COLLEGE OF AGRICULTURE, FORESTRY AND LIFE SCIENCES

The mission of the College of Agriculture, Forestry and Life Sciences is to provide teaching, research, and service in agriculture, forestry, and life sciences that will benefit the citizens of South Carolina and the nation. The College of Agriculture, Forestry and Life Sciences serves more than 2,900 graduate and undergraduate students.

The ability to understand and manipulate the molecular structure of biological systems while at the same time understanding their practical management offers immense potential to improve our world, whether it is to improve foods, building products, the environment, or our health. The College of Agriculture, Forestry and Life Sciences is using the same expertise to produce more food on a shrinking globe; package environmentally sound products; grow better foods to fight breast cancer, prevent heart disease, and increase dairy production; increase timber production and provide new fuels; and develop businesses and promote a “green” society.

To assist students in achieving these goals, the William B. Bookhart Jr. Student Services Center provides academic advising and developmental services to promote success for students in the related degree programs. These services involve recruitment and retention, academic advising, multicultural affairs, study abroad, career development, and placement.

The College of Agriculture, Forestry and Life Sciences is impacting the world one graduate at a time—whether it is to improve foods, building products, the environment, or our health. The College of Agriculture, Forestry and Life Sciences is to provide teaching, research, and service in agriculture, forestry, and life sciences.

AGRICULTURAL EDUCATION

Bachelor of Science

Agricultural Education provides broad preparation in agricultural sciences and professional education, including communications and human relations skills. In addition to required courses, students may select a minor (see page 61).

The Bachelor’s degree prepares students for professional education positions in the mainstream of agriculture, including teaching, cooperative extension service, and government agricultural agencies. The Agricultural Education degree also prepares students for other educational work, such as agricultural missionary, public relations, and training officers in agricultural industry.

In consultation with the departmental advisor, students choose one of the following emphasis areas: Communications, Leadership, or Teaching.

COMUNICATIONS EMPHASIS AREA

Junior Year
First Semester
1 - AG ED 102 Agric. Education Freshman Seminar
3 - AG ED 200 Agricultural Applications of Educational Technology1 or 3 - Arts and Humanities (Non-Lit.) and STS Requirements1
3 - AVS 150 Introduction to Animal Science
1 - AVS 151 Introduction to Animal Science Lab.
3 - BIOL 103 General Biology I
1 - BIOL 105 General Biology Lab. I
1 - HORT 101 Horticulture
3 - Mathematics Requirement2
18

Second Semester
1 - AG ED 100 Orientation and Field Experience
3 - AG M 205 Principles of Fabrication
3 - BIOL 104 General Biology II
1 - BIOL 106 General Biology Lab. II
3 - ENGL 103 Accelerated Composition
6 - Social Science Requirement1
17

Sophomore Year
First Semester
3 - AG ED 201 Intro. to Agricultural Education
3 - AG ED 204 Applied Agriculture Calculations
3 - B T 220 Biosystems Technology I
4 - CH 101 General Chemistry
3 - HORT 212 Introduction to Turfgrass Culture
1 - HORT 213 Turfgrass Culture Lab.
17

Second Semester
4 - CH 102 General Chemistry
1 - COMM 101 Communication Academic and Professional Development 1
3 - ED SP 370 Introduction to Special Education
3 - EX ST 301 Introductory Statistics
3 - PHYS 207 General Physics I
3 - Technical Requirement4
16-17

Students in the Communications and Leadership Emphasis Area must take AG ED 200. Students in the Teaching Emphasis Area must take a course to satisfy both the Arts and Humanities (Non-Lit.) and STS Requirements. See General Education Requirements.

3See General Education Requirements. This course must also satisfy the Science and Technology in Society Requirement.
3See advisor.
3See General Education Requirements. This course must also satisfy the Science and Technology in Society Requirement.
3See advisor.
3See General Education Requirements. This course must also satisfy the Social Science Requirement.
3Required of students in Communications Emphasis Area only.
3See advisor.

SECOND SEMESTER

COMMUNICATIONS EMPHASIS AREA

Junior Year
First Semester
3 - AG ED 303 Mech. Technology for Agric. Ed.
1 - AG ED 321 Introduction to Agric. Ed.
3 - AG M 221 Surveying
4 - CSENV 202 Soils
3 - HORT 303 Landscape Plants
3 - Advanced Writing Requirement1
3 - Arts and Humanities (Literature) Requirement2
3 - Technical Requirement3
18

Senior Year
First Semester
3 - ENGL 231 Introduction to Journalism
3 - HORT 303 Landscape Plants
3 - Arts and Humanities (Literature) Requirement1
6 - Departmental Communication Requirement1
3 - Technical Requirement1
18

Second Semester
12 - AG ED 407 Internship in Extension and Leadership Education5

135 Total Semester Hours

LEADERSHIP EMPHASIS AREA

Junior Year
First Semester
3 - AG ED 303 Mech. Technology for Agric. Ed.
3 - AG M 221 Surveying
4 - CSENV 202 Soils
3 - HORT 303 Landscape Plants
3 - Advanced Writing Requirement1
3 - Arts and Humanities (Non-Lit.) Requirement2
19

Second Semester
3 - ED F 302 Educational Psychology
3 - EN R 302 Natural Resources Measurements
3 - HORT 305 Plant Propagation
1 - HORT 306 Plant Propagation Techniques Lab.
3 - Oral Communication Requirement4
3 - Technical Requirement4
16

Senior Year
First Semester
3 - AG ED 415 Leadership of Volunteers
3 - AG ED 416 Ethics and Issues in Agriculture and the Food and Fiber System
3 - MGT 201 Principles of Management
3 - Arts and Humanities (Literature) Requirement1
3 - Technical Requirement4
18

42
### AGRICULTURAL MECHANIZATION AND BUSINESS

#### Bachelor of Science
The Agricultural Mechanization and Business major provides a program for students who desire training in areas relevant to dynamic agricultural enterprise. The program is organized with strength in both business management and technical support of agriculture and agribusiness. To produce well rounded individuals with good communication skills, the curriculum includes courses in the humanities, social sciences, English composition, and public speaking.

Graduates in Agricultural Mechanization and Business find meaningful and remunerative employment in a variety of situations directly and indirectly related to agricultural production, processing, marketing, and the many services connected therewith. Farming and technical sales in the agricultural, industrial, and heavy equipment industries are frequently chosen careers.

By completing this curriculum, graduates will have fulfilled the requirements for an Agricultural Business Management minor or other selected minor. Contact the Enrolled Student Services Office to have the minor recorded.

Additional information is available from the departmental offices or can be found at [http://www.clemson.edu/cafsl/department/bioenvironment/index.html](http://www.clemson.edu/cafsl/department/bioenvironment/index.html).

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### TEACHING EMPHASIS AREA

#### Junior Year
**First Semester**
- 3 - AG ED 303 Mech. Technology for Ag. Ed.
- 3 - AG M 221 Surveying
- 4 - CSENV 202 Soils
- 3 - HORT 303 Landscape Plants
- 3 - Advanced Writing Requirement

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Second Semester
- 3 - AG ED 416 Ethics and Issues in Agriculture and the Food and Fiber System
- 3 - ED F 302 Educational Psychology
- 3 - E N R 302 Natural Resources Measurements
- 3 - HORT 305 Plant Propagation
- 1 - HORT 306 Plant Propagation Techniques Lab.
- 3 - Oral Communication Requirement

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#### Senior Year
**First Semester**
- 1 - AG ED 400 Supervised Field Experience II
- 3 - AG ED 401 Instructional Methods in Ag. Ed.
- 3 - AG ED 403 Principles of Adult/Ext. Education
- 3 - AG ED 423 Curriculum
- 3 - Arts and Humanities (Literature) Requirement
- 3 - Technical Requirement

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Second Semester
- 12 - AG ED 406 Directed Teaching
- 2 - AG ED 425 Teaching Agricultural Mechanics

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130 Total Semester Hours

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1‘ENGL 304 or 314 is recommended.
2See General Education Requirements. Six of these credit hours must also satisfy the Science and Technology in Society Requirement.
3See General Education Requirements. COMM 150 or 250 is recommended.
4See advisor.

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### Freshman Year
**First Semester**
- 3 - AG ED 303 Agricultural Applications of Educational Technology
- 1 - AG M 101 Intro to Ag. Mech. and Business
- 3 - AG M 205 Principles of Fabrication
- 1 - BIOL 103 General Biology I

**Second Semester**
- 1 - BIOL 103 General Biology Lab. I
- 1 - MTHSC 102 Intro. to Mathematical Analysis

#### Sophomore Year
**First Semester**
- 3 - AG M 221 Surveying
- 4 - CH 101 General Chemistry
- 2 - E G 210 Computer Aided Design/Engr. Apps. or
- 2 - E G 208 Engr. Graphics and Machine Design or
- 2 - E G 209 Intro. to Engr./Comp. Graphics
- 3 - MKT 301 Principles of Marketing or
- 3 - AP EC 309 Econ. of Agricultural Marketing
- 4 - PHYS 200 Introductory Physics or
- 1 - PHYS 209 General Physics I and

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Second Semester
- 3 - AG M 206 Machinery Management
- 3 - AG M 303 Calculations for Mechanized Agric.
- 4 - CH 102 General Chemistry
- 3 - COMM 250 Public Speaking
- 3 - Arts and Humanities (Literature) Requirement

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#### Junior Year
**First Semester**
- 3 - AG M 301 Soil and Water Conservation
- 3 - AG M 405 Environmental Control in Animal Structures
- 3 - AP EC 302 Economics of Farm Management or
- 3 - MGT 201 Principles of Management
- 3 - AP EC 308 Quantitative Applied Economics
- 4 - CSENV 202 Soils

Second Semester
- 3 - ACCT 201 Financial Accounting Concepts
- 3 - AG M 402 Drainage and Irrigation
- 3 - AG M 452 Mobile Power
- 3 - Arts and Humanities (Non-Lit.) Requirement
- 3 - Minor Requirement

#### Senior Year
**First Semester**
- 3 - AG M 406 Mechanical and Hydraulic Systems
- 3 - AG M 460 Electrical Systems
- 3 - AP EC 319 Agribusiness Management or
- 3 - MGT 201 Principles of Management
- 3 - Minor Requirement
- 3 - Plant/Crop Science Requirement
- 3 - Social Science Requirement

15 Total Semester Hours

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1Required for students minoring in Business Administration.
2See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and the Science and Technology in Society Requirements.
3MGT 201 can count for either of the AGM 302 or 319 requirement but not for both.
4See CAFLS approved minors. If requirements for an approved minor have already been satisfied, this course may be any 300 level (or higher) course from an approved program. Any required course in the curriculum can also be used to count towards minor requirements.
5AGRIC 104, CSENV 405, 423, 426, HORT 212, 305, 433, 455, 456, PL PA 310, 406, 411, or 459. If applicable, these courses may also be used to satisfy minor requirement.
6AG M 419 is a Full-only course. Students electing to take AG M 419 must switch the course order with a Fall offering.
7CSENV 403, 446, 452, 485, or 490. If applicable, these courses may also be used to satisfy minor requirement.
ANIMAL AND VETERINARY SCIENCES

Bachelor of Science

The Animal and Veterinary Sciences curriculum provides students with both a basic and applied understanding of the scientific principles needed for successful careers in the scientific, technical, and business phases of livestock and poultry production, processing, and marketing. Strengths of this program include extensive hands-on instruction at Clemson’s five animal farms, personalized advising, and the opportunity for valued-added experiences, including involvement in research, teaching, extension, international travel, and internships. Students choose from three concentrations.

The Animal Agribusiness Concentration prepares students for careers in the many facets of the animal industries, including production, sales and marketing, business management, advertising, and extension. The Equine Business Concentration prepares students for such professions as trainers, managers, riding instructors, sales or media representatives, breed association representatives or for equine entrepreneurial careers such as owners of tack shops, boarding facilities, or riding schools. The Preveterinary and Science Concentration prepares students to meet the requirements for most veterinary schools, graduate schools, and medical and dental schools. Students with South Carolina residency may compete for contract seats at Mississippi State, Tuskegee, and University of Georgia Colleges of Veterinary Medicine. Experienced preprofessional advising is provided for all students pursuing advanced degrees.

Change of Major into Animal and Veterinary Sciences

Students who change majors into Animal and Veterinary Sciences must have a 2.5 minimum cumulative grade-point ratio.

ANIMAL AGROBUSINESS CONCENTRATION

Freshman Year

First Semester
1 - AVS 100 Orientation to Animal and Vet. Sci.  
3 - AVS 405 Principles of Animal Nutrition  
3 - AVS 410 Domestic Animal Behavior  
3 - AVS 415 Contemporary Issues in Animal Sci.  
3 - MTHSC 102 Intro. to Math. Analysis or  
3 - MTHSC 106 Calculus of One Variable I  
2 - AVS Techniques Requirement²  
16-17

Second Semester
3 - AVS 375 Applied Animal Nutrition  
3 - AVS 413 Animal Products  
3 - AVS 453 Animal Reproduction  
3 - LAW 322 Legal Environment of Business  
3 - Elective  
15

Junior Year

First Semester
4 - AVS 301 Anat. and Phys. of Domestic Animals  
3 - AVS 370 Principles of Animal Nutrition  
3 - AVS 470 Animal Genetics  
3 - CSENV 423 Field Crops—Forages  
3 - ECON 212 Principles of Macroeconomics  
16

Second Semester
3 - AVS 370 Principles of Animal Nutrition  
3 - AVS 417 Animal Agribusiness Development  
3 - AVS 410 Domestic Animal Behavior  
2 - Elective  
15

Senior Year

First Semester
3 - AVS 310 Animal Health  
3 - AVS 405 Principles of Animal Nutrition  
3 - AVS 415 Contemporary Issues in Animal Sci.  
3 - MTHSC 102 Intro. to Math. Analysis or  
3 - MTHSC 106 Calculus of One Variable I  
2 - AVS Techniques Requirement²  
16

Second Semester
2 - AVS 406 Seminars and Related Topics  
3 - AVS 410 Domestic Animal Behavior  
2 - AVS 417 Animal Agribusiness Development  
4 - AVS 450 Sustainable Livestock Production Sys.  
3 - AVS Experience-Based Activity³  
2 - Elective  
15

123–126 Total Semester Hours

SOPHOMORE YEAR

1See General Education Requirements. AP EC and ECON courses may not be used to fulfill General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

2Select from: AVS 200, 201, 203, 204, 206, 209, 302, 309, 311, 323, 405 or 455

3AVS 302, 309, 311 or 323

4AVS 160, 390, 441, 442, 443, 444 or 491

Note: No course listed in footnote 2, 3 or 4 may be used to satisfy more than one requirement.

