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—from cell research to food production to packaged materials to the globe—developing partnerships for the future to make the world greener, healthier, tastier, and wealthier.

**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.

### Freshman Year

**First Semester**

1. AG ED 102 Agric. Education Freshman Seminar
2. AG ED 200 Agricultural Applications of Educational Technology\(^1\) or
3. Arts and Humanities (Non-Lit.) and STS Requirements\(^1\)
4. AVS 150 Introduction to Animal Science
5. AVS 151 Introduction to Animal Science Lab.
6. BIOL 103 General Biology I
7. BIOL 105 General Biology Lab. I
8. HORT 101 Horticulture
9. Mathematics Requirement\(^2\)

**Second Semester**

1. AG ED 100 Orientation and Field Experience
2. AG M 205 Principles of Fabrication
3. BIOL 104 General Biology II
4. BIOL 106 General Biology Lab. II
5. ENGL 103 Accelerated Composition
6. Social Science Requirement\(^1\)

### Sophomore Year

**First Semester**

1. AG ED 201 Intro. to Agricultural Education
2. AG ED 204 Applied Agriculture Calculations
3. BT 220 Biosystems Technology I
4. CH 101 General Chemistry
5. HORT 212 Introduction to Turfgrass Culture
6. HORT 213 Turfgrass Culture Lab.

**Second Semester**

1. CH 102 General Chemistry
2. COMM 101 Communication Academic and Professional Development I\(^1\)
3. ED SP 370 Introduction to Special Education
4. EX ST 301 Introductory Statistics
5. PHYS 207 General Physics I
6. Technical Requirement\(^3\)

### Junior Year

**First Semester**

2. AG M 221 Surveying
3. CSENV 202 Soils
5. ENGL 304 or 314 is recommended.
6. Technical Requirement\(^4\)
7. Arts and Humanities (Literature) Requirement\(^1\)

**Second Semester**

2. AG ED 415 Leadership of Volunteers
3. AG ED 416 Ethics and Issues in Agriculture and the Food and Fiber System
4. MGT 201 Principles of Management
5. Arts and Humanities (Non-Lit.) Requirement\(^1\)
6. Technical Requirement\(^4\)

**Senior Year**

**First Semester**

1. ENGL 231 Introduction to Journalism
2. HORT 303 Landscape Plants
3. Arts and Humanities (Literature) Requirement\(^1\)
4. Departmental Communication Requirement\(^1\)
5. Technical Requirement\(^1\)

**Second Semester**

1. AG ED 407 Internship in Extension and Leadership Education\(^1\)

**LEADERSHIP EMPHASIS AREA**

### Junior Year

**First Semester**

2. AG M 221 Surveying
3. CSENV 202 Soils
5. ENGL 304 or 314 is recommended.
6. Technical Requirement\(^4\)
7. Arts and Humanities (Non-Lit.) Requirement\(^1\)

**Second Semester**

1. ED F 302 Educational Psychology
2. E N R 302 Natural Resources Measurements
3. HORT 305 Plant Propagation
5. Oral Communication Requirement\(^1\)
6. Technical Requirement\(^4\)

**Senior Year**

**First Semester**

2. AG ED 415 Leadership of Volunteers
3. AG ED 416 Ethics and Issues in Agriculture and the Food and Fiber System
4. MGT 201 Principles of Management
5. Arts and Humanities (Literature) Requirement\(^1\)
6. Technical Requirement\(^4\)
Second Semester
12 - AG ED 407 Internship in Extension and Leadership Education

12

134 Total Semester Hours

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/cafs/departments/bioystemeng/agmec/index.html.

Freshman Year
First Semester
3 - AG ED 200 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
1 - BIOL 105 General Biology Lab. I
3 - MTHSC 102 Intro. to Mathematical Analysis
14

Second Semester
12 - AG ED 406 Directed Teaching
2 - AG ED 425 Teaching Agricultural Mechanics
14

130 Total Semester Hours

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

16

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

3 - Human and Social Sciences Requirement

16

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

16

Second Semester
12 - AG ED 406 Directed Teaching
2 - AG ED 425 Teaching Agricultural Mechanics
14

130 Total Semester Hours

1 - Required for students minoring in Business Administration.
2 - See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and the Science and Technology in Society Requirements.
3 - MGT 201 can count for either of the AGM 302 or 319 requirements but not for both.
4 - See 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.
5 - AGRIC 104, CSENV 405, 421, 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.
6 - AG M 419 must switch the course order with a Fall offering.
7 - CSENV 403, 446, 452, 485, or 490. If applicable, these courses may also be used to satisfy minor requirement.
8 - Required for students minoring in Business Administration.
**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 value-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 Preveternery 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 AGRI-BUSINESS CONCENTRATION**

**Freshman Year**

<table>
<thead>
<tr>
<th>First Semester</th>
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</thead>
<tbody>
<tr>
<td>1 - AVS 100 Orientation to Animal and Vet. Sci.</td>
</tr>
<tr>
<td>3 - AVS 150 Introduction to Animal Science</td>
</tr>
<tr>
<td>1 - AVS 106 General Biology Lab. I or 5 - BIOL 110 Principles of Biology I</td>
</tr>
<tr>
<td>4 - CH 101 General Chemistry</td>
</tr>
<tr>
<td>3 - Arts and Humanities (Non-Lit.) Requirement¹</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second Semester</th>
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</thead>
<tbody>
<tr>
<td>3 - AVS Techniques Requirement²</td>
</tr>
<tr>
<td>3 - Elective</td>
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</table>

