<b>Junior</b>		
Select 4 from Plant Sciences and Landscape Systems 330, 334, 340, 350, 360, 370, 380, 390, or 391 .....	12	12
Plant Sciences and Landscape Systems 326 .....	3	3
Select 1 from Philosophy 342, Agriculture and Extension Education 346, or Journalism 310 .....	3	3
Select 1 from Botany 309, 330; Entomology and Plant Pathology 313, 321, 410 .....	6	6
Select 1 from Technical Electives .....	6	6
<b>Senior</b>		
Select 4 from Plant Sciences and Landscape Systems 410, 421, 427, 429, 430, 431, 433,434, 436, 437, 440, 446, 450, 451, 460, 480, 485, 493, or 494 .....	8-12	8-12
Plant Sciences and Landscape Systems 490 and 492 .....	4	4
<sup>1</sup> Social Science Elective .....	3	3
<sup>1</sup> History Elective .....	3	3
Select 2 from Technical Electives .....	6	6
Unrestricted Electives .....	6-11	6-11
<b>Total</b>	<b>124</b>	

<sup>1</sup>Lists of appropriate electives are available and should be selected in conference with academic advisor. Students are encouraged to take some of the history and humanities courses at the 300- and 400-level. Three hours of the humanities or history electives must be a writing emphasis course.

**Turfgrass Management Concentration**

The Turfgrass Management concentration is designed for the student desiring to pursue professions that include growing and managing turfgrasses used for golf courses, parks, athletic fields, sports complexes, and residential and commercial lawns. Careful selection of departmental courses and other electives in consultation with an academic advisor will prepare graduates for the career of their choice.

## Requirements for the Bachelor of Science in Plant Sciences and Landscape Systems • Plant Sciences and Landscape Systems Major • Turfgrass Management Concentration

	Hours	Credit
<b>Freshman</b>		
Botany 110-120 .....	8	8
Chemistry 100-110 or 120-130 .....	8	8
English 101-102 .....	6	6
Mathematics 119 and (123 or 125) .....	6	6
Plant Sciences and Landscape Systems 110 or 235 .....	3	3
<sup>1</sup> Social Science Elective .....	3	3
<b>Sophomore</b>		
Plant Sciences and Landscape Systems 220, 230, 231, or 280 .....	3	3
Agriculture and Natural Resources 290 .....	3	3
<sup>1</sup> Humanities Elective .....	3	3
<sup>1</sup> Social Science Elective .....	4	4
Environmental and Soil Sciences 210 .....	4	4
Speech Communication 210 or 240 .....	3	3
<sup>1</sup> History Elective .....	3	3
Unrestricted Electives .....	6	6
<b>Junior</b>		
Plant Sciences and Landscape Systems 334, 370, and 340 .....	9	9
Select 2 from Plant Sciences and Landscape Systems 330, 350, 360, 390, or 391 .....	6	6
Plant Sciences and Landscape Systems 492 .....	3	3
Technical Electives .....	6	6
<sup>1</sup> History Elective .....	3	3
Unrestricted Elective .....	3	3
<b>Senior</b>		
Select 2 from Plant Sciences and Landscape Systems 410, 421, 430, 431, 433, 434, 435, 450, 451, 460, 471, or 493 .....	4-6	4-6
Plant Sciences and Landscape Systems 440 and 490 .....	5	5
Technical Electives .....	6	6
Botany 321 .....	4	4
<sup>1</sup> Humanities Elective .....	3	3
Unrestricted Electives .....	7-9	7-9
<b>Total</b>	<b>124</b>	

<sup>1</sup>Lists of appropriate electives are available and should be selected in conference with academic advisor. Students are encouraged to take some of the history and humanities courses at the 300- and 400-level. Three hours of the humanities or history electives must be a writing emphasis course.

## Minor in Plant Sciences and Landscape Systems

Plant Sciences and Landscape Systems 110 or 235; one additional lower-division course; and a minimum of 12 credit hours at the upper-division. Plant Sciences and Landscape Systems 471 will not be accepted as a course to meet minor requirements. Prerequisites, if any, to these courses will not be waived, but must be included in addition to the total of 18 hours.

Total 18

## ADDITIONAL ELECTIVES LIST FOR PLANT SCIENCES AND LANDSCAPE SYSTEMS MAJOR

### BUSINESS MANAGEMENT CONCENTRATION

#### Technical Electives

Biosystems Engineering Technology 202, 212, 452, 462; Environmental and Soil Sciences 324, 334, 462; Entomology and Plant Pathology 313, 321, 410.

### HORTICULTURE AND AGRONOMY CONCENTRATION

#### Technical Electives: Agronomy Tract

Agricultural Economics Elective (3); Biosystems Engineering Technology 212, 452, 462; Botany 310, 330; Environmental and Soil Sciences 324, 355, 434, 442, 444; Forestry, Wildlife, and Fisheries 250.

#### Technical Electives: Horticulture Tract

Agricultural Economics Elective (3); Biosystems Engineering Technology 212, 452, 462; Botany 310, 412, 431, 451; Forestry, Wildlife, and Fisheries 250.

#### Directed Electives for Sophomore Year:

##### Agronomy Track:

Microbiology 210 and Biology 240;

##### Horticulture Track:

Select 1 from Plant Sciences and Landscape Systems 220, 230, 231, or 280 and select 1 from Microbiology 210 or Biology 240

#### Directed Electives for Junior Year:

##### Agronomy Track:

Environmental and Soil Sciences 462

##### Horticulture Track:

Botany 330

#### Directed Electives for Senior Year:

##### Agronomy Track:

Plant Sciences and Landscape Systems 431, 434, 435, and 453

##### Horticulture Track:

Select 4 from Plant Sciences and Landscape Systems 410, 430, 431, 433, 434, 440, 451 or 453

### LANDSCAPE DESIGN CONCENTRATION

#### Environmental/Technical Electives

Architecture 111, 180, 211, 232, 421; Art 101, 103, 191, 295; Art Drawing 211, 212; Biology 250; Biosystems Engineering Technology 202, 212; Botany 305, 306, 330, 431; Entomology and Plant Pathology 306, 313, 321, 410; Environmental and Soil Sciences 324, 334; Forestry, Wildlife, and Fisheries 211, 250; Geology 201, 202; Geography 310, 439; Planning 401, 402.

### PUBLIC HORTICULTURE CONCENTRATION

#### Technical Electives

Accounting 415; Art 481; Botany 431; Educational Psychology 210; Forestry 423; Interior Design 200; Philosophy 342; Environmental and Soil Sciences 355, 434; Public Health 410; Public Relations 470; Recreation and Leisure Studies 410, 430; Speech 440.

### PUBLIC HORTICULTURE AND LANDSCAPE DESIGN CONCENTRATIONS

#### Natural Science Electives:

Chemistry 110, 130; Geography 131; Geology 101, 103.

### TURFGRASS MANAGEMENT CONCENTRATION

#### Technical Electives

Agricultural Economics Elective (3); Biosystems Engineering Technology 202, 212, 452, 462; Environmental and Soil Sciences 324, 334, 462; Entomology and Plant Pathology 313, 321, 410.