College of Agriculture, Forestry and Life Sciences

EQUINE BUSINESS CONCENTRATION

Freshman Year

First Semester
1 - AVS 100 Orientation to Animal and Vet. Sci.  
3 - AVS 150 Introduction to Animal Science  
1 - AVS 151 Introduction to Animal Science Lab.  
3 - BIOL 103 General Biology I and  
1 - BIOL 105 General Biology Lab. I or  
5 - BIOL 110 Principles of Biology I  
4 - CH 101 General Chemistry  
3 - Arts and Humanities (Non-Lit.) Requirement¹  
16-17

Second Semester
3 - BIOL 106 General Biology Lab. II  
3 - BIOL 104 General Biology II  
3 - Arts and Humanities (Lit.) Requirement¹  
16

Sophomore Year

First Semester
2 - AVS Techniques Requirement²  
3 - ACCT 201 Financial Accounting Concepts  
2 - AVS 204 Horse Care Techniques  
3 - EXST 301 Introductory Statistics  
3 - ACCT 201 Financial Accounting Concepts  
3 - MGT 201 Principles of Management  
16-18

Second Semester
3 - BIOL 106 General Biology Lab. II or  
1 - BIOL 106 General Biology Lab. II or  
5 - BIOL 111 Principles of Biology II  
4 - CH 102 General Chemistry  
3 - ENGL 103 Accelerated Composition  
3 - MTHSC 101 Ess. Math. for Inform. Soc. or  
3 - MTHSC 102 Intro. to Math. Analysis or  
3 - MTHSC 106 Calculus of One Variable I  
2 - AVS Techniques Requirement²  
16-18

Junior Year

First Semester
4 - AVS 301 Anat. and Phys. of Domestic Animals  
3 - AVS 370 Principles of Animal Nutrition  
3 - AVS 470 Animal Genetics  
3 - CSENV 423 Field Crops—Forages  
3 - ECON 212 Principles of Macroeconomics  
16

Second Semester
3 - ECON 311 Principles of Microeconomics  
3 - FIN 306 Corporation Finance  
3 - MGT 301 Principles of Marketing  
2 - AVS Techniques Requirement²  
3 - Social Science Requirement¹  
16

Junior Year

First Semester
4 - AVS 301 Anat. and Phys. of Domestic Animals  
3 - AVS 370 Principles of Animal Nutrition  
3 - AVS 470 Animal Genetics  
3 - CSENV 423 Field Crops—Forages  
3 - ECON 212 Principles of Macroeconomics  
16

Second Semester
3 - AVS 417 Animal Agribusiness Development  
3 - AVS 410 Domestic Animal Behavior  
2 - AVS 417 Animal Agribusiness Development  
4 - AVS 450 Sustainable Livestock Production Sys.  
3 - AVS Experience-Based Activity³  
2 - Elective  
15

1See General Education Requirements. AP EC and ECON courses may not be used to fulfill General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

2Select from: AVS 200, 201, 203, 204, 206, 209, 302, 309, 311, 323, 405 or 455

3AVS 302, 309, 311 or 323

4AVS 160, 390, 441, 442, 443, 444 or 491

Note: No course listed in footnote 2, 3 or 4 may be used to satisfy more than one requirement.
Senior Year

First Semester
3  - AVS 310 Animal Health
1  - AVS 400 Animal and Veterinary Sciences Professional Development
2  - AVS 406 Seminars and Related Topics
3  - AVS 415 Contemporary Issues in Animal Sci.
4  - AVS 416 Equine Exercise Physiology
2  - AVS Experience-Based Activity¹

Second Semester
3  - AVS 410 Domestic Animal Behavior
4  - AVS 412 Advanced Equine Management
2  - AVS 417 Animal Agribusiness Development
5  - Elective

121–124 Total Semester Hours

¹See General Education Requirements. AP EC and ECON courses may not be used to fulfill General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

²AVS 200, 201, 203, 205, 206, 209, 302, 309, 311, 323, 405 or 455
³AVS 360, 390, 441, 442, 443, 444 or 491

Note: No course listed in footnote 2 or 3 may be used to satisfy more than one requirement.

PREVETERINARY AND SCIENCE CONCENTRATION

Freshman Year
First Semester
1  - AVS 100 Orientation to Animal and Vet. Sci.
3  - AVS 150 Introduction to Animal Science
1  - AVS 151 Intro. to Animal Science Lab.
3  - BIOL 103 General Biology I and
1  - BIOL 105 General Biology Lab. I or
5  - BIOL 110 Principles of Biology I
4  - CH 101 General Chemistry
3  - Arts and Humanities (Non-Lit.) Requirement
1
16-17

Second Semester
3  - BIOL 104 General Biology II and
1  - BIOL 106 General Biology Lab. II or
5  - BIOL 111 Principles of Biology II
4  - CH 102 General Chemistry
3  - ENGL 103 Accelerated Composition
3  - MTHSC 102 Intro. to Math. Analysis or
4  - MTHSC 106 Calculus of One Variable I
2  - AVS Techniques Requirement²

16-18

Sophomore Year
First Semester
3  - CH 223 Organic Chemistry
1  - CH 227 Organic Chemistry Lab.
3  - PHYS 207 General Physics I
1  - PHYS 209 General Physics I Lab.
3  - Arts and Humanities (Literature) Requirement
2  - AVS Techniques Requirement²
3  - Social Science Requirement¹

16

Second Semester
3  - CH 224 Organic Chemistry
1  - CH 228 Organic Chemistry Lab.
3  - EX ST 301 Introductory Statistics or
3  - MTHSC 203 Elem. Statistical Inference
3  - PHYS 208 General Physics II
1  - PHYS 210 General Physics II Lab.
2  - AVS Evaluation Requirement³ or
3  - Oral Communication Requirement¹
2  - AVS Techniques Requirement²

15-16

Junior Year
First Semester
4  - AVS 301 Anat. and Phys. of Domestic Animals
3  - AVS 310 Animal Health
3  - AVS 370 Principles of Animal Nutrition
3  - BIOCH 301 Molecular Biochemistry or
3  - BIOCH 305 Essential Elements of Bioch. or
3  - BIOCH 406 Physiological Chemistry
3  - Departmental Requirement⁴

16

Second Semester
3  - AVS 375 Applied Animal Nutrition
3  - AVS 453 Animal Reproduction
3  - GEN 300 Fundamental Genetics⁵
4  - MICRO 305 General Microbiology
1  - AVS Experience-Based Activity³

14

Senior Year
First Semester
4  - AVS 410 Anat. and Phys. of Domestic Animals
3  - AVS 413 Animal Products
3  - AVS 410 Domestic Animal Behavior
3  - AVS 413 Animal Products
2  - AVS Techniques Requirement²
3  - Elective

12

Second Semester
3  - AVS 415 Contemporary Issues in Animal Sci.
3  - AVS 400 Animal and Veterinary Sciences
2  - AVS Techniques Requirement²
3  - Departmental Requirement⁴

16

¹See General Education Requirements. Courses must be selected from two different fields. AP EC and ECON are considered in the same field. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.
²AVS 200, 201, 203, 204, 206, 209, 302, 309, 311, 323, 405 or 455
³AVS 360, 390, 441, 442, 443, 444 or 491
⁴May take GEN 300 and MICRO 305 in either semester of the junior year.
⁵Select from: AVS 360, 390, 441, 442, 443, 444 or 491

Note: No course listed in footnote 2, 3, 4 or 6 may be used to satisfy more than one requirement.

BIOCHEMISTRY

Bachelor of Science

Biochemistry is the study of the molecular basis of life. To comprehend current biochemical information and make future contributions to our molecular understanding of life processes, students must obtain a broad background in biology and a firm foundation in chemistry, mathematics, and physics. This is the basis of the biochemistry curriculum.

The program provides an excellent educational background for professional school (medicine, dentistry, or veterinary medicine) and graduate school in biochemistry, molecular biology, or another biological science discipline. Graduates will find employment opportunities in the research and service programs of universities, medical schools, hospitals, research institutes, and industrial and government laboratories.

Freshman Year
First Semester
1  - BIOCH 103 Careers in Biochem. and Genetics
5  - BIOL 110 Principles of Biology I
4  - CH 101 General Chemistry
4  - MTHSC 106 Calculus of One Variable I
14

Second Semester
5  - BIOL 111 Principles of Biology II
4  - CH 102 General Chemistry
3  - ENGL 103 Accelerated Composition
4  - MTHSC 108 Calculus of One Variable II
16

Sophomore Year
First Semester
3  - CH 223 Organic Chemistry
1  - CH 227 Organic Chemistry Lab.
3  - GEN 302 Molecular and General Genetics
2  - GEN 303 Molecular and Gen. Genetics Lab.
3  - PHYS 122 Physics with Calculus I
1  - PHYS 124 Physics Lab. I
3-4  - Advanced Mathematics Requirement⁶
16-17

Second Semester
3  - BIOCH 301 Molecular Biochemistry
3  - CH 224 Organic Chemistry
1  - CH 228 Organic Chemistry Lab.
3  - COMM 150 Intro. to Human Comm. or
3  - COMM 250 Public Speaking
3  - PHYS 221 Physics with Calculus II
1  - PHYS 223 Physics Lab. II
3  - Arts and Humanities (Literature) Requirement⁷
17

Junior Year
First Semester
3  - BIOCH 431 Physical Approach to Biochem.
2  - BIOCH 433 General Biochemistry Lab. I
1  - CH 330 Introduction to Physical Chemistry³
3  - Science Requirement⁴
5  - Elective
16
Second Semester
3 - BIOC 432 Biochemistry of Metabolism
2 - BIOC 434 General Biochemistry Lab. II
3 - BIOC 436 Molecular Biol.; Genes to Proteins
3 - PHIL 326 Science and Values
3 - Science Requirement* 4
- Elective 4
14

Senior Year
First Semester
3 - BIOC 461 Cell Biology
3 - GEN (BIOC) 440 Bioinformatics
3 - Social Science Requirement 1
4 - Elective 6
13
Second Semester
2 - BIOC 493 Senior Seminar
3 - Science Requirement 4
3 - Social Science Requirement 3
6 - Elective 6
14
120–121 Total Semester Hours

*See General Education Requirements.

**BIOSC 222, 223, or any courses at 300 level or above in BIOC, BIOE, BION, CH, EXST, GEN, MICRO, MTHSC, PHYS, PL PA, and PL PH. Other courses must be approved by advisor.

***See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

**Fourth semester of a foreign language are strongly recommended.

Note:
1. A student is allowed to enroll in science and mathematics courses only when all prerequisites have been passed with a grade of C or higher.
2. A minimum grade of C is required in all science and mathematics courses. No student may exceed a maximum of two attempts, excluding a W, to complete successfully any science or mathematics course.

BIOLOGICAL SCIENCES

Bachelor of Science

Biology encompasses the broad spectrum of the modern life sciences, including the study of all aspects of life from the structure and function of the whole organism down to the subcellular levels and up through the interactions of organisms to the integrated existence of life on the entire planet. Descriptive, structural, functional, and evolutionary questions are explored through the hierarchy of the organization of life. Applications of current advances to the health and well-being of man and society, to nature and the continuation of earth as a balanced ecosystem, and to an appreciation of the place of natural science in our cultural heritage receive emphasis.

Majors in Biological Sciences receive classroom, laboratory, and field training in biology with an emphasis on chemistry, mathematics, and physics as necessary tools. The Bachelor of Science in Biological Sciences curriculum prepares students for graduate study in any of the life science areas (such as agricultural sciences, biochemistry, botany, cell and molecular biology, conservation, ecology and environmental science, entomology, forestry, genetics, industrial and regulatory biology, microbiology, morphology, physiology, wildlife biology, and zoology; for the health professions (medicine, dentistry, etc.), veterinary medicine; and for science teaching.

Combined Bachelor of Science in Biological Sciences/Master of Science in Bioengineering

Under this plan, students may reduce the time necessary to earn both degrees by applying graduate credits to both undergraduate and graduate program requirements. See Academic Regulations in this catalog for enrollment guidelines and procedures. Students are encouraged to obtain the specific requirements for the dual degree from the Department of Biological Sciences or Bioengineering as early as possible in their undergraduate program as a number of required courses have prerequisites not normally taken by Biological Sciences majors.

Freshman Year
First Semester
5 - BIOL 110 Principles of Biology I
1 - BIOC 101 Frontiers in Biology I
4 - CH 101 General Chemistry
3 - COMM 150 Intro. to Human Communication or 3 - COMM 250 Public Speaking
4 - MTHSC 106 Calculus of One Variable I
17
Second Semester
5 - BIOL 111 Principles of Biology II
1 - BIOC 102 Frontiers in Biology II
4 - CH 102 General Chemistry
3 - ENGL 103 Accelerated Composition
4 - MTHSC 107 Calculus II for Scientists and Engineers
17

Sophomore Year
First Semester
3 - CH 223 Organic Chemistry and 1 - CH 227 Organic Chemistry Lab. or 4 - CH 201 Survey of Organic Chemistry
4 - Animal or Plant Diversity Requirement 2
3 - Arts and Humanities (Literature) Requirement 1
3 - Biochemistry or Genetics Requirement 4
14
Second Semester
3 - CH 224 Organic Chemistry and 1 - CH 228 Organic Chemistry Laboratory or 4 - Major Requirement 6
4 - Animal or Plant Diversity Requirement 2
3 - Biochemistry or Genetics Requirement 4
5 - Major Requirement 6
16
Junior Year
First Semester
3 - BIOC 335 Evolutionary Biology
3 - BIOC 461 Cell Biology
2 - BIOC 462 Cell Biology Lab.
3 - ENGL 315 Scientific Writing and Comm.
3 - PHYS 207 General Physics I and 1 - PHYS 209 General Physics I Lab. or 3 - PHYS 122 Physics with Calculus I and 1 - PHYS 124 Physics Lab. I
15
Second Semester
3 - PHYS 208 General Physics II and 1 - PHYS 210 General Physics II Lab. or 3 - PHYS 221 Physics with Calculus II and 1 - PHYS 223 Physics Lab. II
3 - Arts and Humanities (Non-Lit.) Requirement 1
5 - Major Requirement 6
3 - Social Science Requirement 1
15
Senior Year
First Semester
2 - BIOC 493 Senior Seminar
13 - Major Requirement 6
15
Second Semester
12 - Major Requirement 6
3 - Social Science Requirement 3
15
124 Total Semester Hours

BIOL 110 and 111 are strongly recommended; however, BIOL 103 may substitute for BIOL 110, and BIOL 104/106 may substitute for BIOL 111. The remaining 1–2 credits required must be satisfied by completing 1–2 extra credits from department course offerings at the 300 level or above. See advisor. At least one lecture and associated laboratory course must be completed for both animal diversity (BIOC 302/306 or BIOC 303/307, or other approved coursework at the 300 level or higher) and for plant diversity (BIOC 304/305, BIOC 320, or BIOC 406/407, or other approved coursework at the 300 level or higher).