<table>
<thead>
<tr>
<th>Junior Year</th>
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</thead>
<tbody>
<tr>
<td>First Semester</td>
</tr>
<tr>
<td>4 - AVS 301 Anat. and Phys. of Domestic Animals</td>
</tr>
<tr>
<td>3 - AVS 370 Principles of Animal Nutrition</td>
</tr>
<tr>
<td>3 - AVS 470 Animal Genetics</td>
</tr>
<tr>
<td>3 - CSENV 423 Field Crops—Forages</td>
</tr>
<tr>
<td>3 - ECON 212 Principles of Macroeconomics</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Second Semester</th>
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</thead>
<tbody>
<tr>
<td>3 - AVS 375 Applied Animal Nutrition</td>
</tr>
<tr>
<td>3 - AVS 413 Animal Products</td>
</tr>
<tr>
<td>3 - AVS 453 Animal Reproduction</td>
</tr>
<tr>
<td>3 - LAW 322 Legal Environment of Business</td>
</tr>
<tr>
<td>3 - Elective</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Senior Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Semester</td>
</tr>
<tr>
<td>3 - AVS 310 Animal Health</td>
</tr>
<tr>
<td>1 - AVS 400 Animal and Veterinary Sciences Professional Development</td>
</tr>
<tr>
<td>3 - AVS 415 Contemporary Issues in Animal Sci.</td>
</tr>
<tr>
<td>3 - MKT 301 Principles of Marketing</td>
</tr>
<tr>
<td>2 - AVS Experience-Based Activity³</td>
</tr>
<tr>
<td>2 - AVS Techniques Requirement²</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 - AVS 406 Seminars and Related Topics</td>
</tr>
<tr>
<td>3 - AVS 410 Domestic Animal Behavior</td>
</tr>
<tr>
<td>2 - AVS 417 Animal Agribusiness Development</td>
</tr>
<tr>
<td>4 - AVS 450 Sustainable Livestock Production Sys.</td>
</tr>
<tr>
<td>3 - AVS Experience-Based Activity³</td>
</tr>
<tr>
<td>2 - Elective</td>
</tr>
</tbody>
</table>

123–126 Total Semester Hours

²See 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.

³Select from: AVS 200, 201, 203, 204, 206, 209, 302, 309, 311, 323, 405 or 455

²AVS 302, 309, 311 or 323

²AVS 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.

**EQUINE BUSINESS CONCENTRATION**

**Freshman Year**

<table>
<thead>
<tr>
<th>First Semester</th>
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<tbody>
<tr>
<td>1 - AVS 100 Orientation to Animal and Vet. Sci.</td>
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<tr>
<td>3 - AVS 150 Introduction to Animal Science</td>
</tr>
<tr>
<td>1 - AVS 151 Introduction to Animal Science Lab.</td>
</tr>
<tr>
<td>3 - BIOL 103 General Biology I and 1 - BIOL 105 General Biology Lab. I or 5 - BIOL 110 Principles of Biology I</td>
</tr>
<tr>
<td>4 - CH 101 General Chemistry</td>
</tr>
<tr>
<td>3 - Arts and Humanities (NonLit.) Requirement¹</td>
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<thead>
<tr>
<th>Second Semester</th>
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</thead>
<tbody>
<tr>
<td>3 - BIOL 104 General Biology II and 1 - BIOL 106 General Biology Lab. II or 5 - BIOL 111 Principles of Biology II</td>
</tr>
<tr>
<td>4 - CH 102 General Chemistry</td>
</tr>
<tr>
<td>3 - ENGL 103 Accelerated Composition</td>
</tr>
<tr>
<td>3 - MTHSC 101 Ess. Math. for Informed Soc. or 3 - MTHSC 102 Intro. to Math. Analysis or 4 - MTHSC 106 Calculus of One Variable I</td>
</tr>
<tr>
<td>2 - AVS Techniques Requirement²</td>
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<tr>
<th>Sophomore Year</th>
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</thead>
<tbody>
<tr>
<td>First Semester</td>
</tr>
<tr>
<td>3 - ACCT 201 Financial Accounting Concepts</td>
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<tr>
<td>3 - EX ST 301 Introductory Statistics</td>
</tr>
<tr>
<td>3 - MGT 201 Principles of Management</td>
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<tr>
<td>2 - AVS Techniques Requirement²</td>
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<td>3 - Elective</td>
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<tr>
<th>Second Semester</th>
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<tbody>
<tr>
<td>3 - ECON 211 Principles of Microeconomics</td>
</tr>
<tr>
<td>3 - FIN 306 Corporation Finance</td>
</tr>
<tr>
<td>3 - Arts and Humanities (Literature) Requirement¹</td>
</tr>
<tr>
<td>2 - AVS Evaluation Requirement¹</td>
</tr>
<tr>
<td>2 - AVS Techniques Requirement²</td>
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<tr>
<td>3 - Social Science Requirement¹</td>
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<tbody>
<tr>
<td>First Semester</td>
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<td>3 - AVS 310 Animal Health</td>
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<td>1 - AVS 400 Animal and Veterinary Sciences Professional Development</td>
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123–126 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.

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

²AVS 302, 309, 311 or 323

²AVS 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 110 Animal Health
- 1 - AVS 400 Animal and Related 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 Activity

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

14

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.

### 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
- 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

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 - BIOCH 103 Careers in Biochem. and Genetics
- 1 - PHYS 124 Physics Lab. I

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### 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 Requirement
- 3 - Social Science Requirement

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### 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.

#### Junior Year

**First Semester**
- 3 - BIOCH 431 Physical Approach to 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 110 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 Requirement

16-17

**Second Semester**
- 3 - BIOCH 301 Molecular Biochemistry
- 3 - CH 224 Organic Chemistry
- 1 - CH 228 Organic Chemistry Lab.
- 3 - PHYS 223 Physics Lab. II
- 3-4 - Arts and Humanities (Literature) Requirement

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#### 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 110 Principles of Biology II
- 4 - CH 102 General Chemistry
- 3 - ENGL 103 Accelerated Composition
- 4 - MTHSC 108 Calculus of One Variable II

16

**Senior Year**

**First Semester**
- 2 - AVS 406 Seminars and Related Topics
- 1 - AVS 400 Animal and Veterinary Sciences: Professional Development
- 3 - AVS 415 Contemporary Issues in Animal Sci.
- 2 - AVS Techniques Requirement
- 3 - Departmental Requirement

14

**Second Semester**
- 3 - AVS 410 Domestic Animal Behavior
- 3 - AVS 413 Animal Products
- 2 - AVS Experience-Based Activity

14

### Junior Year

**First Semester**
- 1 - AVS 105 General Biology I
- 3 - AVS 106 General Biology Lab. II or 5 - BIOL 110 Principles of Biology I
- 4 - CH 101 General Chemistry
- 3 - Arts and Humanities (Literature) Requirement

14

**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

16-18

**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 Requirement

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 223 Physics Lab. II

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**Senior Year**

**First 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 223 Physics Lab. II

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**Second Semester**
- 3 - BIOCH 431 Physical Approach to Biochem. and Genetics
- 2 - BIOCH 433 General Biochemistry Lab. I
- 3 - CH 330 Introduction to Physical Chemistry
- 3 - Science Requirement
- 5 - Elective

16
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 - 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

Second Semester
5 - BIOL 111 Principles of Biology 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