*See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

**At least one lecture course must be completed for both biochemistry (BIOC 301 or 305, or other approved coursework at the 200 level or higher) and for genetics (GEN 300 or 302, or other approved coursework at the 200 level or higher).

*BIOC 434 may be substituted for CH 228.

See advisor. Select one lecture/lab combination from each of the following fields:
- Physiology—BIOC 316, 401/402, 459/460, 475/476

The remaining courses may be selected from a department approved list. Students planning to apply to medical, dental or graduate school should select a statistics course.

ENTOMOLOGY EMPHASIS AREA

See Bachelor of Science curriculum for freshman year requirements.

Sophomore Year
First Semester
3 - CH 223 Organic Chemistry and 1 - CH 227 Organic Chemistry Lab. or 4 - CH 201 Survey of Organic Chemistry
4 - ENT (BIOC) 301 Insect Biol. and Diversity
3 - Arts and Humanities (Literature) Requirement 1
3 - Biochemistry or Genetics Requirement 4
14
Second Semester
3 - CH 224 Organic Chemistry and 1 - CH 228 Organic Chemistry Laboratory or 4 - Major Requirement 6
4 - Animal or Plant Diversity Requirement 2
3 - Biochemistry or Genetics Requirement 4
5 - Major Requirement 6
16
Junior Year
First Semester
3 - BIOSC 335 Evolutionary Biology
3 - ENGL 315 Scientific Writing and Comm.
3 - PHYS 207 General Physics I and
1 - PHYS 209 General Physics I Lab. or
3 - PHYS 122 Physics with Calculus I and
1 - PHYS 124 Physics Lab. I
4 - Entomology Requirement6
14
Second Semester
3 - PHYS 208 General Physics II and
1 - PHYS 210 General Physics II Lab. or
3 - PHYS 221 Physics with Calculus II and
1 - PHYS 223 Physics Lab. II
3 - Arts and Humanities (Non-Lit.) Requirement1
3 - Entomology Requirement6
3 - Major Requirement4
3 - Social Science Requirement1
16
Senior Year
First Semester
3 - BIOSC 461 Cell Biology
2 - BIOSC 462 Cell Biology Lab.
2 - BIOSC 493 Senior Seminar
4 - Entomology Requirement6
4 - Major Requirement4
15
Second Semester
3 - Entomology Requirement6
9 - Major Requirement4
3 - Social Science Requirement1
15
124 Total Semester Hours

PREPHARMACY EMPHASIS AREA

Freshman Year
First Semester
3 - BIOL 103 General Biology I
1 - BIOL 105 General Biology Lab. I
1 - BIOSC 101 Frontiers in Biology I
4 - CH 101 General Chemistry
3 - COMM 150 Intro. to Human Communication or
3 - COMM 250 Public Speaking
4 - MTHSC 106 Calculus of One Variable I
16
Second Semester
3 - BIOL 104 General Biology II
1 - BIOL 106 General Biology Lab. II
1 - BIOSC 102 Frontiers in Biology II
4 - CH 102 General Chemistry
3 - ENGL 103 Accelerated Composition
4 - MTHSC 111 Calculus II for Biologists
16
Sophomore Year
First Semester
3 - CH 223 Organic Chemistry
1 - CH 227 Organic Chemistry Lab.
4 - Animal or Plant Diversity Requirement
3 - Arts and Humanities (Literature) Requirement1
3 - Biochemistry or Genetics Requirement6
3 - Social Science Requirement1
17
Second Semester
3 - CH 224 Organic Chemistry
1 - CH 228 Organic Chemistry Lab.
4 - MICRO 195 General Microbiology
4 - Animal or Plant Diversity Requirement2
3 - Biochemistry or Genetics Requirement6
15
Junior Year
First Semester
4 - BIOSC 315 Functional Human Anatomy
3 - BIOSC 335 Evolutionary Biology
3 - ENGL 315 Scientific Writing and Comm.
5 - PHYS 207 General Physics I and
1 - PHYS 209 General Physics I Lab. or
3 - PHYS 122 Physics with Calculus I and
1 - PHYS 124 Physics Lab. I
14
Second Semester
3 - PHYS 208 General Physics II and
1 - PHYS 210 General Physics II Lab. or
3 - PHYS 221 Physics with Calculus II and
1 - PHYS 223 Physics Lab. II
3 - PSYCH 201 Introduction to Psychology
4 - Animal Physiology Requirement5
3 - Biochemistry or Genetics Requirement6
3 - Economics Requirement6
3 - Major Requirement1
17
Senior Year
First Semester
3 - BIOSC 461 Cell Biology
2 - BIOSC 462 Cell Biology Lab.
2 - BIOSC 493 Senior Seminar
8 - Major Requirement1
15
Second Semester
3 - Arts and Humanities (Non-Lit.) Requirement1
11 - Major Requirement1
14
124 Total Semester Hours

1See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.
2At least one lecture course must be completed for biochemistry (BIOCH 301, 305, or other approved coursework at the 200 level or higher) and for genetics (GEN 300, 302, 303/307, or other approved coursework at the 200 level or higher).
3At least one lecture course must be completed for biochemistry (BIOCH 301 or 305, or other approved coursework at the 200 level or higher) and for genetics (GEN 300 or 302, or other approved coursework at the 200 level or higher).
4At least one lecture course must be completed for botany (BIOSC 302, 306, 307/309, or other approved coursework at the 200 level or higher) and for genetics (GEN 300 or 302, or other approved coursework at the 200 level or higher).
5See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.
6At least one lecture and associated laboratory must be completed for both animal diversity (BIOSC 302, 306, 307, or other approved coursework at the 200 level or higher) and for plant diversity (BIOSC 304, 308, BIOSC 320, or BIOSC 466/467, or other approved coursework at the 200 level or higher).
7See advisor. Select one lecture/lab combination from ecology (BIOSC 441/444, 447/448, 447/471). The remaining courses may be selected from a department approved list. Students planning to apply to medical, dental or graduate school should select a statistics course.

QUANTITATIVE BIOLOGY EMPHASIS AREA
See Bachelor of Science curriculum for freshman year requirements.

Sophomore Year
First Semester
3 - CH 223 Organic Chemistry
1 - CH 227 Organic Chemistry Lab. or
4 - CH 201 Survey of Organic Chemistry
4 - Animal or Plant Diversity Requirement
3 - Biochemistry or Genetics Requirement2
3 - Partial Differential Equations Requirement3
14
Second Semester
3 - CH 224 Organic Chemistry
1 - CH 228 Organic Chemistry Lab.
4 - MICRO 195 General Microbiology
4 - Animal or Plant Diversity Requirement2
3 - Biochemistry or Genetics Requirement2
3 - Major Requirement5
17
Junior Year
First Semester
3 - BIOSC 335 Evolutionary Biology
3 - ENGL 315 Scientific Writing and Comm.
3 - PHYS 207 General Physics I and
1 - PHYS 209 General Physics I Lab. or
3 - PHYS 122 Physics with Calculus I and
1 - PHYS 124 Physics Lab. I
14
Second Semester
3 - PHYS 208 General Physics II and
1 - PHYS 210 General Physics II Lab. or
3 - PHYS 221 Physics with Calculus II and
1 - PHYS 223 Physics Lab. II
3 - PSYCH 201 Introduction to Psychology
4 - Animal Physiology Requirement5
3 - Biochemistry or Genetics Requirement6
3 - Economics Requirement6
3 - Major Requirement1
17
Senior Year
First Semester
3 - BIOSC 461 Cell Biology
2 - BIOSC 462 Cell Biology Lab.
2 - BIOSC 493 Senior Seminar
8 - Major Requirement1
15
Second Semester
3 - Arts and Humanities (Non-Lit.) Requirement1
11 - Major Requirement1
14
124 Total Semester Hours

1Pharmacy programs require BIOL 103/105 and 104/106 or equivalent; however, BIOL 110 and 111 may substitute. The additional 1-2 credit hours will be subtracted from Major Requirement credits.
2At least one lecture and associated laboratory must be completed for both animal diversity (BIOSC 302, 306, 307, or other approved coursework at the 200 level or higher) and for plant diversity (BIOSC 304, 308, BIOSC 320, or BIOSC 466/467, or other approved coursework at the 200 level or higher).
3At least one lecture course must be completed for biochemistry (BIOCH 301 or 305, or other approved coursework at the 200 level or higher) and for genetics (GEN 300 or 302, or other approved coursework at the 200 level or higher).
4At least one lecture course must be completed for biochemistry (BIOCH 301 or 305, or other approved coursework at the 200 level or higher) and for genetics (GEN 300 or 302, or other approved coursework at the 200 level or higher).
5See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.
6At least one lecture course must be completed for botany (BIOSC 302, 306, 307/309, or other approved coursework at the 200 level or higher) and for genetics (GEN 300 or 302, or other approved coursework at the 200 level or higher).
7See advisor. Select one lecture/lab combination in ecology (BIOSC 441/444, 447/448, 447/471). The remaining courses may be selected from a department approved list. Students planning to apply to medical, dental or graduate school should select a statistics course.
Second Semester
4 - BIOSC 428 Quantitative Biology
3 - BIOSC 461 Cell Biology
2 - BIOSC 462 Cell Biology Lab.
1 - PHYS 208 General Physics II and
1 - PHYS 210 General Physics II Lab. or
3 - PHYS 221 Physics with Calculus II and
1 - PHYS 223 Physics Lab. II
3 - Social Science Requirement6
16

Senior Year
First Semester
2 - BIOSC 493 Senior Seminar
3 - GEN 440 Bioinformatics
3 - Arts and Humanities (Literature) Requirement6
5 - Major Requirement5
3 - Biochemistry or Genetics Requirement3
3 - CH 224 Organic Chemistry1
Second Semester
3 - BIOSC 210 Introduction to Toxicology
requirements.
TOXICOLOGY EMPHASIS AREA
4BIOSC 434 may be substituted for CH 228.
1At least one lecture and associated laboratory must be completed
125 Total Semester Hours
for both animal diversity (BIOSC 302/306 or BIOSC 303/307, or other approved coursework at the 200 level or higher) and
or plant diversity (BIOSC 304/308, BIOSC 305/309, BIOSC 320, or BIOSC 406/407, or other approved coursework at the 200 level or higher).
2At least one lecture course must be completed for both biochem-
3 - CH 313 Quantitative Analysis
14
ysis (BIOSC 301 or 305, or other approved coursework at the 200 level or higher) and for genetics (GEN 300 or 302, or other approved coursework at the 200 level or higher).
3 - CH 413 Chemistry of Aquatic Systems or
1 - PHYS 210 General Physics II and
3 - Social Science Requirement6
14
3 - ARTS 421 Chemical Sources and Fate in
1 - PHYS 209 General Physics I Lab. or
Environmental System
3 - Arts and Humanities (Literature) Requirement6
4 - Major Requirement4
3 - Toxicology Requirement2
1 - PHYS 212 Physics with Calculus I and
3 - Social Science Requirement6
16-17
1 - PHYS 214 Physics Lab. I
5 - Major Requirement3
3 - Major Requirement3
16
3 - TOX 430 Toxicology
2 - BIOSC 434/435 Evolutionary Biology
3 - ENGL 315 Scientific Writing and Comm.
3 - ENTOX 430 Toxicology
3 - GEN 300 or 302, or other approved coursework at the 200 level or higher).
4 - CH 228 Organic Chemistry Laboratory
12
BIOL 124 Total Semester Hours
1CH 223/227 and 224 are recommended.
3At least one lecture and associated laboratory must be completed
3 - COMM 450 Intro. to Human Communication or
3At least one lecture and associated laboratory must be completed
3 - ENTOX 421 Chemical Sources and Fate in
for both animal diversity (BIOSC 302/306 or BIOSC 303/307, or other approved coursework at the 200 level or higher) and for plant diversity (BIOSC 304/308, BIOSC 305/309, BIOSC 320, or BIOSC 406/407, or other approved coursework at the 200 level or higher).
2At least one lecture course must be completed for both biochem-
3 - ARTS 421 Chemical Sources and Fate in
1 - PHYS 209 General Physics I Lab. or
3 - Social Science Requirement6
14
ysis (BIOSC 301 or 305, or other approved coursework at the 200 level or higher) and for genetics (GEN 300 or 302, or other approved coursework at the 200 level or higher).
3 - CH 413 Chemistry of Aquatic Systems or
1 - PHYS 210 General Physics II and
3 - Social Science Requirement6
14
3 - ARTS 421 Chemical Sources and Fate in
1 - PHYS 212 Physics with Calculus I and
3 - Social Science Requirement6
16-17
3 - ARTS 421 Chemical Sources and Fate in
1 - PHYS 214 Physics Lab. I
5 - Major Requirement3
3 - Major Requirement3
16

Senior Year
First Semester
3 - BIOSC 461 Cell Biology
2 - BIOSC 462 Cell Biology Lab.
2 - BIOSC 493 Senior Seminar
3 - CH 313 Quantitative Analysis
1 - CH 317 Quantitative Analysis Lab.
3 - Major Requirement3
14
Second Semester
3 - CH 413 Chemistry of Aquatic Systems or
3 - ENTOX 421 Chemical Sources and Fate in
Environmental System
3 - Arts and Humanities (Non-Lit.) Requirement6
3 - Major Requirement5
3 - Social Science Requirement6
14
Senior Year
First Semester
3 - BIOSC 461 Cell Biology
2 - BIOSC 462 Cell Biology Lab.
2 - BIOSC 493 Senior Seminar
3 - CH 313 Quantitative Analysis
1 - CH 317 Quantitative Analysis Lab.
3 - Major Requirement3
14
Second Semester
3 - CH 413 Chemistry of Aquatic Systems or
3 - ENTOX 421 Chemical Sources and Fate in
Environmental System
3 - Arts and Humanities (Non-Lit.) Requirement6
3 - Major Requirement5
3 - Social Science Requirement6
14

Sophomore Year
First Semester
3 - BIOSC 210 Introduction to Toxicology
3 - CH 223 Organic Chemistry1 and
1 - CH 227 Organic Chemistry Lab., or
4 - CH 201 Survey of Organic Chemistry
4 - Animal or Plant Diversity Requirement2
3 - Biochemistry or Genetics Requirement1
14
Second Semester
3 - CH 224 Organic Chemistry1 and
1 - CH 228 Organic Chemistry Laboratory6 or
4 - Major Requirement2
4 - Animal or Plant Diversity Requirement2
3 - Biochemistry or Genetics Requirement1
5 - Major Requirement1
16

Junior Year
First Semester
3 - BIOSC 335 Evolutionary Biology
3 - ENGL 315 Scientific Writing and Comm.
3 - ENTOX 430 Toxicology
3 - PHYS 207 General Physics I and
1 - PHYS 209 General Physics I Lab. or
3 - PHYS 122 Physics with Calculus I and
1 - PHYS 124 Physics Lab. I
3 - Major Requirement3
16
Second Semester
3 - PHYS 208 General Physics II and
1 - PHYS 210 General Physics II Lab. or
3 - PHYS 221 Physics with Calculus II and
1 - PHYS 223 Physics Lab. II
3 - Arts and Humanities (Literature) Requirement6
4 - Major Requirement4
3 - Social Science Requirement6
14

Bachelor of Arts
The Bachelor of Arts in Biological Sciences provides a strong foundation in biology and is ideal for students desiring a liberal education emphasizing an interdisciplinary approach to a thorough understanding of the life sciences.