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 3 - Arts and Humanities (Literature) Requirement 3 - Biochemistry or Genetics Requirement 14

Second Semester
3 - CH 224 Organic Chemistry and 1 - CH 228 Organic Chemistry Laboratory or 4 - Major Requirement 4 - Animal or Plant Diversity Requirement 4 - Biochemistry or Genetics Requirement 5 - Major Requirement 16

Junior Year

First Semester
3 - BIOSC 335 Evolutionary Biology 2 - BIOSC 461 Cell 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

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 5 - Major Requirement 3 - Social Science Requirement

Senior Year

First Semester
1 - CH 225 Organic Chemistry and 1 - CH 227 Organic Chemistry Lab. or 4 - CH 201 Survey of Organic Chemistry 4 - Animal or Plant Diversity Requirement 3 - Arts and Humanities (Literature) Requirement 3 - Biochemistry or Genetics Requirement 15

Second Semester
12 - Major Requirement 3 - Social Science Requirement 15

124 Total Semester Hours

1BIOL 110 and 111 are strongly recommended; however, BIOL 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.

2At least one lecture and associated laboratory must be completed for both animal diversity (BIOSC 302/306 or BIOSC 303/307, 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).

3See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

4BIOL 110 and 111 are strongly recommended; however, BIOL 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.

5At least one lecture course must be completed for both biochemistry (BIOSP 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).

6BIOSC 434 may be substituted for CH 228.

7See advisor. Select one lecture/lab combination from each of the following fields:
- Physiology—BIOSC 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 - Animal or Plant Diversity Requirement 3 - Arts and Humanities (Literature) Requirement 3 - Biochemistry or Genetics Requirement 14

Second Semester
3 - CH 224 Organic Chemistry and 1 - CH 228 Organic Chemistry Laboratory or 4 - Major Requirement 4 - Animal or Plant Diversity Requirement 4 - Biochemistry or Genetics Requirement 5 - Major Requirement 16

Junior Year

First Semester
3 - BIOSC 335 Evolutionary Biology 2 - BIOSC 461 Cell 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

Second Semester
3 - CH 224 Organic Chemistry and 1 - CH 228 Organic Chemistry Laboratory or 4 - Major Requirement 4 - Animal or Plant Diversity Requirement 5 - Major Requirement 4 - Plant Diversity Requirement 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

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 233 Physics Lab. II
3 - Arts and Humanities (Non-Lit.) Requirement3
3 - Entomology Requirement6
3 - Major Requirement4
3 - Social Science Requirement4

124 Total Semester Hours

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. BIOSC 475 and 476 are recommended to satisfy the Physiology Requirement.

Second Semester
3 - CH 223 Organic Chemistry
1 - CH 227 Organic Chemistry Lab.
4 - Animal or Plant Diversity Requirement1
3 - Arts and Humanities (Literature) Requirement1
3 - Biochemistry or Genetics Requirement2
3 - Social Science Requirement4

Sophomore Year
First Semester
3 - BIOSC 315 Functional Human Anatomy
3 - BIOC 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 221 Physics with Calculus II and
1 - PHYS 223 Physics Lab. II
3 - PSYCH 201 Introduction to Psychology
4 - Animal Physiology Requirement
3 - Economics Requirement4
3 - Major Requirement4

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 Requirement
3 - Economics Requirement4
3 - Major Requirement4

Senior Year
First Semester
3 - BIOSC 461 Cell Biology
2 - BIOSC 462 Cell Biology Lab.
2 - BIOSC 493 Senior Seminar
8 - Major Requirement4

PREPHARMACY EMPHASIS AREA
Freshman Year
First Semester
3 - BIOL 105 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

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

Sophomore Year
First Semester
3 - CH 223 Organic Chemistry
1 - CH 227 Organic Chemistry Lab.
4 - Animal or Plant Diversity Requirement1
3 - Arts and Humanities (Literature) Requirement1
3 - Biochemistry or Genetics Requirement2
3 - Social Science Requirement4

Second Semester
3 - CH 224 Organic Chemistry
1 - CH 228 Organic Chemistry Lab.
4 - MICRO 305 General Microbiology
4 - Animal or Plant Diversity Requirement1
3 - Biochemistry or Genetics Requirement2

Junior Year
First Semester
4 - BIOSC 315 Functional Human Anatomy
3 - BIOC 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 221 Physics with Calculus II and
1 - PHYS 223 Physics Lab. II
3 - PSYCH 201 Introduction to Psychology
4 - Animal Physiology Requirement
3 - Economics Requirement4
3 - Major Requirement4

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 Requirement
3 - Economics Requirement4
3 - Major Requirement4

Senior Year
First Semester
3 - BIOSC 461 Cell Biology
2 - BIOSC 462 Cell Biology Lab.
2 - BIOSC 493 Senior Seminar
8 - Major Requirement4

Second Semester
3 - Arts and Humanities (Non-Lit.) Requirement
4 - Major Requirement4

124 Total Semester Hours

School of Science and Technology in Society Requirements.

At least one lecture course must be completed 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 320, or BIOSC 406/407, or other approved coursework at the 200 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 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 316, 459/460, or 475/476

200 level or higher.

See advisor. Select one lecture/lab combination in ecology (BIOC 441/445, 443/444, 446/447, 470/471). 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 and
1 - CH 227 Organic Chemistry Lab. or
4 - CH 201 Survey of Organic Chemistry
4 - Animal or Plant Diversity Requirement1
3 - Biochemistry or Genetics Requirement2
3 - Partial Differential Equations Requirement3

Second Semester
3 - CH 224 Organic Chemistry and
1 - CH 228 Organic Chemistry Lab. or
4 - Animal or Plant Diversity Requirement1
3 - Biochemistry or Genetics Requirement2
3 - Major Requirement5

Junior Year
First Semester
3 - BIOSC 335 Evolutionary Biology
3 - ENGL 315 Scientific Writing and Comm.
3 - EX ST 311 Introductory Statistics II
3 - PHYS 207 General Physics I and
1 - PHYS 209 General Physics I 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 Requirement
3 - Economics Requirement4
3 - Major Requirement4

Senior Year
First Semester
3 - BIOSC 461 Cell Biology
2 - BIOSC 462 Cell Biology Lab.
2 - BIOSC 493 Senior Seminar
8 - Major Requirement4