Double Major in Biological Sciences/Science Teaching—Biological Sciences
The Bachelor of Arts Degree in Biological Sciences and Science Teaching—Biological Sciences prepares students for teaching biology on the secondary school level and for graduate studies in any of the life science areas. See page 111 for the curriculum.

Freshman Year
First Semester
5 - BIOL 110 Principles of Biology I1
1 - BIOSC 101 Frontiers in Biology I2
1 - CH 101 General Chemistry
3 - ENGL 103 Scientific Writing and Comm.
3 - PHY 105 Calculus of One Variable I
15
Second Semester
5 - BIOL 111 Principles of Biology II1
1 - BIOSC 102 Frontiers in Biology II1
4 - CH 102 General Chemistry
3 - ENGL 103 Accelerated Composition
3 - Mathematical Sciences Requirement1
16-17

Sophomore Year
First Semester
4 - CH 201 Survey of Organic Chemistry4
4 - Animal or Plant Diversity Requirement2
3 - Biochemistry or Genetics Requirement6
4 - Foreign Language Requirement1
15
Second Semester
4 - Animal or Plant Diversity Requirement2
3 - Biochemistry or Genetics Requirement6
4 - Foreign Language Requirement1
4 - Major Requirement8
15

Junior Year
First Semester
3 - BIOSC 335 Evolutionary Biology
3 - BIOSC 461 Cell Biology
2 - BIOSC 462 Cell Biology Laboratory9
1 - CH 101 General Chemistry
3 - ENGL 315 Scientific Writing and Comm.
3 - Foreign Language Requirement2
3 - Minor Requirement13
17
Second Semester
3 - Arts and Humanities (Non-Lit.) Requirement11
3 - Foreign Language Requirement2
3 - Major Requirement8
6 - Minor Requirement10
15
College of Agriculture, Forestry and Life Sciences

Senior Year

First Semester
2 - BIOSC 493 Senior Seminar
3 - PHYS 207 General Physics I
1 - PHYS 209 General Physics I Lab.
3 - Major Requirement
3 - Minor Requirement
3 - Social Science Requirement
15

Second Semester
3 - PHYS 208 General Physics II
1 - PHYS 210 General Physics II Lab.
3 - Arts and Humanities (Literature) Requirement
2 - Major Requirement
3 - Minor Requirement
3 - Social Science Requirement
15

125–126 Total Semester Hours

PREREHABILITATION SCIENCES EMPHASIS AREA

Freshman Year

First Semester
3 - BIOL 103 General Biology I and
1 - BIOL 105 General Biology Lab. I
1 - BIOSC 101 Frontiers in Biology I
3 - CH 101 General Chemistry
3 - COMM 150 Intro. to Human Communication or
3 - COMM 250 Public Speaking
4 - MTHSC 106 Calculus of One Variable I
16

Second Semester
3 - BIOL 104 General Biology II and
1 - BIOL 106 General Biology Lab. II
1 - BIOSC 102 Frontiers in Biology II
4 - CH 102 General Chemistry
3 - ENGL 103 Accelerated Composition
3 - Statistics Requirement
15

Sophomore Year

First Semester
4 - CH 201 Survey of Organic Chemistry
4 - Animal or Plant Diversity Requirement
3 - Biochemistry or Genetics Requirement
4 - Foreign Language Requirement
15

Second Semester
3 - PSYCH 201 Introduction to Psychology
4 - Animal or Plant Diversity Requirement
3 - Biochemistry or Genetics Requirement
4 - Foreign Language Requirement
3 - Social Science Requirement
15

Junior Year

First Semester
4 - BIOSC 315 Functional Human Anatomy
3 - BIOSC 335 Evolutionary Biology
3 - BIOSC 461 Cell Biology
2 - BIOSC 462 Cell Biology Laboratory
2 - Foreign Language Requirement
15

Second Semester
4 - BIOSC 316 Human Physiology
3 - Arts and Humanities (Non-Lit) Requirement
4 - Foreign Language Requirement
6 - Minor Requirement
16

Senior Year

First Semester
2 - BIOSC 493 Senior Seminar
3 - ENGL 315 Scientific Writing and Comm.
3 - PHYS 207 General Physics I
1 - PHYS 209 General Physics I Lab.
3 - Major Requirement
3 - Minor Requirement
15

Second Semester
3 - PHYS 208 General Physics II
1 - PHYS 210 General Physics II Lab.
3 - Arts and Humanities (Literature) Requirement
3 - Major Requirement
6 - Minor Requirement
16

125 Total Semester Hours

ENVIRONMENTAL AND NATURAL RESOURCES

Bachelor of Science

The Environmental and Natural Resources curriculum produces professionals who have a broad-based knowledge in natural resources and an ability to interact with other resource professionals to provide thoughtful solutions to environmental and natural resource problems. The world is blessed with an abundance of natural resources, but the problems associated with their conservation are immense. Protection of rare and endangered species, preventing and controlling invasions of exotics, protecting old growth forests, restoring degraded ecosystems, and balancing the resource demands of industry and the public are some of the environmental issues which are enmeshed in politicized environments.

Three concentrations are offered within the Environmental and Natural Resources major. The Conservation Biology Concentration is oriented toward students who desire a greater exposure to taxa, their habitats, and their interrelationships. The Natural Resources Management Concentration emphasizes both resource management and negotiation skills. These two concentrations are administered by the Department of Forestry and Natural Resources. The Natural Resource and Economic Policy Concentration provides more in-depth study in economics and policy applications and is administered by the Department of Applied Economics and Statistics.
Graduates in Environmental and Natural Resources are well prepared for further graduate studies in natural resources and related fields. Potential public sector employers of graduates include federal, state, and municipal resource management agencies, private industries impacting land and water resources, environmental management consulting firms, and various environmental advocacy groups.

**Freshman Year**

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 - BIOL 103 General Biology I</td>
<td>3 - ENGL 314 Technical Writing</td>
</tr>
<tr>
<td>1 - BIOL 105 General Biology Lab. I</td>
<td>3 - E N R 302 Natural Resources Measurements</td>
</tr>
<tr>
<td>4 - CH 101 or 105 (Chemistry Requirement)</td>
<td>3 - Ecology Requirement</td>
</tr>
<tr>
<td>1 - E N R 101 Intro. to Env. and Natural Res. I</td>
<td>3 - Physiology Requirement</td>
</tr>
<tr>
<td>3 - MTHSC 102 Intro. to Mathematical Analysis</td>
<td>3 - Taxonomy/Habitat Requirement</td>
</tr>
<tr>
<td>3 - Oral Communications Requirement</td>
<td>15</td>
</tr>
</tbody>
</table>

**Second Semester**

| 3 - BIOL 104 General Biology II |
| 1 - BIOL 106 General Biology Lab. II |
| 4 - CH 102 or 106 (Chemistry Requirement) |
| 3 - ENGL 103 Accelerated Composition |
| 3 - EX ST 301 Introductory Statistics |
| 3 - F N R 102 FNR Freshman Portfolio |
| 15 |

See advisor. Conservation Biology Concentration students or students planning to take organic chemistry must take CH 101 and CH 102 and must satisfy the General Education Science and Technology in Society Requirement through another course.

**CONSERVATION BIOLOGY CONCENTRATION**

**Sophomore Year**

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 - AP EC 257 Natural Resources, Environment, and Economics or</td>
<td>3 - E N R 450 Conservation Issues</td>
</tr>
<tr>
<td>3 - ECON 211 Principles of Microeconomics</td>
<td>1 - FOR 498 Senior Portfolio or</td>
</tr>
<tr>
<td>4 - BIOSC 320 Field Botany and</td>
<td>1 - W F B 498 Senior Portfolio</td>
</tr>
<tr>
<td>1 - Elective or</td>
<td>6 - Taxonomy/Habitat Requirement</td>
</tr>
<tr>
<td>2 - FOR 205 Dendrology and</td>
<td>2 - Elective</td>
</tr>
<tr>
<td>3 - FOR 221 Forest Biology</td>
<td>15</td>
</tr>
<tr>
<td>3 - CH 223 Organic Chemistry</td>
<td>120 Total Semester Hours</td>
</tr>
<tr>
<td>4 - F N R 204 Soil Information Systems or</td>
<td>3 - Taxonomy/Habitat Requirement</td>
</tr>
<tr>
<td>4 - CSENV 202 Soils</td>
<td>15</td>
</tr>
<tr>
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</tbody>
</table>

See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement. (Note: Social Science Requirement may be in an area other than economics or applied economics.)

**Junior Year**

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 - AP EC 457 Nat. Res. Use, Technology and Policy</td>
<td>3 - ECON 302, 310 or 315</td>
</tr>
<tr>
<td>3 - ECON 319 Environmental Economics</td>
<td>3 - Applied Economics Requirement</td>
</tr>
<tr>
<td>3 - AP EC 475 Wildlife Economics</td>
<td>3 - Community Development Requirement</td>
</tr>
<tr>
<td>3 - AP EC 491, Creative Inquiry (AP EC 491), or Directed Research (AGRIC 491)</td>
<td>3 - Elective or</td>
</tr>
<tr>
<td>3 - AP EC 494, Conservation Economics (AP EC 494) or Directed Research (AGRIC 491)</td>
<td>3 - Minor Requirement</td>
</tr>
<tr>
<td>3 - AP EC 499, Creative Inquiry (AP EC 499) or Directed Research (AGRIC 491 or H492)</td>
<td>15</td>
</tr>
<tr>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

120 Total Semester Hours

**NATURAL RESOURCE AND ECONOMIC POLICY CONCENTRATION**

**Sophomore Year**

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 - AP EC 257 Natural Resources, Environment, and Economics or</td>
<td>3 - ECON 450 Conservation Issues</td>
</tr>
<tr>
<td>3 - ECON 211 Principles of Microeconomics</td>
<td>1 - FOR 498 Senior Portfolio or</td>
</tr>
<tr>
<td>3 - PO SC 101 American National Government or</td>
<td>1 - W F B 498 Senior Portfolio</td>
</tr>
<tr>
<td>3 - PO SC 102 Intro. to International Relations</td>
<td>6 - Taxonomy/Habitat Requirement</td>
</tr>
<tr>
<td>3 - Geography Requirement</td>
<td>2 - Elective</td>
</tr>
<tr>
<td>3 - Natural Science Requirement</td>
<td>15</td>
</tr>
<tr>
<td>3 - Applied Economics Requirement</td>
<td>120 Total Semester Hours</td>
</tr>
</tbody>
</table>

1See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement. (Note: Social Science Requirement must be in an area other than economics or applied economics.)

2Select from any BIOSC, ECON, E N R, EE&S, ENSP, ENST, OX, FOR, GEOL, or W F B courses numbered 300 or higher.

3Select from any AP EC courses numbered 300 or higher.

4Select from any BIOSC, CSENV, E N R, EE&S, EN ST, OX, FOR, GEOL, or W F B courses numbered 300 or higher.

5Select from any BioE, CSENV, E N R, EE&S, EN ST, OX, FOR, GEOL, or W F B courses numbered 300 or higher.

6Select from any AP EC courses numbered 300 or higher.

7Select from any AP EC courses numbered 300 or higher.

8Select from any BIOSC, CSENV, E N R, EE&S, EN ST, OX, FOR, GEOL, or W F B courses numbered 300 or higher.

9Select from any AP EC courses numbered 300 or higher.

**NATURAL RESOURCES MANAGEMENT CONCENTRATION**

**Sophomore Year**

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 - F N R 204 Soil Information Systems or</td>
<td>3 - BIOSC 35 Evolutionary Biology</td>
</tr>
<tr>
<td>4 - CSENV 202 Soils</td>
<td>3 - Arts and Humanities (Non-Lit.) Requirement</td>
</tr>
<tr>
<td>2 - FOR 205 Dendrology</td>
<td>3 - Natural Resources Economics Requirement</td>
</tr>
<tr>
<td>3 - FOR 221 Forest Biology</td>
<td>3 - Natural Resources Economics Requirement</td>
</tr>
<tr>
<td>3 - W F B 300 Wildlife Biology</td>
<td>3 - Arts and Humanities (Non-Lit.) Requirement</td>
</tr>
<tr>
<td>3 - Arts and Humanities (Literature) Requirement</td>
<td>3 - Elective</td>
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15
Second Semester
3 - E N R 302 Natural Resources Measurements
3 - FOR 206 Forest Ecology
3 - W F B 350 Principles of Fish and Wildlife Biol.
3 - Arts and Humanities (Non-Lit.) Requirement
3 - Social Science Requirement
15

Junior Year
First Semester
3 - AP EC 257 Natural Resources, Environment and Economics or
3 - ECON 211 Principles of Microeconomics
4 - BIOSC 320 Field Botany or
3 - BIOSC 406 Intro. Plant Taxonomy and
1 - BIOSC 407 Plant Taxonomy Lab.
3 - E N R 429 Environmental Law and Policy or
3 - FOR 400 Public Relations in Natural Res.
3 - Minor Requirement
3 - Elective
16

Second Semester
3 - C R D (AP EC) 357 Natural Res. Economics
3 - GEOL 101 Physical Geology
1 - GEOL 103 Physical Geology Lab.
3 - W F B (BIOSC) 313 Conservation Biology
6 - Minor Requirement
16

Senior Year
First Semester
3 - FOR (E N R) 416 Forest Policy and Admin.
3 - FOR (E N R) 434 GIS for Landscape Planning
3 - Internship, Creative Inquiry or Directed Research Requirement
3 - Minor Requirement
3 - Elective
15

Second Semester
3 - E N R 450 Conservation Issues
3 - ENGL 314 Technical Writing
2 - FOR 406 Forested Watershed Management
1 - FOR 498 Senior Portfolio or
1 - W F B 498 Senior Portfolio
3 - W F B 462 Wetland Wildlife Biology
3 - Minor Requirement
15

122 Total Semester Hours

See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement. (Note: Social Science Requirement must be in an area other than economics or applied economics.)