Second Semester
3 - Arts and Humanities (Non-Lit.) Requirement
4 - Major Requirement4
## Second Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>3 - BIOSC 428</td>
<td>Quantitative Biology</td>
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<tr>
<td>3 - BIOSC 461</td>
<td>Cell Biology</td>
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<td>2 - BIOSC 462</td>
<td>Cell Biology Lab.</td>
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<tr>
<td>1 - PHYS 208</td>
<td>General Physics II</td>
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<td>1 - PHYS 210</td>
<td>General Physics II Lab. or</td>
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<td>1 - PHYS 221</td>
<td>Physics with Calculus II and</td>
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<tr>
<td>1 - PHYS 223</td>
<td>Physics Lab. II</td>
</tr>
<tr>
<td>3 - Social Science Requirement</td>
<td></td>
</tr>
</tbody>
</table>

**Senior Year**

### First Semester

1. BIOSC 493 Senior Seminar
2. GEN 440 Bioinformatics
3. Arts and Humanities (Literature) Requirement
4. Major Requirement
5. Social Science Requirement

**Second Semester**

1. BIOSC 468 Undergraduate Research
2. Social Science Requirement
3. Major Requirement

### Junior Year

#### First Semester

1. BIOSC 335 Evolutionary Biology
2. ENGL 315 Scientific Writing and Comm.
3. ENTOX 430 Toxicology
4. PHYS 207 General Physics I and
5. PHYS 209 General Physics I Lab. or
6. PHYS 122 Physics with Calculus I and
7. PHYS 124 Physics Lab. I
8. Major Requirement

#### Second Semester

1. PHYS 208 General Physics II and
2. PHYS 210 General Physics II Lab. or
3. PHYS 221 Physics with Calculus II and
4. Major Requirement
5. Social Science Requirement

### Senior Year

#### First Semester

1. BIOSC 461 Cell Biology
2. BIOSC 462 Cell Biology Lab.
3. BIOSC 493 Senior Seminar
4. CH 313 Quantitative Analysis
5. CH 317 Quantitative Analysis Lab.
6. Major Requirement

#### Second Semester

1. CH 413 Chemistry of Aqueous Systems or
2. ENTOX 421 Chemical Sources and Fate in Environmental Systems
3. Arts and Humanities (Non-Lit.) Requirement
4. Major Requirement
5. Social Science Requirement
6. Toxicology Requirement

**College of Agriculture, Forestry and Life Sciences**

- Arts and Humanities (Non-Lit.) Requirement
- Biochemistry or Genetics Requirement
- Animal or Plant Diversity Requirement
- Social Science Requirement
- Biological Sciences Requirement

## TOXICOLOGY EMPHASIS AREA

See Bachelor of Science curriculum for freshman year requirements.

### Sophomore Year

#### First Semester

1. BIOSC 210 Introduction to Toxicology
2. CH 223 Organic Chemistry and
3. CH 227 Organic Chemistry Lab. or
4. CH 201 Survey of Organic Chemistry
5. Animal or Plant Diversity Requirement
6. Biochemistry or Genetics Requirement

#### Second Semester

1. CH 224 Organic Chemistry and
2. CH 228 Organic Chemistry Laboratory or
3. Animal or Plant Diversity Requirement
4. Biochemistry or Genetics Requirement
5. Major Requirement

**BIOLOGICAL SCIENCES**

### 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

1. BIOL 110 Principles of Biology
2. BIOSC 101 Frontiers in Biology
3. CH 102 General Chemistry
4. CH 101 General Chemistry
5. BIOL 110 Principles of Biology
6. BIOL 110 Principles of Biology
7. MTHSC 106 Calculus of One Variable

#### Second Semester

1. BIOL 111 Principles of Biology
2. BIOSC 102 Frontiers in Biology
3. CH 102 General Chemistry
4. ENGL 135 Scientific Writing and Comm.
5. COMM 250 Public Speaking

### Sophomore Year

#### First Semester

1. CH 201 Survey of Organic Chemistry
2. Animal or Plant Diversity Requirement
3. Biochemistry or Genetics Requirement
4. Foreign Language Requirement

#### Second Semester

1. CH 201 Survey of Organic Chemistry
2. Animal or Plant Diversity Requirement
3. Biochemistry or Genetics Requirement
4. Foreign Language Requirement
5. Major Requirement

### Junior Year

#### First Semester

1. BIOSC 335 Evolutionary Biology
2. BIOSC 461 Cell Biology
3. BIOSC 462 Cell Biology Laboratory
4. CH 313 Quantitative Analysis
5. CH 317 Quantitative Analysis Lab.
6. Major Requirement

#### Second Semester

1. CH 224 Organic Chemistry
2. CH 228 Organic Chemistry Laboratory or
3. Animal or Plant Diversity Requirement
4. Biochemistry or Genetics Requirement
5. Major Requirement

#### Any 400-level ENTOX course.

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*See advisor. Select one lecture/lab combination from each of the following fields:
- Physiology—BIOSC 316, 401/402, 459/460, 475/476
*See General Education Requirements. Six of these credits must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

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*At least one lecture and associated laboratory must be completed 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).
*At least one lecture course must be completed for both biochemistry (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).
*At least one lecture and associated laboratory must be completed 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).
*At least one lecture and associated laboratory must be completed 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).
Senior Year
First Semester
1 - BIOSC 493 Senior Seminar
2 - PHYS 207 General Physics I
3 - PHYS 209 General Physics I Lab.
3 - Major Requirement
4 - Minor Requirement
5 - 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

BIOL 110 and 111 are strongly recommended; however, BIOL 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.

Students seeking a double major in Science Teaching and Biological Sciences should substitute EDSEC 457 for BIOSC 493.

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
17
Junior Year
First Semester
4 - BIOSC 315 Functional Human Anatomy
3 - BIOL 335 Evolutionary Biology
3 - BIOSC 461 Cell Biology
2 - BIOSC 462 Cell Biology Laboratory
3 - Foreign Language Requirement
15
Second Semester
4 - BIOSC 316 Human Physiology
3 - Arts and Humanities (Non-Lit.) Requirement
3 - 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

PREREHABILITATION SCIENCES

First Semester
3 - BIOL 103 General Biology I and
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 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
17
Junior Year
First Semester
4 - BIOSC 315 Functional Human Anatomy
3 - BIOL 335 Evolutionary Biology
3 - BIOSC 461 Cell Biology
2 - BIOSC 462 Cell Biology Laboratory
3 - Foreign Language Requirement
15
Second Semester
4 - BIOSC 316 Human Physiology
3 - Arts and Humanities (Non-Lit.) Requirement
3 - 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

Notes:
1. HLTH 350 is recommended.
2. American Heart Association Basic Life Support for Health Professionals is required.