A minor is required and must be selected from the following: Biochemistry; Biological Sciences; Chemistry; Crop and Soil Environmental Science; Environmental Science and Policy; Forest Resource Management; Geology; Horticulture; Legal Studies; Microbiology; Natural Resource Economics; Nonprofit Leadership; Park and Protected Area Management; Therapeutic Recreation; Travel and Tourism; Urban Forestry; Wildlife and Fisheries Biology.

Internship (F N R 490); Creative Inquiry (F N R 470); or Directed Research (W F B 463 or F N R H491).

FOOD SCIENCE

Bachelor of Science

Food Science majors apply principles of basic and applied sciences to design and manufacture safe and quality foods in addition to identifying the relationship between nutrients and human health. The curriculum allows flexibility for concentrating in one of two areas:

In the Food Science and Technology Concentration, students may emphasize business, culinary science (one of three national programs that have been approved by the Research Chef's Association as Culinary™), engineering, food packaging, and additional sciences that complement requirements of the Institute of Food Technologists.

Food processing industries, ingredient manufacturers, and packaging suppliers employ graduates in new food product development, quality assurance, production management, and technical sales. State and federal agencies also need graduates for food safety and regulatory positions.

The Nutrition and Dietetics Concentration prepares students for graduate study in nutrition and a variety of health related fields as well as dietetic internship programs to become a Registered Dietitian.

Examples of career opportunities include employment as dietitians, nutritionists, consultants and food specialists. The Nutrition and Dietetics curriculum is accredited by the Accreditation Council for Education of Nutrition and Dietetics (ACEND).

The Department of Food, Nutrition and Packaging Sciences also offers an accelerated five-year combined bachelor's/master's program that allows students to count up to twelve hours of graduate credit toward both the BS degree in Food Science and the MS degree in Food, Nutrition and Culinary Sciences. Details are available from the Department of Food, Nutrition and Packaging Sciences or at www.clemson.edu/fns.

FOOD SCIENCE AND TECHNOLOGY CONCENTRATION

Freshman Year
First Semester
3 - BIOL 103 General Biology I and
1 - BIOL 105 General Biology Lab. I or
5 - BIOL 110 Principles of Biology I
4 - CH 101 General Chemistry
3 - COMM 150 Intro. to Human Communication
1 - FD SC 101 Epochs in Man's Struggle for Food
3 - MTHSC 102 Intro. to Math. Analysis or
4 - MTHSC 106 Calculus of One Variable I
15-17

Second Semester
3 - BIOL 104 General Biology II and
1 - BIOL 106 General Biology Lab. II or
5 - BIOL 111 Principles of Biology II
4 - CH 102 General Chemistry
3 - ENGL 103 Accelerated Composition
1 - FD SC 102 Perspectives in Food and Nutrition Sciences
1 - FD SC 450 Creative Inquiry
1 - PSYCH 201 Introduction to Psychology
16-17

Sophomore Year
First Semester
4 - CH 201 Survey of Organic Chemistry or
3 - CH 223 Organic Chemistry and
1 - CH 227 Organic Chemistry Lab.
1 - FD SC 450 Creative Inquiry
3 - PHYS 122 Physics with Calculus I and
1 - PHYS 124 Physics Lab. I or
4 - PHYS 200 Introductory Physics or
3 - PHYS 207 General Physics I and
1 - PHYS 209 General Physics I Lab.
3 - Arts and Humanities (Non-Lit.) Requirement
3 - Social Science Requirement
15

Second Semester
3 - BIOC 305 Essential Elements of Biochem.
2 - BIOSC 434 Biological Chemistry Lab. Techniq.
3 - EX ST 301 Introductory Statistics
3 - FD SC 214 Food Resources and Society
1 - FD SC 450 Creative Inquiry
3 - Arts and Humanities (Non-Lit.) Requirement
2 - Elective
17

Junior Year
First Semester
1 - FD SC 301 Food Regulations and Policy
1 - FD SC 417 Seminar
1 - FD SC 450 Creative Inquiry
4 - MICRO 305 General Microbiology
3 - NUTR 451 Human Nutrition
3 - Departmental Requirement
2 - Emphasis Area Requirement
15

Second Semester
3 - ENGL 304 Business Writing or
3 - ENGL 314 Technical Writing
2 - FD SC 403 Food Chemistry and Analysis
4 - FD SC 410 Food Product Development
1 - FD SC 450 Creative Inquiry
4 - MICRO 407 Food and Dairy Microbiology
3 - Emphasis Area Requirement
17

Senior Year
First Semester
3 - FD SC 306 Food Service Operations or
3 - FD SC 307 Restaurant Food Service Mgt.
3 - FD SC 401 Food Chemistry I
3 - FD SC 404 Food Preservation and Processing
2 - FD SC 407 Quantity Food Production
1 - FD SC 450 Creative Inquiry
3 - Emphasis Area Requirement
15
Second Semester
3 - FD SC 402 Food Chemistry II
4 - FD SC 408 Food Process Engineering
3 - FD SC (PKGSC) 409 Total Quality Mgt. for the Food and Packaging Industries
1 - FD SC 450 Creative Inquiry
3 - Emphasis Area Requirement
14
124–127 Total Semester Hours

*See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

**FD SC 430 or AVS 413

See advisor.

NUTRITION AND DIETETICS CONCENTRATION

Freshman Year
First Semester
3 - BIOL 103 General Biology I and
1 - BIOL 105 General Biology Lab. I or
5 - BIOL 110 Principles of Biology I
4 - CH 101 General Chemistry
3 - COMM 150 Intro. to Human Communication
1 - FD SC 101 Epochs in Man’s Struggle for Food
1 - BIOL 106 General Biology Lab. II
1 - PSYCH 201 Introduction to Psychology

15-16

Second Semester
3 - BIOL 104 General Biology II and
1 - BIOL 106 General Biology Lab. II or
5 - BIOL 111 Principles of Biology II
4 - CH 102 General Chemistry
3 - ENGL 103 Accelerated Composition
1 - FD SC 102 Perspectives in Food and Nutrition Sciences
3 - PSYCH 201 Introduction to Psychology

15-16

Sophomore Year
First Semester
3 - AP EC 202 Agricultural Economics or
3 - ECON 211 Principles of Microeconomics or
3 - ECON 212 Principles of Macroeconomics
4 - CH 201 Survey of Organic Chemistry or
3 - CH 223 Organic Chemistry and
1 - CH 227 Organic Chemistry Lab.
1 - NUTR 216 Current Issues in Nutrition
3 - PHYS 122 Physics with Calculus I and
1 - PHYS 124 Physics Lab. I or
4 - PHYS 200 Introductory Physics or
3 - PHYS 207 General Physics I and
1 - PHYS 209 General Physics I Lab.
3 - Arts and Humanities (Literature) Requirement
15

Second Semester
3 - BIOSC 305 Essential Elements of Biochem.
2 - BIOSC 434 Biological Chemistry Lab. Techniq.
3 - EX ST 301 Introductory Statistics
3 - FD SC 214 Food Resources and Society
1 - FD SC 450 Creative Inquiry
3 - Arts and Humanities (Non-Lit.) Requirement
2 - Elective
17

Junior Year
First Semester
4 - BIOSC 222 Human Anatomy and Phys. I
1 - FD SC 301 Food Regulations and Policy
1 - FD SC 450 Creative Inquiry
4 - MICRO 305 General Microbiology
3 - NUTR 451 Human Nutrition
2 - Elective
15

Second Semester
4 - BIOSC 223 Human Anatomy and Phys. II
3 - ENGL 304 Business Writing or
3 - ENGL 314 Technical Writing
2 - FD SC 403 Food Chemistry and Analysis
1 - FD SC 450 Creative Inquiry
4 - MICRO 407 Food and Dairy Microbiology
3 - NUTR 455 Nutrition and Metabolism

17

Senior Year
First Semester
3 - FD SC 306 Food Service Operations
3 - FD SC 401 Food Chemistry I
3 - FD SC 404 Food Preservation and Processing
2 - FD SC 407 Quantity Food Production
1 - NUTR 418 Professional Devel. in Dietetics or
1 - NUTR 419 Professional Devel. in Nutrition
4 - NUTR 424 Medical Nutrition Therapy I

16

Second Semester
3 - FD SC 402 Food Chemistry II
3 - FD SC (PKGSC) 409 Total Quality Mgt. for the Food and Packaging Industries
1 - FD SC 450 Creative Inquiry
4 - NUTR 225 Medical Nutrition Therapy II or
5 - NUTR 426 Community Nutrition

14

124–127 Total Semester Hours

*See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

NUTR 419 is recommended for students not pursuing registered dietitian (RD) status.

FOREST RESOURCE MANAGEMENT

Bachelor of Science
The Forest Resource Management curriculum combines a broad education in the arts and sciences with applied forest sciences. This combination provides the necessary foundation for the scientific management of forest resources, products, and services.

Foresters are qualified for a broad spectrum of employment opportunities in the public and private sectors. They may be engaged as managers, administrators, or owners of forest lands or forest-based businesses; as technical specialists in the production of timber, usable water, wildlife, and aesthetic values, and in the recreational use of the forest; or as professionals in other areas where the conservation of natural resources is a concern. Foresters earning advanced degrees find employment in academic work and in research conducted by public and private agencies.

The curriculum, accredited by the Society of American Foresters, provides a strong program in the basic knowledge and skills required of a professional forester. Forest Resource Management majors will select a minor (see page 61). The curriculum also provides the necessary prerequisites for graduate study.

For students interested in conservation biology, water, and natural resources, the Department of Forestry and Natural Resources also administers the Conservation Biology Concentration and the Natural Resources Management Concentration within the Environmental and Natural Resources degree program. See pages 50-51 for program details.

Freshman Year
First Semester
3 - BIOL 103 General Biology I
1 - BIOL 105 General Biology Lab. I
4 - CH 101 General Chemistry
1 - E N R 101 Intro. to Environ. and Natural Res. I
3 - MTHSC 102 Intro. to Mathematical Analysis
1 - Oral Communication Requirement
15

Second Semester
3 - BIOL 104 General Biology II
1 - BIOL 106 General Biology Lab. II
3 - ENGL 103 Accelerated Composition
3 - EX ST 301 Introductory Statistics
1 - F N R 102 FNR Freshman Portfolio
4 - Departmental Science Requirement
15

Sophomore Year
First Semester
4 - F N R 204 Soil Information Systems
2 - FOR 205 Dendrology
3 - FOR 221 Forest Biology
3 - Arts and Humanities (Literature) Requirement
3 - Economics Requirement
15

Second Semester
3 - ENGL 314 Technical Writing
3 - FOR 206 Forestry Ecology
3 - Arts and Humanities (Non-Lit.) Requirement
3 - Social Science Requirement
3 - Minor Requirement
15

Forestry Summer Camp
2 - FOR 251 Forest Communities
1 - FOR 252 Forest Operations
4 - FOR 253 Forest Mensuration
1 - FOR 254 Forest Products

Junior Year
First Semester
2 - FOR 302 Forest Biometrics
3 - FOR 304 Forest Resource Economics
3 - FOR 341 Wood Procurement Practices in the Forest Industry
4 - FOR 413 Integrated Forest Pest Management
3 - FOR (E N R) 434 GIS for Landscape Planning
1 - Internship, Creative Inquiry or Directed Research Requirement
16
Second Semester
2 - FOR 308 Remote Sensing in Forestry
3 - FOR 408 Wood and Paper Products
3 - FOR 418 Forest Resource Valuation
4 - FOR 465 Silviculture
3 - Minor Requirement¹
1 - Internship, Creative Inquiry or Directed Research Requirement¹

Senior Year
First Semester
4 - FOR 410 Harvesting Processes
3 - FOR (E N R) 416 Forest Policy and Regulation
2 - FOR 431 Recreation Resource Planning in Forest Management
3 - Minor Requirement⁴
1 - Internship, Creative Inquiry or Directed Research Requirement¹

Second Semester
1 - F N R 499 Natural Resources Seminar
2 - FOR 254 Forest Products
1 - FOR 252 Forest Operations
1 - FOR 253 Forest Mensuration
1 - FOR 254 Forest Products
1 - F N R 490 Field Training in Natural Resources⁴
14

31 Total Semester Hours

1 See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement. (Note: Social Science Requirement must be in an area other than economics or applied economics.)
2 See advisor. CH 102 or PHYS 200 or higher level general physics course.
3 AP EC 257, ECON 200, 211, or 212.
4 To be selected by the middle of the sophomore year.
5 F N R 470, 490, or FOR 419.

LAND SURVEYING EMPHASIS AREA

Freshman Year
First Semester
3 - BIOL 103 General Biology I
1 - BIOL 105 General Biology Lab. I
4 - CH 101 General Chemistry
1 - E N R 101 Intro. to Environ. and Natural Res. I
3 - MTHSC 102 Intro. to Mathematical Analysis
3 - Oral Communication Requirement¹
15

Second Semester
3 - BIOL 104 General Biology II
1 - BIOL 106 General Biology Lab. II
3 - ENGL 103 Accelerated Composition
3 - EX ST 301 Introductory Statistics
1 - F N R 102 FNR Freshman Portfolio
4 - Departmental Science Requirement²
15

Sophomore Year
First Semester
4 - F N R 204 Soil Information Systems
2 - FOR 205 Dendrology
3 - FOR 221 Forest Biology
3 - Arts and Humanities (Literature) Requirement¹
3 - Economics Requirement¹
15

Second Semester
2 - E G 210 Engineering Graphics for Civil Engr.
3 - ENGL 314 Technical Writing
3 - FOR 206 Forestry Ecology
3 - Arts and Humanities (Non-Lit.) Requirement¹
3 - Social Science Requirement¹
14

Forestry Summer Camp
2 - FOR 251 Forest Communities
1 - FOR 252 Forest Operations
4 - FOR 253 Forest Mensuration
1 - FOR 254 Forest Products
8

Junior Year
First Semester
2 - FOR 302 Forest Biometrics
3 - FOR 304 Forest Resource Economics
3 - FOR 341 Wood Procurement Practices in the Forest Industry
4 - FOR 413 Integrated Forest Pest Management
3 - FOR (E N R) 414 GIS for Landscape Planning
15

Second Semester
3 - AG M 321 Surveying: Earthwork and Area Measurements
2 - FOR 308 Remote Sensing in Forestry
3 - FOR 308 Wood and Paper Products
3 - FOR 418 Forest Resource Valuation
4 - FOR 465 Silviculture
15

Summer
3 - F N R 490 Field Training in Natural Resources⁴

Senior Year
First Semester
4 - FOR 410 Harvesting Processes
3 - FOR (E N R) 416 Forest Policy and Admin.
3 - FOR 417 Forest Resource Mgt. and Regulation
2 - FOR 431 Recreation Resource Planning in Forest Management
3 - FOR 433 GPS Applications
15

Second Semester
3 - B E 322 Small Watershed Hydrology and Sedimentology
1 - F N R 499 Natural Resources Seminar
2 - FOR 406 Forested Watershed Management
3 - FOR 415 Forest Wildlife Management
2 - FOR 425 Forest Resource Management Plans
1 - FOR 498 Senior Portfolio
3 - LAW 333 Real Estate Law
15

130 Total Semester Hours

¹See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement. (Note: Social Science Requirement must be in an area other than economics or applied economics.)
²See advisor. CH 102 or PHYS 200 or higher level general physics course.
³To be selected by the middle of the sophomore year.
⁴F N R 470, 490, or FOR 419.
⁵Summer internship must be in land surveying.

GENETICS

Bachelor of Science

Genetics is the study of heredity. Genetics research takes many forms, from the study of heredity at the level of individual molecules to study at the level of cells and chromosomes, individuals, or populations. To comprehend current genetic information and to make future contributions to our molecular understanding of life processes, students must obtain a broad background in biology and a firm foundation in chemistry and mathematics. This is the basis of the genetics curriculum.

A degree in Genetics is a strong preparation for many careers. The degree provides an excellent foundation for medical, veterinary, or pharmacy school, as well as graduate research in any discipline related to biology, including bioinformatics, forensic technology, and genetic counseling. Because of the increasing emphasis on genetics in everyday life, a Bachelor of Science in Genetics can also be a direct path to a career in the emerging biotechnology industries (pharmaceuticals, agricultural technologies, biomimetic minerals) in research, sales, or business operations. Combined with a law degree, a genetics bachelor of science is a good background for a career as a patent attorney.
### Junior Year

**First Semester**
1. GEN 420 Molecular Genetics and Gene Regulation
2. GEN 421 Molecular Genetics and Gene Regulation Lab.
3. GEN (BIOCH) 440 Bioinformatics
4. Science Requirement
5. Elective

**Second Semester**
1. BIOSC 461 Cell Biology
2. GEN 410 Population and Quantitative Genetics
3. GEN 411 Population and Quantitative Genetics Lab.
4. PHIL 326 Science and Values
5. Genetics Requirement
6. Elective

**Senior Year**

**First Semester**
1. GEN 450 Comparative Genetics
2. Science Requirement
3. Social Science Requirement
4. Social Science Requirement
5. Elective

**Second Semester**
1. GEN 493 Senior Seminar
2. Genetics Requirement
3. Science Requirement
4. Elective

**Sophomore Year**

**First Semester**
1. BIOL 103 General Biology I
2. BIOL 105 General Biology Lab. I
3. CH 101 General Chemistry
4. HORT 101 Horticulture
5. Spanish Language Requirement
6. Related Science Requirement

**Second Semester**
1. CH 102 General Chemistry
2. ENGL 103 Accelerated Composition
3. MTHSC 101 Essential Math. for Informed Society
4. Elective

**Minor Year**

**First Semester**
1. HORT 409 Seminar
2. Internship
3. Elective

**Second Semester**
1. HORT 410 Molecular Genetics and Gene Lab.
2. HORT 411 Advanced Internship
3. Elective

### HORTICULTURE Bachelor of Science

Horticulture connects plants and people to improve our world, be it through the enhancement of the foods we eat, the creation of healthy natural living spaces, the economic and aesthetic enhancement of our homes and communities, or the application of green solutions to the challenges of environmental quality. The plants of horticulture are the foundation of human and environmental well being, and it is horticulture professionals who have the knowledge, skills, and passion to utilize those plants for the betterment of humankind.

The Horticulture degree program includes courses in science, mathematics, business, leadership, law, and communication, combined with a strong foundation in horticultural sciences and arts. The curriculum provides the flexibility to choose courses within those categories that best support the student’s personal interests, goals, and success. Career opportunities are endless.

Students work closely with faculty in creative inquiry groups to investigate and implement solutions to real problems. Internships are excellent opportunities to learn and explore potential careers.

### freshman Year

**First Semester**
1. BIOL 105 General Biology I
2. BIOL 105 General Biology Lab. I
3. CH 101 General Chemistry
4. HORT 101 Horticulture
5. Spanish Language Requirement
6. Related Science Requirement

**Second Semester**
1. CH 102 General Chemistry
2. ENGL 103 Accelerated Composition
3. MTHSC 101 Essential Math. for Informed Society
4. Elective

### Sophomore Year

**First Semester**
1. BIOSC 304 Biology of Plants and
2. BIOSC 308 Biology of Plants Laboratory
3. HORT 210 Growing Garden Plants in the Fall
4. MTHSC 101 Essential Math. for Informed Society
5. Arts and Humanities (Non-Lit.) Requirement
6. Business Requirement

**Second Semester**
1. CSENV 202 Soils
2. HORT 211 Growing Plants in the Spring
3. Arts and Humanities (Literature) Requirement
4. Social Science Requirement

### Summer

1. HORT 271 Internship
2. HORT 471 Advanced Internship

### Microbiology Bachelor of Science

Microbiology deals with the study of bacteria, viruses, yeasts, filamentous fungi, protozoa, and unicellular algae. Microbiologists seek to describe these organisms in terms of their structures, functions, and processes of reproduction, growth, and death at both the cellular and molecular levels. They are also concerned with their ecology, particularly in regard to their pathological effects on man, and with their economic importance.

The Microbiology major provides a thorough training in the basic microbiological skills. Further, students receive instruction in mathematics, physics, chemistry, and biochemistry, all essential to the training of a modern microbiologist. Students can prepare for a variety of careers through a wide choice of electives.

The Microbiology curriculum with a Biomedicine Concentration is recommended for students planning postgraduate programs. Microbiology graduates may enter graduate school in microbiology, biochemistry, bioengineering, or related disciplines; they may...
enter medical or dental schools or pursue careers in one of the many industries or public service departments dependent upon microbiology. Some of these are the fermentation and drug industries, medical and public health microbiology, various food industries, and agriculture.

Microbiology majors planning to apply for admission to a medical or dental school should inform their advisors immediately upon entering the program.

Freshman Year
First Semester
- 5 - BIOL 110 Principles of Biology I
- 4 - CH 101 General Chemistry
- 3 - COMM 150 Intro. to Human Communication or
- 3 - COMM 250 Public Speaking
- 1 - MICRO 101 Microbes and Human Affairs
- 4 - MTHSC 106 Calculus of One Variable I

Second Semester
- 5 - BIOL 111 Principles of Biology II
- 4 - CH 102 General Chemistry
- 3 - ENGL 103 Accelerated Composition
- 4 - Mathematical Sciences Requirement

Sophomore Year
First Semester
- 3 - CH 223 Organic Chemistry
- 1 - CH 228 Organic Chemistry Lab.
- 3 - CH 224 Organic Chemistry
- 2 - BIOSC 434 Biol. Chemistry Lab. Techniques
- 3 - Arts and Humanities (Non-Lit.) Requirement
- 3 - Social Science Requirement
- 3 - Elective

Second Semester
- 2 - MICRO 452 Advanced Micro Lab III
- 2 - MICRO 493 Senior Seminar
- 3 - Microbiology Requirement
- 3 - Elective

Senior Year
First Semester
- 3 - BIOSC 461 Cell Biology
- 3 - MICRO 415 Microbial Genetics
- 2 - MICRO 451 Advanced Micro Lab II
- 3 - Virology Requirement
- 3 - Elective

Second Semester
- 2 - MICRO 452 Advanced Micro Lab III
- 2 - MICRO 493 Senior Seminar
- 3 - Microbiology Requirement
- 3 - Elective

124–125 Total Semester Hours

3-6 Electives

BIOMEDICINE CONCENTRATION

Freshman Year
First Semester
- 5 - BIOL 110 Principles of Biology I
- 4 - CH 101 General Chemistry
- 3 - COMM 150 Intro. to Human Communication or
- 3 - COMM 250 Public Speaking
- 1 - MICRO 101 Microbes and Human Affairs
- 4 - MTHSC 106 Calculus of One Variable I

Second Semester
- 5 - BIOL 111 Principles of Biology II
- 4 - CH 102 General Chemistry
- 3 - ENGL 103 Accelerated Composition
- 4 - Mathematical Sciences Requirement

15-16 Total Semester Hours

Sophomore Year
First Semester
- 3 - CH 223 Organic Chemistry
- 2 - MICRO 452 Advanced Micro Lab III
- 2 - MICRO 493 Senior Seminar
- 3 - Microbiology Requirement
- 3 - Elective

Second Semester
- 3 - CH 224 Organic Chemistry
- 1 - CH 228 Organic Chemistry Lab.
- 3 - Arts and Humanities (Non-Lit.) Requirement
- 3 - Biochemistry Requirement
- 3 - Biomedicine Requirement
- 4 - General Microbiology Requirement

15-16 Total Semester Hours

Junior Year
First Semester
- 3 - MICRO 410 Microbial Diversity and Ecology
- 3 - PHYS 207 General Physics I and
- 1 - PHYS 209 General Physics I Lab. or
- 3 - PHYS 122 Physics with Calculus I and
- 1 - PHYS 124 Physics Lab. I
- 6 - Microbiology Requirement
- 3 - Elective

Second Semester
- 3 - MICRO 412 Bacterial Physiology
- 2 - MICRO 450 Advanced Micro Lab I
- 3 - Microbiology Requirement
- 3 - Elective

15-16 Total Semester Hours

Senior Year
First Semester
- 3 - MICRO 414 Basic Immunology
- 3 - MICRO 415 Microbial Genetics
- 3 - MICRO 416 Introductory Virology
- 2 - MICRO 451 Advanced Micro Lab II
- 3 - Biomedicine Requirement

14 Total Semester Hours

Second Semester
- 3 - MICRO 411 Pathogenic Bacteriology
- 3 - MICRO 417 Molecular Mechanisms of Carcinogenesis and Aging
- 2 - MICRO 452 Advanced Micro Lab III
- 2 - MICRO 493 Senior Seminar
- 3 - Biomedicine Requirement
- 3 - Elective

16 Total Semester Hours

103/105 may substitute for BIOL 110, and BIOL 104/106 may substitute for BIOL 111. The remaining 1–2 credits required must be satisfied by completing 1–2 extra credits from departmental course offerings at the 300 level or above. See advisor.

2MTHSC 111, 301, or EX ST 301, or other approved coursework. See advisor.

3See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

4Elective hours may be used toward satisfying the requirements of a minor.

5BIOCH 301 or 305, or other approved coursework at the 200 level or higher.

6MICRO 305 or other approved coursework at the 200 level or higher.

7See advisor.
First Semester
- BIOL 103 General Biology I
- BIOL 105 General Biology Lab. I
- CH 101 General Chemistry
- MTHSC 106 Calculus of One Variable I
- PKGSC 101 Packaging Orientation
- Social Science Requirement

Second Semester
- BIOL 104 General Biology II
- BIOL 106 General Biology Lab. II
- CH 102 General Chemistry
- COMM 250 Public Speaking
- ENGL 103 Accelerated Composition
- PKGSC 102 Intro. to Packaging Science

Sophomore Year
First Semester
- CH 201 Survey of Organic Chemistry or
- CH 223 Organic Chemistry and
- CH 227 Organic Chemistry Lab.
- PHYS 207 General Physics I and
- PHYS 209 General Physics I Lab. or
- PHYS 122 Physics with Calculus I and
- PHYS 124 Physics Lab. II
- PKGSC 202 Packaging Materials and Manuf. I
- PKGSC 220 Product/Package Design and Prototyping

Second Semester
- PHYS 208 General Physics II and
- PHYS 210 General Physics II Lab. or
- PHYS 221 Physics with Calculus I and
- PHYS 223 Physics Lab. II
- PKGSC 201 Packaging Perishable Products
- PKGSC 204 Container Systems
- PKGSC 206 Container Systems Lab.
- Arts and Humanities (Literature) Requirement

Summer
- CO-OP 101 Cooperative Education

Junior Year
First Semester
- ENGL 314 Technical Writing
- PKGSC 320 Graphics for Packaging
- PKGSC 325 Fundamental Principles of Packaging
- PKGSC 326 Protective Packaging
- PKGSC 454 Product and Package Eval. Lab.
- Emphasis Area Requirement

Second Semester
- PKGSC 320 Package Design Fundamentals
- PKGSC 368 Packaging and Society
- PKGSC 401 Packaging Machinery
- PKGSC 430 Converting for Flexible Packaging
- PKGSC 440 Packaging for Distribution
- Emphasis Area Requirement

Senior Year
First Semester
- EX ST 301 Introductory Statistics
- PKGSC 416 Appl. of Polymers in Packaging
- PKGSC 464 Food and Health Care Pkg. Syst.
- Emphasis Area Requirement

Second Semester
- AP EC 202 Agricultural Economics
- ECON 211 Principles of Microeconomics
- PKGSC 403 Packaging Career Preparation
- PKGSC 420 Package Design and Development
- Arts and Humanities (Non-Lit.) Requirement
- Emphasis Area Requirement

124 Total Semester Hours

Combined Bachelor of Science/Master of Science Degree Program
The Department of Food, Nutrition and Packaging Sciences also offers an accelerated five-year combined bachelor’s/master’s program that allows students to count up to twelve hours of graduate credit toward both the BS degree in Packaging Science and the MS degree in Packaging Science. Details are available from the Department of Food, Nutrition and Packaging Sciences or at www.clemson.edu/fnps.