ENVIRONMENTAL AND NATURAL RESOURCES
Bachelor of Science

The Environmental and Natural Resources curriculums are designed for students who have a broad-based knowledge in natural resources and an ability to interact with other resources 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 exotic species, protecting and conserving 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 wish to pursue a career in conservation, research, or policy. The Natural Resources Management Concentration emphasizes both resource management and policy 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**

**First Semester**
- 3 - BIOL 103 General Biology I
- 1 - BIOL 105 General Biology Lab. I
- 4 - CH 101 or 105 (Chemistry Requirement)b
- 1 - E N R 101 Intro. to Env. and Natural Res. 1
- 3 - MTHSC 102 Intro. to Mathematical Analysis
- 3 - Oral Communications Requirementa

15

**Second Semester**
- 3 - BIOL 104 General Biology II
- 1 - BIOL 106 General Biology Lab. II
- 4 - CH 102 or 106 (Chemistry Requirement)b
- 3 - ENGL 106 Advanced Composition
- 3 - EX ST 301 Introductory Statistics
- 1 - 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.

See General Education Requirements.

**CONSERVATION BIOLOGY**

**CONCENTRATION**

**Sophomore Year**

**First Semester**
- 3 - AP EC 257 Natural Resources, Environment, and Economics or
- 3 - ECON 211 Principles of Microeconomics
- 4 - BIOSC 320 Field Botany and
  - 1 - Elective or
  - 2 - FOR 205 Dendrology and
  - 3 - FOR 221 Forest Biology
- 3 - CH 223 Organic Chemistry
- 4 - F N R 204 Soil Information Systems or
  - 4 - CSENV 202 Soils

15

**Second Semester**
- 3 - GEN 300 Fundamental Genetics
- 3 - W F B (BIOSC) 313 Conservation Biology
- 3 - Arts and Humanities (Literature) Requirementa
- 2 - Physical Environment Requirementb
- 3 - Taxonomy/Habitat Requirementc

15

**Junior Year**

**First Semester**
- 3 - BIOSC 335 Evolutionary Biology
- 3 - Arts and Humanities (Non-Lit.) Requirementa
- 3 - Ecology Requirementb
- 3 - Natural Resource Economics Requirementc
- 3 - Taxonomy/Habitat Requirementc

15

**Second Semester**
- 3 - ENGL 314 Technical Writing
- 3 - E N R 302 Natural Resources Measurements
- 3 - Ecology Requirementc
- 3 - Physiology Requirementd
- 3 - Taxonomy/Habitat Requirementc

15

**Senior Year**

**First Semester**
- 3 - FOR (E N R) 434 GIS for Landscape Planning
- 3 - E N R 450 Conservation Issues
- 1 - FOR 498 Senior Portfolio or
  - 1 - W F B 498 Senior Portfolio
- 6 - Taxonomy/Habitat Requirement
- 2 - Elective

15

120 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.)

1GEOG 106, GEOL 101, or PHYS 240
2AGM 301, BIOSC 302/306, 303/307, 304/308, 305/309, 320, 406/407, 410/411, 417, 442, 464, 468, 472, 477, 496, CSENV 404, ENT (BIOSC) 301, (BIOSC, W F B) 469, FOR 251, 406, GEOL 112, 114, 210, 403, MICRO 403, W F B 300, 418, 440, 462 or 476. At least four of the courses must be laboratories or courses with a required laboratory component.
3BIOSC 441, 442, 443, 446, 470, or F N R 466
4AP EC 433, 475, C R D R (AP EC) 357, or FOR 304
5AVS 301, BIOSC 401/402, 439, 452, 453, or (AVS) 480
6E N R 429, FOR 400, (E N R) 416, or W F B 450
7Internship (F N R 490); Creative Inquiry (F N R 470); Directed Research (W F B 463); or Senior Honors Thesis (F N R H491).

**NATURAL RESOURCE**

**AND ECONOMIC POLICY**

**CONCENTRATION**

**Sophomore Year**

**First Semester**
- 3 - AP EC 257 Natural Resources, Environment, and Economics or
- 3 - ECON 211 Principles of Microeconomics
- 3 - PO SC 101 American National Government or
- 3 - PO SC 102 Intro. to International Relations
- 3 - Geography Requirementa
- 3 - Natural Science Requirementb
- 3 - Elective

15

**Second Semester**
- 3 - AP EC (C R D) 357 Natural Res. Economics
- 3 - ECON 212 Principles of Macroeconomics
- 3 - Arts and Humanities (Literature) Requirementa
- 3 - Arts and Humanities (Non-Lit.) Requirementa
- 3 - Elective

15

**Junior Year**

**First Semester**
- 3 - ECON 314 Intermediate Microeconomics
- 3 - E N R 429 Environmental Law and Policy
- 3 - Advanced Writing Requirementb
- 3 - Applied Economics Requirementc
- 3 - Natural Science Requirementc

15

**Second Semester**
- 3 - AP EC 475 Wildlife Economics
- 3 - ENSP 400 Studies in Environmental Science
- 3 - EX ST 462 Statistics Applied to Economics
- 3 - Microeconomics Requirementd
- 3 - Natural Science Requirementd

15

**Senior Year**

**First Semester**
- 3 - AP EC 457 Nat. Res. Use, Technology and Policy
- 3 - ECON 319 Environmental Economics
- 6 - Applied Economics Requirementc or
- 3 - Applied Economics Requirementd and
- 3 - Minor Requirement
- 3 - Internship, Creative Inquiry or Directed Research Requirementb

15

120 Total Semester Hours

1GEOG 101, 103, or 106
2Select from any BIOSC, CSENV, E N R, EE&S, EN SP, ENT-OX, FOR, GEOL, or W F B courses numbered 300 or higher.
3See 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.)
4Select from any AP EC courses numbered 300 or higher.
5ECON 302, 310 or 315
6Internship (AP EC 491); Creative Inquiry (AP EC 494); or Directed Research (AGRIC H491 or H492).
7C R D 335 or 336 or R S 401 or 459

**NATURAL RESOURCES MANAGEMENT**

**CONCENTRATION**

**Sophomore Year**

**First Semester**
- 4 - F N R 204 Soil Information Systems or
  - 4 - CSENV 202 Soils
- 2 - FOR 205 Dendrology
- 3 - FOR 221 Forest Biology
- 3 - W F B 300 Wildlife Biology
- 3 - Arts and Humanities (Literature) Requirementd

15

50
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 - BIOCS 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
3 - Elective
15

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

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/fnp.