Preprofessional Health Studies
Non-degree
The health professions need individuals with a diversity of educational backgrounds and a wide variety of talents and interests. The philosophies of education, the specific preprofessional course requirements, the noncognitive qualifications for enrollment, and the systems of training vary among the professional health schools; but all recognize the desirability of a broad education—a good foundation in the natural sciences, highly developed communication skills, and a solid background in the humanities and social sciences. The absolute requirements for admission to professional health schools are limited to allow latitude for developing individualized undergraduate programs of study; however, most schools of medicine and dentistry require 16 semester hours of chemistry, including organic chemistry, eight hours of biological sciences, eight hours of physics, and six hours of mathematics. These requirements should be balanced with courses in vocabulary building, the humanities, and social sciences. The basic requirements in the natural sciences and as many of the courses in the humanities and social sciences as possible should be completed by the third year so students are prepared to take the Dental Admission Test or the Medical College Admission Test prior to applying to a professional school.

Undergraduates may also prepare to study optometry, podiatry, and other health professions. While the basic requirements for these professional schools are essentially the same as those for schools of medicine and dentistry, specific requirements for individual schools in these professions vary somewhat; consequently, interested students are advised to consult with the chief health professionals advisor.
At Clemson, rather than having a separate, organized preprofessional health studies program, students are allowed to major in any curriculum, as long as the basic entrance requirements of the professional health school are fulfilled. These schools are not as concerned about a student’s major as they are about academic performance in whichever curriculum the student chooses. Professional health schools have neither preferences nor prejudices concerning any curriculum, which is evidenced by the fact that their entering students represent a broad spectrum of curricula. The emphasis is placed on the student’s doing well in the curriculum chosen, and this becomes critical as competition increases for the limited number of places available in professional health schools.

PREPHARMACY

The two-year Prepharmacy program requires 66–72 credit hours, depending on the pharmacy school of interest. Upon completion of the program, students will be eligible to apply to a college of pharmacy, usually the South Carolina College of Pharmacy (MUSC and USC campuses), and may be eligible to apply for the Bachelor of Science in Preprofessional Studies. The degree in Pharmacy is awarded by the institution attended. It is important for students to work closely with their advisor as there are variations in courses required by the pharmacy schools.

For financial aid purposes, students in the Prepharmacy program are considered to be enrolled in a degree-seeking program.

First Year

First Semester
3 - BIOL 103 General Biology I
1 - BIOL 105 General Biology Lab. I
4 - CH 101 General Chemistry
4 - MTHSC 106 Calculus of One Variable I
3 - PSYCH 201 Introduction to Psychology
3 - Arts and Humanities (Non-Lit.) Requirement
18

Second Semester
4 - MTHSC 107 Calculus of One Variable II
3 - PHYS 101 General Physics I
3 - ENGL 103 Accelerated Composition
3 - PSYCH 140 Lifespan Developmental Psych.
3 - Arts and Humanities (Literature) Requirement
See advisor.
3 - Science and Technology in Society Requirement
18

Third Year

72–90 Total Semester Hours
1A A H 210 or MUSIC 210
2Select any ENGL course from General Education Arts and Humanities (Literature) Requirement.
3See General Education Requirements.
4Students planning to receive the Bachelor of Science degree upon completion of the program are required to complete a minimum of 18 additional credit hours which must include MICRO 365. See advisor for requirements.

PREHABILITATION SCIENCES

The Prehabilitation Sciences major includes concentrations in physical therapy, occupational therapy, communication sciences and disorders, as well as in physician assisting and allied health areas. This curriculum is designed to meet the requirements of the programs in the College of Health Professions at the Medical University of South Carolina and other professional schools. The program requires a minimum of 90 semester hours of undergraduate coursework. In addition, students must apply to a professional school for acceptance into its program. Because preparation for some of the concentrations, such as the physical therapy, occupational therapy, and communication sciences and disorders programs at MUSC, requires a baccalaureate degree in any area, students are advised to select a major with similar requirements after consultation with the Prehabilitation Sciences advisor. The following curriculum fulfills the general requirements for those fields requiring less than a baccalaureate degree. Electives should be chosen after consultation with the advisor.

Professional schools may change their requirements at any time, so it is imperative that students in this major stay in close contact with their advisor.

For financial aid purposes, students in the Prehabilitation Sciences program are considered to be enrolled in a degree-seeking program.

First Year

First Semester
3 - BIOL 103 General Biology I
1 - BIOL 105 General Biology Lab. I
4 - CH 101 General Chemistry
4 - MTHSC 106 Calculus of One Variable I
3 - EX ST 301 Introductory Statistics
1 - Elective
18

Second Semester
4 - MTHSC 107 Calculus of One Variable II
3 - PHYS 101 General Physics I
3 - ENGL 103 Accelerated Composition
3 - PSYCH 140 Lifespan Developmental Psych.
3 - Arts and Humanities (Non-Lit.) Requirement
See advisor.
3 - Science and Technology in Society Requirement
18

Second Year

First Semester
4 - MTHSC 207 Calculus of Several Variables
3 - PHYS 207 General Physics I
1 - PHYS 209 General Physics I Lab.
3 - Arts and Humanities (Literature) Requirement
See advisor.
3 - Science and Technology in Society Requirement
18

Second Semester
4 - MTHSC 208 Calculus III
3 - PHYS 208 General Physics II
3 - COMM 250 Public Speaking
3 - Arts and Humanities Requirement
18

Third Year

90 Total Semester Hours
1See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.
2Select any ENGL course from General Education Arts and Humanities (Literature) Requirement.
3See advisor.
4Students planning to receive the Bachelor of Science degree upon completion of the program are required to complete an additional 24 credit hours. See advisor for requirements.

PREVETERINARY MEDICINE

Under a regional plan, the South Carolina Prevet-
enary Advisory Committee coordinates a program for South Carolina residents who are interested in pursuing careers in veterinary medicine. South Carolina residents attending any college or university may apply through the Veterinary Medical College Application Service (VMCAS) to the University of Georgia College of Veterinary Medicine. Currently the University of Georgia admits up to 17 students each year through arrangements with the Southern Regional Education Board. The State of South Caro-
lina has a contract with Mississippi State University to admit up to five South Carolina residents. The State of South Carolina also has a contract with Tuskegee University to admit up to four South Carolina residents. Application must be made directly to Tuskegee University.

Minimum requirements for admission to a college of veterinary medicine generally include the satisfactory completion of prescribed courses in a well-rounded undergraduate degree program. Specific requirements for admission to the University of Georgia College of Veterinary Medicine include the following under-

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graduate courses: six credits of English, 14 credits of humanities and social studies, eight credits of physics, eight credits of general biology, eight credits of advanced biology, three credits of biochemistry, and 16 credits of organic and inorganic chemistry. (Chemistry and physics courses must be at the premedical level; they may not be survey courses.)

To be in the best competitive position, applicants should complete courses in animal agriculture, genetics, nutrition, biochemistry, and advanced biology. Considerations for selection are character, scholastic achievement, personality, experience with large and small animals, general knowledge, and motivation. In the past, competition has been keen, and only those applicants who have shown exceptional ability have been admitted. Specific considerations may include a minimal grade-point average and completion of standardized tests such as the Graduate Record Examination and the Veterinary College Admissions Test.

Since out-of-state students attending Clemson are ineligible to apply to the University of Georgia or Tuskegee University under the South Carolina quota, they should contact the college(s) of veterinary medicine to which they plan to apply. They may apply at the University of Georgia for at-large admission.

Veterinary schools accept students with a broad range of academic backgrounds; therefore, it is recommended that the beginning university student select any undergraduate major and simultaneously complete the courses required for veterinary school entrance and those required for completion of a BS or BA degree. For students selecting Animal and Veterinary Sciences or Biological Sciences at Clemson University, the basic curricula have been designed to accommodate Georgia’s entrance requirements. Further information is available from the Department of Animal and Veterinary Sciences at (864) 656-3427.

SOILS AND SUSTAINABLE CROP SYSTEMS

Bachelor of Science

The BS degree program in Soils and Sustainable Crop Systems is a multidisciplinary program that educates students with expertise in soils, crop sciences, and applied agricultural biotechnology. It offers students a rigorous, science-based degree with educational opportunities related to management of agricultural commodities and natural resources, as well as soil and water resources. Students can tailor the program to fit their professional and academic goals by selecting one of three concentrations with emphasis areas.

The Agricultural Biotechnology Concentration integrates conventional disciplines with molecular advances in plants, pathogens, and biosystem interactions and responds to the educational void between the rapid adoption of biotechnology products into agricultural production and the intermediate- and end-users, farmers, and consumers. Graduates in this concentration will be competitive as scientists in emerging agricultural biotechnology industries, as educators, and as policy makers and officers in regulatory agencies.

Students with a concentration in Soil and Water Environmental Science can address compelling problems such as land application of agricultural and industrial wastes, reduction of contamination of ground and surface waters, establishment of functional septic drain fields, and production of food and fiber crops. Graduates will be able to establish careers in traditional agrarian fields such as soil scientists and conservationists, extension agents, and farm consultants, and in the broader environmental arenas of DHEC, consulting engineering firms, and environmental consulting. Graduates will be well prepared for graduate work in fields ranging from soil science to environmental engineering and law.

Students with a concentration in Sustainable Crop Production will graduate with comprehensive knowledge to increase farm profits by decreasing the costs of crop and production; build soil tilth and fertility through rotations, multiple cropping, and nutrient cycling; protect the environment by minimizing or more efficiently using synthetic agrichemicals; manage crop pests and weeds with integrated, ecologically sound strategies; develop strategies for profitable marketing of agricultural commodities; and create a strong, diversified agriculture that is stable through market and weather fluctuations. Graduates can assume positions as self-employed farmers, farm managers, state and federal natural resource managers, research technicians, agricultural industry employees, greenhouse managers, consultants in pest management and sustainable agriculture, field ecology professionals, pest control industry specialists, extension personnel, or regulatory officers.

Freshman Year

First Semester

1 - BIOL 110 Principles of Biology I
2 - CH 101 General Chemistry
3 - MTHSC 102 Intro. to Math. Analysis or
4 - MTHSC 106 Calculus of One Variable I
1 - SSCS 103 Survey of Soils and Sustainable Crop Systems
3 - Arts and Humanities (Non-Lit.) Requirement
16-17

Second Semester

1 - BIOL 111 Principles of Biology II
4 - CH 102 General Chemistry
3 - ENGL 103 Accelerated Composition
3 - EX ST 301 Introductory Statistics or
4 - MTHSC 108 Calculus of One Variable II or
4 - MTHSC 207 Multivariable Calculus
1 - SSCS 102 Academic and Professional Dev. I
14-15

Sophomore Year

First Semester

1 - CH 223 Organic Chemistry
1 - CH 227 Organic Chemistry Lab.
3 - COMM 150 Intro. to Human Comm. or
3 - COMM 250 Public Speaking
3 - ECON 200 Economic Concepts or
3 - ECON 211 Principles of Microeconomics
3 - SSCS 333 Agricultural Genetics
3 - Arts and Humanities (Literature) Requirement
16

Second Semester

3 - AP EC 205 Agriculture and Society
3 - BIOSC 335 Evolutionary Biology
3 - CH 224 Organic Chemistry
1 - CH 228 Organic Chemistry Lab.
1 - GEN 300 Fundamental Genetics
1 - GEN 301 Fundamental Genetics Lab.
14

Junior Year

First Semester

1 - BIOCH 305 Essential Elements of Biochem.
3 - BIOSC 304 Biology of Plants
2 - BIOSC 434 Biological Chem. Lab. Tech
3 - CSENV (SSCS) 422 Major World Crops
3 - SSCS 335 Agricultural Biotechnology
3 - Social Science Requirement
17

Second Semester

1 - CSENV (SSCS) 350 Practicum
3 - ENGL 314 Technical Writing or
3 - ENGL 315 Scientific Writing and Comm.
1 - PL PA 310 Plant Diseases and People
3 - PL PH (BIOSC) 340 Plant Med. and Magic
1 - SSCS 401 Academic and Professional Dev. II
4 - Emphasis Area Requirement
15

Senior Year

First Semester

3 - BIOSC 401 Plant Physiology
1 - BIOSC 402 Plant Physiology Lab.
3 - CSENV (SSCS) 350 Practicum
4 - ENT (BIOSC) 301 Insect Biology and Diversity
1 - SSCS 445 Regulatory Issues and Policies
1 - SSCS 450 Agric. Biosystems and Risk Assess.
3 - Emphasis Area Requirement
16

Second Semester

2 - CSENV (SSCS) 350 Practicum
3 - CSENV 409 Biology of Invasive Plants
1 - SSCS 451 Agric. Biotech. and Global Society
9 - Emphasis Area Requirement
15

125-127 Total Semester Hours

AGRICULTURAL BIOTECHNOLOGY CONCENTRATION

Sophomore Year

First Semester

3 - CH 223 Organic Chemistry
1 - CH 227 Organic Chemistry Lab.
3 - COMM 150 Intro. to Human Comm. or
3 - COMM 250 Public Speaking
3 - ECON 200 Economic Concepts or
3 - ECON 211 Principles of Microeconomics
3 - SSCS 333 Agricultural Genetics
3 - Arts and Humanities (Literature) Requirement
16

Second Semester

3 - AP EC 205 Agriculture and Society
3 - BIOSC 335 Evolutionary Biology
3 - CH 224 Organic Chemistry
1 - CH 228 Organic Chemistry Lab.
1 - GEN 300 Fundamental Genetics
1 - GEN 301 Fundamental Genetics Lab.
14

Junior Year

First Semester

3 - BIOCH 305 Essential Elements of Biochem.
3 - BIOSC 304 Biology of Plants
2 - BIOSC 434 Biological Chem. Lab. Tech
3 - CSENV (SSCS) 422 Major World Crops
3 - SSCS 335 Agricultural Biotechnology
3 - Social Science Requirement
17

Second Semester

1 - CSENV (SSCS) 350 Practicum
3 - ENGL 314 Technical Writing or
3 - ENGL 315 Scientific Writing and Comm.
1 - PL PA 310 Plant Diseases and People
3 - PL PH (BIOSC) 340 Plant Med. and Magic
1 - SSCS 401 Academic and Professional Dev. II
4 - Emphasis Area Requirement
15

Senior Year

First Semester

3 - BIOSC 401 Plant Physiology
1 - BIOSC 402 Plant Physiology Lab.
3 - CSENV (SSCS) 350 Practicum
4 - ENT (BIOSC) 301 Insect Biology and Diversity
1 - SSCS 445 Regulatory Issues and Policies
1 - SSCS 450 Agric. Biosystems and Risk Assess.
3 - Emphasis Area Requirement
16

Second Semester

2 - CSENV (SSCS) 350 Practicum
3 - CSENV 409 Biology of Invasive Plants
1 - SSCS 451 Agric. Biotech. and Global Society
9 - Emphasis Area Requirement
15

125-127 Total Semester Hours

1ECON 200 is recommended for students in the Agricultural Biotechnologies and Technology Emphasis Area. ECON 211 is recommended for students in the Agricultural Biotechnology and Global Society Emphasis Area.