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
3 - 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 (Literature) Requirement
3 - Social Science Requirement
15

SECOND SEMESTER
3 - BIOCS 395 Essential Elements of Biochem.
2 - BIOSC 434 Biological Chemistry Lab. II, Techniq.
3 - EKST 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 4

124–127 Total Semester Hours

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

For students undecided on concentration area, AP EC 202, ECON 211 or 212 is recommended.

FD SC 430 or AVS 413

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### 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
- **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
- **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 1

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 4
- **2** - Elective

17

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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
- **3** - Oral Communication Requirement 1

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 2

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 1
- **3** - Economics Requirement 1

15

#### Second Semester
- **3** - ENGL 314 Technical Writing
- **3** - FOR 206 Forest Ecology
- **3** - Arts and Humanities (Non-Lit.) Requirement 1
- **3** - Social Science Requirement 1
- **3** - Minor Requirement 4

15

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

5

#### Junior Year

**First Semester**
- **2** - FOR 302 Forest Biometrics
- **3** - FOR 304 Forest Resource Economics
- **3** - FOR 341 Forest Resource Management
- **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 5

16
### Bachelor of Science in Genetics

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 emerging biotechnology industries (pharmaceuticals, agricultural technologies, biomimetic minerals) in emerging biotechnology industries (pharmaceuticals, agricultural technologies, biomimetic minerals) in emerging biotechnology industries (pharmaceuticals, agricultural technologies, biomimetic minerals) in.
College of Agriculture, Forestry and Life Sciences

Second Semester
3 - BIOCH 301 Molecular Biochemistry
2 - BIOCH 302 Molecular Biochemistry Lab.
3 - CH 224 Organic Chemistry
1 - CH 228 Organic Chemistry Lab.
3 - EX ST 301 Introductory Statistics
3 - Arts and Humanities (Literature) Requirement
2 - Social Science Requirement

Junior Year
First Semester
3 - GEN 420 Molecular Genetics and Gene Regulation
2 - GEN 421 Molecular Genetics and Gene Regulation Lab.
3 - GEN (BIOCH) 440 Bioinformatics
3 - Science Requirement
3 - Elective

Second Semester
3 - BIOSC 461 Cell Biology
3 - GEN 410 Population and Quantitative Genetics
2 - GEN 411 Population and Quantitative Genetics Lab.
3 - PHIL 326 Science and Values
3 - Genetics Requirement
3 - Elective

Senior Year
First Semester
3 - GEN 450 Comparative Genetics
3 - Science Requirement
3 - Social Science Requirement
3 - Science Requirement
3 - Elective
3 - Arts and Humanities (Literature) Requirement
3 - EX ST 301 Introductory Statistics
3 - CH 224 Organic Chemistry
2 - BIOCH 302 Molecular Biochemistry Lab.

Second Semester
2 - GEN 493 Senior Seminar
6 - Genetics Requirement
3 - Science Requirement
3 - Elective

123 Total Semester Hours

1Medical, veterinary, and graduate school requirements often include two semesters of physics with calculus and the physics laboratory. Students are encouraged to check requirements for admission to professional graduate programs.

2See General Education Requirements. The Cross-Cultural Awareness Requirement must be satisfied by other general education courses or other required courses.

3Internship must be completed in one or two semesters. Prior approval is required for internships, and a 2.0 grade point ratio is required for registration.

Note: Horticulture majors must make a C or better in all HORT courses.

3See advisor. Select from department-approved list.

3Bachelor of Science

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
3 - BIOL 103 General Biology I
1 - BIOL 105 General Biology Lab. I
4 - CH 101 General Chemistry
3 - HORT 101 Horticulture
4 - Spanish Language Requirement
15

Second Semester
4 - CH 102 General Chemistry
3 - ENGL 103 Accelerated Composition
1 - HORT 102 Experience Horticulture
4 - MTHSC 101 Essential Math. for Informed Soc.
3 - Arts and Humanities (Non-Lit.) Requirement
15

Sophomore Year
First Semester
3 - BIOSC 304 Biology of Plants and
1 - BIOSC 308 Biology of Plants Laboratory
3 - HORT 210 Growing Garden Plants in the Fall
3 - MTHSC 101 Essential Math. for Informed Soc.
3 - Arts and Humanities (Literature) Requirement
3 - Business Requirement
16

Second Semester
4 - CSENV 202 Soils
3 - HORT 211 Growing Plants in the Spring
3 - Arts and Humanities (Literature) Requirement
3 - Social Science Requirement
13

Summer
3 - HORT 271 Internship or
3 - HORT 471 Advanced Internship

Junior Year
First Semester
3 - HORT 303 Landscape Plants
3 - Horticulture Specialization Requirement
3 - Oral Communication Requirement
3 - Social Science Requirement
3 - Elective
15

Second Semester
3 - HORT 305 Plant Propagation
1 - HORT 306 Plant Propagation Techniques Lab.
1 - HORT 409 Seminar
3 - Business Requirement
3 - Horticulture Specialization Requirement
3 - Related Science Requirement
1 - Elective
15

Senior Year
First Semester
3 - Business Requirement
6 - Horticulture Specialization Requirement
6 - Related Science Requirement
13

Second Semester
3 - BIOSC 401 Plant Physiology
1 - BIOSC 402 Plant Physiology Lab.
3 - Horticulture Specialization Requirement
6 - Related Science Requirement
13

120 Total Semester Hours

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
1 - 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
17
Second Semester
5 - BIOL 111 Principles of Biology II
4 - CH 102 General Chemistry
3 - ENGL 103 Scientific Writing and Comm.
34 - Mathematical Sciences Requirement^2
15-16

Sophomore Year
First Semester
3 - CH 223 Organic Chemistry
1 - CH 227 Organic Chemistry Lab.
3 - ENGL 315 Scientific Writing and Comm.
3 - Arts and Humanities (Literature) Requirement^3
3 - Social Science Requirement^3
3 - Elective^4
16
Second Semester
2 - BIOSC 434 Biol. Chemistry Lab. Techniques
3 - CH 224 Organic Chemistry
1 - CH 228 Organic Chemistry Lab.
3 - Arts and Humanities (Non-Lit.) Requirement^4
3 - Biochemistry Requirement^5
4 - General Microbiology Requirement^6
16