2See General Education Requirements.

3Select from a department approved list. Courses to support proficiency in a foreign language also are encouraged.
SOIL AND WATER ENVIRONMENTAL SCIENCE CONCENTRATION

Sophomore Year
First Semester
3 - CH 223 Organic Chemistry and 1 - CSENV 207 Organic Chemistry Lab. or 4 - CH 201 Survey of Organic Chemistry 4 - CSENV 202 Soils 3 - GEOL 101 Physical Geology 1 - GEOL 103 Physical Geology Lab. 3 - PHYS 207 General Physics I and 1 - PHYS 209 General Physics I Lab. or 3 - PHYS 122 Physics with Calculus I and 1 - PHYS 124 Physics Lab. I 16

Second Semester
3 - PHYS 208 General Physics II and 1 - PHYS 210 General Physics II Lab. or 3 - PHYS 221 Physics with Calculus II and 1 - PHYS 223 Physics Lab. II 3 - Arts and Humanities (Literature) Requirement 1 - Cross-Cultural Awareness Requirement 4 - Emphasis Area Requirement 4 - Plant Science Requirement 14

Junior Year
First Semester
3 - COMM 150 Intro. to Human Comm. or 3 - COMM 250 Public Speaking 4 - MICRO 305 General Microbiology 5 - Emphasis Area Requirement 6 - Plant Science Requirement 15

Second Semester
3 - CSENV 490 Beneficial Soil Organisms in Plant Growth 3 - ENGL 314 Technical Writing or 3 - ENGL 315 Scientific Writing and Comm. 3 - GEOL 408 Geohydrology 1 - SSCS 401 Academic and Professional Dev. II 3 - Emphasis Area Requirement 3 - Social Science Requirement 16

Senior Year
First Semester
3 - CSENV (SSCS) 350 Practicum 2 - CSENV 403 Soil Genesis and Classification 1 - CSENV 453 Seminar 3 - Applied Spatial Technology Requirement 4 - Emphasis Area Requirement 3 - Field Scale Environmental Mgt. Requirement 15

Second Semester
3 - AGRIC (EN SP) 315 Environment and Agric. 3 - BIOCS 401 Plant Physiology and 1 - BIOCS 402 Plant Physiology Lab. 3 - CSENV (B E) 408 Land Treatment of Wastewater and Sludges 3 - Emphasis Area Requirement 2 - Social Science Requirement 16

124–126 Total Semester Hours

SUSTAINABLE CROP PRODUCTION CONCENTRATION

Sophomore Year
First Semester
3 - AP EC 202 Agricultural Economics or 3 - ECON 211 Principles of Microeconomics 3 - CH 223 Organic Chemistry1 and 1 - CH 227 Organic Chemistry Lab. or 4 - CH 201 Survey of Organic Chemistry 4 - CSENV 202 Soils 3 - PL PA 310 Plant Diseases and People 14

Second Semester
3 - AP EC 205 Agriculture and Society 3 - CH 224 Organic Chemistry1 and 1 - CH 228 Organic Chemistry Lab. or 2 - BIOCS 434 Biol. Chem. Lab Techniques and 2 - Elective 3 - COMM 150 Intro. to Human Comm. or 3 - COMM 250 Public Speaking 3 - SSCS 333 Agricultural Genetics 3 - Plant Science Requirement 16

Junior Year
First Semester
4 - ENT (BIOCS) 301 Insect Biology and Diversity 3 - IPM 401 Principles of Integrated Pest Mgt. 3 - Emphasis Area Requirement 3 - Plant Science Requirement 3 - Social Science Requirement 10

Second Semester
3 - BIOCS 401 Plant Physiology 3 - BIOCS 402 Plant Physiology Lab. 3 - CSENV 405 Plant Breeding 3 - CSENV 409 Biology of Invasive Plants 3 - ENGL 314 Technical Writing or 3 - ENGL 315 Scientific Writing and Comm. 2 - PL PA 411 Plant Disease Diagnosis I 1 - SSCS 401 Academic and Professional Dev. II 16

Senior Year
First Semester
3 - CSENV 490 Beneficial Soil Organisms in Plant Growth 4 - ENT 407 Applied Agricultural Entomology 6 - Emphasis Area Requirement 13

1See General Education Requirements.
2Selected from department-approved list. Emphasis areas include Soil and Water Quality, Soil Management, and Soil Science.
3BIOS 441, CSENV 421, 422, 423, (AP EC) 426, or HORT 456.
4AG M 410, FOR 433, or other course approved by advisor.
5AD M 402, ENTOX 421, or other course approved by advisor.

TURFGRASS

Bachelor of Science

Turfgrass is a major part of our built environment and daily life, including home lawns, sports fields, and golf courses. Grasped areas are aesthetically attractive and provide many environmental benefits, including the prevention of soil erosion, noise reduction, improved water quality, and reduced injuries from sports.

Graduates pursue careers in management of professional golf courses and sports fields and in lawn care; production and sale of seed, sod, supplies, and equipment; or as technicians for businesses or government agencies. The curriculum provides a strong foundation in science, advanced business, and environmental and leadership skills that are needed for success in today’s competitive environment. Courses in horticulture also provide a background for turfgrass managers who may have responsibilities for landscaped areas.

Students work closely with faculty in creative inquiry groups to investigate and implement solutions to real problems. Student intern experiences a wide range of turf facilities, businesses, and public institutions to develop skills and experience needed for successful careers. In addition, the University’s golf course (Walker Golf Course) and athletic fields offer great employment and learning opportunities.

Freshman Year
First Semester
4 - CH 101 General Chemistry 3 - HORT 101 Horticulture 3 - MTHSC 102 Intro to Math Analysis 4 - Spanish Language Requirement 14

Second Semester
3 - BIOL 106 General Biology Laboratory II 4 - CH 102 General Chemistry 3 - ENGL 103 Accelerated Composition 1 - HORT 102 Experience Horticulture 4 - Related Science Requirement 16

Second Semester
3 - CSENV (SSCS) 350 Practicum 3 - CSENV 452 Soil Fertility and Management 1 - CSENV 453 Soil Fertility Lab. 1 - CSENV 455 Seminar 3 - Arts and Humanities (Literature) Requirement 6 - Emphasis Area Requirement 17

124–126 Total Semester Hours

1CH 223/227, and 224/228 are strongly recommended.
2BIOS 304, CSENV 422, 423, HORT 310, 455, 456, or other department-approved course.
3Select from department-approved list. Emphasis areas include Crop Production, and Integrated Pest Management.
4See General Education Requirements.
5Alternative course may be taken as an emphasis area requirement. See advisor.

Second Semester
3 - AP EC 205 Agriculture and Society 3 - CH 224 Organic Chemistry1 and 1 - CH 228 Organic Chemistry Lab. or 2 - Elective 3 - COMM 150 Intro. to Human Comm. or 3 - COMM 250 Public Speaking 3 - SSCS 333 Agricultural Genetics 3 - Plant Science Requirement 16
**Sophomore Year**

**First Semester**
- 3 - HORT 212 Introduction to Turfgrass Culture
- 1 - HORT 213 Turfgrass Culture Lab.
- 3 - HORT 303 Landscape Plants
- 3 - MTHSC 101 Essential Math for Informed Soc.
- 4 - Plant Biology Requirement¹

**Second Semester**
- 4 - CSENV 202 Soils
- 3 - Arts and Humanities (Literature) Requirement²
- 3 - Business Requirement¹
- 6 - Related Science Requirement¹
- 3 - Social Science Requirement²

**Junior Year**

**First Semester**
- 3 - Arts and Humanities (Non-Lit.) Requirement²
- 3 - Business Requirement¹
- 6 - Related Science Requirement¹
- 3 - Social Science Requirement²
- 1 - Elective

**Second Semester**
- 3 - BIOSC 401 Plant Physiology
- 1 - BIOSC 402 Plant Physiology Lab.
- 1 - HORT 409 Seminar
- 3 - HORT 420 Applied Turfgrass Physiology
- 2 - PL PA (ENT) 406 Diseases and Insects of Turfgrasses
- 3 - Horticulture Specialization Requirement¹
- 3 - Oral Communication Requirement²

**Summer**
- 1 - PL PA (ENT) 408 Diseases and Insects of Turfgrasses Laboratory

**Senior Year**

**First Semester**
- 3 - HORT 412 Advanced Turfgrass Management
- 3 - Business Requirement¹
- 3 - Horticulture Specialization Requirement¹
- 3 - Related Science Requirement¹
- 3 - Soils Requirement³

**Second Semester**
- 3 - HORT (CSENV) 433 Landscape and Turf Weed Management
- 3 - Horticulture Specialization Requirement¹
- 3 - Related Science Requirement¹
- 3 - Soils Requirement³

**Second Semester**
- 3 - BIOL 104 General Biology II
- 1 - BIOL 106 General Biology Lab. II
- 1 - CH 102 Chemistry in Context II or
- 4 - PHYS 200 Introductory Physics
- 3 - ENGL 103 Accelerated Composition
- 3 - EX ST 301 Introductory Statistics
- 1 - F N R 102 PNR Freshman Portfolio

**WILDLIFE AND FISHERIES BIOLOGY**

**Bachelor of Science**

Increased interest in conservation of natural resources and the environment and demand for seafood products has resulted in these areas becoming increasingly technical and requiring highly qualified wildlife and fisheries biologists. Greatest demands for graduates are in the areas of management, research, survey, and regulatory positions with state and federal agencies; industrial research and quality control laboratories; conservation, recreation, and other public service agencies; and private enterprises.

The Bachelor of Science degree program in Wildlife and Fisheries Biology provides a solid foundation for many careers in the sciences. The curriculum is strong in basic and applied sciences, communication skills, and the social sciences. In addition, three credit hours are available for field training with appropriate natural resource agencies. Students may satisfy coursework requirements for professional certification by the Wildlife Society and/or the American Fisheries Society.

For students interested in conservation biology, courses and natural resources, the Department of Forestry and Natural Resources also administers the Conservation Biology and Natural Resources Management Concentrations within the Environmental and Natural Resources degree program. See pages 50-51 for program details.

**Combined Bachelor of Science/Master of Science Degree Program**

Under this plan, students may reduce the time necessary to earn both degrees by applying graduate credits to both undergraduate and graduate program requirements. Students are encouraged to obtain the specific requirements for the dual degree from the Department of Forestry and Natural Resources as early as possible in their undergraduate program, as a number of required courses have prerequisites not normally taken by Wildlife and Fisheries Biology majors. Enrollment guidelines and procedures can be found under Academic Regulations in this catalog.

**Freshman Year**

**First Semester**
- 3 - BIOL 103 General Biology I
- 1 - BIOL 105 General Biology Lab. I
- 4 - CH 101 General Chemistry
- 1 - E N R 101 Intro. to Env. and Natural Res. I
- 3 - MTHSC 102 Intro. to Mathematical Analysis
- 1 - Oral Communication Requirement³

**Second Semester**
- 3 - W F B 430 Wildlife Conservation Policy
- 2 - W F B 498 Senior Portfolio

**Sophomore Year**

**First Semester**
- 4 - F N R 204 Soil Information Systems
- 2 - FOR 205 Dendrology
- 3 - W F B 300 Wildlife Biology
- 1 - W F B 301 Wildlife Biology Lab.
- 3 - Arts and Humanities (Non-Lit.) Requirement¹

**Second Semester**
- 3 - ENGL 314 Technical Writing
- 2 - FOR 206 Forestry Ecology
- 1 - CSENV 300 Fundamental Genetics
- 3 - W F B 350 Principles of Fish and Wildlife Biol.
- 3 - Social Science Requirement¹

**Junior Year**

**First Semester**
- 3 - BIOSC 303 Vertebrate Biology
- 4 - BIOSC 320 Field Botany
- 3 - W F B 410 Wildlife Management Techniques
- 3 - Approved Requirement²
- 3 - Arts and Humanities (Literature) Requirement²

**Second Semester**
- 3 - WFB (BIOSC) 313 Conservation Biology
- 3 - W F B 412 Wildlife Management
- 3 - W F B 416 Fishery Biology
- 3 - W F B 440 Non-Game Wildlife Management
- 3 - W F B 462 Wetland Wildlife Biology

**Senior Year**

**First Semester**
- 3 - AP EC 257 Natural Resources, Environment, and Economics
- 4 - AVS 301 Anat. and Phys. of Domestic Animals
- 3 - FOR (E N R) 434 GIS for Landscape Planning
- 1 - W F B 498 Senior Portfolio
- 3 - Approved Requirement²

**Second Semester**
- 1 - F N R 499 Natural Resources Seminar
- 3 - W F B 430 Wildlife Conservation Policy
- 8 - Approved Requirement²
- 3 - Policy and Law Requirement²

122 Total Semester Hours

¹See advisor. Select from department-approved list.
²See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and the Science and Technology in Society Requirements.
³Note: Turfgrass majors must make a C or better in all HORT courses. Courses may be repeated as often as necessary to achieve the minimum grade.
MINORS

Following are minors acceptable for students in the College of Agriculture, Forestry and Life Sciences. Students cannot major and minor in the same field or acquire a minor that is not allowed by the degree program.

Accounting
Adult/Extension Education
Aerospace Studies
Agricultural Business Management
Agricultural Mechanization and Business
American Sign Language Studies
Animal and Veterinary Sciences
Anthropology
Architecture
Art
Athletic Leadership
Biochemistry
Biological Sciences
Business Administration
Chemistry
Cluster
Communication Studies
Computer Science
Crop and Soil Environmental Science
Digital Production Arts
East Asian Studies
Economics
Education
English
Entomology
Entrepreneurship
Environmental Engineering
Environmental Science and Policy
Equine Business—not open to Animal and Veterinary Sciences majors
Film Studies
Financial Management
Food Science
Forest Resource Management
Genetics
Geography
Geology
Global Politics
Great Works
History
Horticulture—not open to Turfgrass majors
Legal Studies
Management
Management Information Systems

Mathematical Sciences
Microbiology
Military Leadership
Modern Languages
Music
Natural Resource Economics
Nonprofit Leadership
Packaging Science
Pan African Studies
Park and Protected Area Management
Philosophy
Physics
Plant Pathology
Political Science
Psychology
Public Policy
Religion
Russian Area Studies
Science and Technology in Society
Screenwriting
Sociology
Spanish-American Area Studies
Theatre
Therapeutic Recreation
Travel and Tourism
Turfgrass—not open to Horticulture majors
Urban Forestry
Wildlife and Fisheries Biology
Women’s Studies
Writing

See pages 38-41 for details.