Junior Year
First Semester
3 - MICRO 401 Microbial Diversity and Ecology
3 - PHYS 207 General Physics I and 1 - PHYS 209 General Physics I Lab. or 3 - PHYS 212 Physics with Calculus I and 1 - PHYS 214 Physics Lab. I
6 - Microbiology Requirement^7
3 - Elective^4
16
Second Semester
3 - MICRO 412 Bacterial Physiology
2 - MICRO 450 Advanced Micro Lab I
3 - Microbiology Requirement^7
3 - Social Science Requirement^3
3 - Elective^4
16

Senior Year
First Semester
3 - BIOSC 461 Cell Biology
3 - MICRO 415 Microbial Genetics
2 - MICRO 451 Advanced Micro Lab II
3 - Virology Requirement^9
3 - Elective^4
14
Second Semester
2 - MICRO 452 Advanced Micro Lab III
2 - MICRO 493 Senior Seminar
3 - Microbiology Requirement^7
9 - Elective^4
16
124–125 Total Semester Hours
^1BIOL 110 and 111 are strongly recommended; however, BIOL 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 at the 200 level or higher.
^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. Minimum of 12 credits is required. At least one course must be selected from each of the following fields: Biomedicine—BIOSC 315, 420, 434, 456/457, 467, 484, 489, GEN 100, HTHL 380, MICRO 400, 411, (AVS, BIOSC) 414, 417
Environmental—BIOSC (PL, PA) 425, MICRO 402, 403, 410
Food Safety, Industrial, and Technology—BIOSC 487, MICRO 407, 413
^8Students planning to apply to medical/dental schools should take PHYS 208 and 210 during the second semester of the junior year.
^9BIOSC 454 or MICRO 416

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
17
Second Semester
5 - BIOL 111 Principles of Biology II
4 - CH 102 General Chemistry
3 - ENGL 103 Accelerated Composition
34 - Mathematical Sciences Requirement^2
15-16
Sophomore Year
First Semester
3 - CH 223 Organic Chemistry
1 - CH 227 Organic Chemistry Lab.
3 - ENGL 315 Scientific Writing and Comm.
3 - Arts and Humanities (Literature) Requirement^3
3 - Social Science Requirement^3
1 - CH 228 Organic Chemistry Lab.
3 - MICRO 401 Microbial Diversity and Ecology
3 - PHYS 207 General Physics I
3 - MICRO 401 Microbial Diversity and Ecology
3 - Arts and Humanities (Non-Lit.) Requirement^4
3 - Biochemistry Requirement^5
3 - Biomedicine Requirement^6
4 - General Microbiology Requirement^7
17
Junior Year
First Semester
3 - BIOSC 461 Cell Biology
2 - BIOSC 462 Cell Biology Lab.
3 - MICRO 401 Microbial Diversity and Ecology
3 - PHYS 207 General Physics I and 1 - PHYS 209 General Physics I Lab. or 3 - PHYS 212 Physics with Calculus I and 1 - PHYS 214 Physics Lab. I
3 - Genetics Requirement^8
15
Second Semester
3 - MICRO 412 Bacterial Physiology
2 - MICRO 450 Advanced Micro Lab I
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 - Social Science Requirement^3
3 - Elective^4
15
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^6
14
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^6
3 - Elective^4
16
125–126 Total Semester Hours
^1BIOL 110 and 111 are strongly recommended; however, BIOL 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.
The Bachelor of Science degree in Packaging Science prepares students for careers in industries producing and utilizing packages for all types of products. Packaging is an essential part of industrialized economics, protecting, preserving, and helping to market products. The field of packaging is highly competitive and highly innovative, requiring an ever-increasing number of professional positions.

Opportunities for employment include a wide variety of career paths such as manufacturing, marketing, sales, design, purchasing, quality assurance, and customer services. Most career opportunities are in positions requiring technical knowledge combined with marketing and management skills.

The core curriculum assures graduates of having the skills and knowledge required by most entry-level packaging positions. Emphasis area choices allow students to select courses to improve career preparation for specific industry segments, including: Distribution, Transportation and Engineering Technology; Materials; Food and Health Care Packaging; and Package Design and Graphics. Alternatively, any University-approved minor may be completed.

Students changing majors to Packaging Science must have at least a 2.0 cumulative grade-point ratio.

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/fsns.

Freshman 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
1 - PKGSC 101 Packaging Orientation
3 - Social Science Requirement
16
Second Semester
3 - BIOL 104 General Biology II
3 - BIOL 106 General Biology Lab. II
4 - CH 102 General Chemistry
3 - COMM 250 Public Speaking
3 - ENGL 103 Accelerated Composition
2 - PKGSC 102 Intro. to Packaging Science
16
Sophomore Year
First Semester
4 - CH 201 Survey of Organic Chemistry or 3 - CH 223 Organic Chemistry and
1 - CH 227 Organic Chemistry Lab.
3 - PHYS 207 General Physics I and
1 - PHYS 209 General Physics I Lab. or
3 - PHYS 122 Physics with Calculus I or
1 - PHYS 124 Physics Lab. II
4 - PKGSC 202 Packaging Materials and Manufact.
4 - PKGSC 220 Product/Package Design and Prototyping
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
1 - PKGSC 201 Packaging Perishable Products
3 - PKGSC 204 Container Systems
1 - PKGSC 206 Container Systems Lab.
3 - Arts and Humanities (Literature) Requirement
14
Summer
0 - CO-OP 101 Cooperative Education
14
Junior Year
First Semester
4 - ENG 103 Technical Writing
4 - G C 103 Graphic Comm. 1 for Packaging Sci.
3 - PKGSC 404 Mechanical Properties of Packages and Principles of Protective Packaging
1 - PKGSC 454 Product and Package Eval. Lab.
3 - Emphasis Area Requirement
16
Second Semester
3 - PKGSC 320 Package Design Fundamentals
3 - PKGSC 368 Packaging and Society
3 - PKGSC 401 Packaging Machinery
3 - PKGSC 430 Converting for Flexible Packaging
3 - PKGSC 440 Packaging for Distribution
3 - Emphasis Area Requirement
18
Senior Year
First Semester
3 - EX ST 301 Introductory Statistics
4 - PKGSC 416 Appl. of Polymers in Packaging
4 - PKGSC 464 Food and Health Care Pkg. Syst.
3 - Emphasis Area Requirement
14
Second Semester
3 - AP EC 202 Agricultural Economics or 3 - ECON 211 Principles of Microeconomics
1 - PKGSC 403 Packaging Career Preparation
3 - PKGSC 420 Package Design and Development
3 - Arts and Humanities (Non-Lit.) Requirement
6 - Emphasis Area Requirement
16
124 Total Semester Hours

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, strongly 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 101 Introduction to Psychology  
3 - Arts and Humanities (Non-Lit.) Requirement1  
18

Second Semester
3 - BIOL 104 General Biology II  
1 - BIOL 106 General Biology Lab. II  
4 - CH 102 General Chemistry  
3 - ECON 200 Economic Concepts  
3 - ENGL 103 Accelerated Composition  
3 - EX ST 301 Introductory Statistics  
1 - Elective  
18

**Second Year**

First Semester
4 - BIOC 222 Human Anatomy and Phys. I  
3 - CH 223 Organic Chemistry  
1 - CH 228 Organic Chemistry Lab.  
3 - COMM 150 Intro. to Human Comm. or  
3 - COMM 150 Intro. to Human Comm. or  
3 - COMM 250 Public Speaking  
3 - PHYS 208 General Physics II  
1 - PHYS 210 General Physics II Lab.  
2 - Science and Tech. in Society Requirement4  
18

Third Semester  
72–90 Total Semester Hours  
1A - H 210 or MUSIC 210  
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 a minimum of 18 additional credit hours which must include MICRO 305. See advisor for requirements.

PREREHABILITATION SCIENCES

The Prerehabilitation 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 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 Prerehabilitation 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 - PSYCH 101 Introduction to Psychology  
3 - Arts and Humanities (Non-Lit.) Requirement1  
18

Second Semester
3 - BIOL 104 General Biology II  
1 - BIOL 106 General Biology Lab. II  
4 - CH 102 General Chemistry  
3 - ECON 200 Economic Concepts  
3 - ENGL 103 Accelerated Composition  
3 - EX ST 301 Introductory Statistics  
1 - Elective  
18

**Second Year**

First Semester
3 - BIOL 104 General Biology II  
1 - BIOL 106 General Biology Lab. II  
4 - CH 101 General Chemistry  
3 - PSYCH 201 Introduction to Psychology  
3 - Arts and Humanities (Non-Lit.) Requirement1  
3 - Science and Technology in Society Req.1  
17

Second Semester
3 - BIOL 104 General Biology II  
1 - BIOL 106 General Biology Lab. II  
4 - CH 102 General Chemistry  
3 - ENGL 103 Accelerated Composition  
3 - EX ST 301 Introductory Statistics  
3 - SOC 201 Introduction to Sociology  
1 - Elective  
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 Prevetinary 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 Carolina 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-
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 premed 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, agrotourism industry specialists, extension personnel, or regulatory officers.

Freshman Year

First Semester

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

Second Semester

5 - 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
16-17

1BIOL 110 and 111 are strongly recommended; however, BIOL 103/105 may substitute for BIOL 110, and BIOL 104/106 may substitute for BIOL 111.

2MTHSC 108 is recommended for students in the Agricultural Biotechnology Concentration.

3See General Education Requirements. PHIL 103 is recommended for students in the Agricultural Biotechnology Concentration.

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 - BIOCS 335 Evolutionary Biology
3 - CH 224 Organic Chemistry
1 - CH 228 Organic Chemistry Lab.
3 - GEN 300 Fundamental Genetics
1 - GEN 301 Fundamental Genetics Lab.
14

Junior Year

First Semester

3 - BIOCH 305 Essential Elements of Biochem.
3 - BIOCS 304 Biology of Plants
2 - BIOCS 434 Biological Chem. Lab. Tech
3 - CSENV 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.
3 - PL PA 310 Plant Diseases and People
3 - PL PH (BIOCS) 340 Plant Med. and Magic
1 - SSCS 401 Academic and Professional Dev. II
4 - Emphasis Area Requirement
15

Senior Year

First Semester

3 - BIOCS 401 Plant Physiology
1 - BIOCS 402 Plant Physiology Lab.
3 - CSENV (SSCS) 350 Practicum
4 - ENT (BIOCS) 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 Biological 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 Biosystems and Technology Emphasis Area. ECON 211 is recommended for students in the Agricultural Biotechnology and Global Society Emphasis Area.

3See 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 - CH 227 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) Requirement1
3 - Cross-Cultural Awareness Requirement1
4 - Emphasis Area Requirement2
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 Requirement3
3 - Plant Science Requirement4
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 Requirement4
3 - Social Science Requirement4
16

Senior Year
First Semester
3 - CSENV (SSCS) 350 Practicum
2 - CSENV 403 Soil Genesis and Classification
1 - CSENV 453 Seminar
5 - Applied Spatial Technology Requirement5
3 - Emphasis Area Requirement6
3 - Field Scale Environmental Mgt. Requirement5
15

Second Semester
3 - AGRIC (EN SP) 315 Environment and Agric.
3 - BIOSC 401 Plant Physiology and
1 - BIOSC 402 Plant Physiology Lab.
1 - CSENV (SSCS) 450 Practicum
3 - CSENV (B E) 408 Land Treatment of Wastewater and Sludges
3 - Emphasis Area Requirement6
3 - Social Science Requirement4
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.1 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.1 or
2 - Elective
3 - COMM 150 Intro. to Human Comm. or
3 - COMM 250 Public Speaking
3 - SSCS 333 Agricultural Genetics
3 - Plant Science Requirement2
16

Junior Year
First Semester
4 - ENT (BIOSC) 301 Insect Biology and Diversity
3 - I P M 401 Principles of Integrated Pest Mgt.
3 - Emphasis Area Requirement3
3 - Plant Science Requirement2
3 - Social Science Requirement4
16

Second Semester
3 - BIOSC 401 Plant Physiology
1 - BIOSC 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 Entomology5
6 - Emphasis Area Requirement5
13

Second Semester
3 - CSENV (SSCS) 350 Practicum
1 - CSENV 452 Soil Fertility and Management
1 - CSENV 453 Soil Fertility Lab.
1 - CSENV 455 Seminar
3 - Arts and Humanities (Literature) Requirement6
6 - Emphasis Area Requirement6
17

124–126 Total Semester Hours

See General Education Requirements.
Selected from department-approved list. Emphasis areas include Soil and Water Quality, Soil Management, and Soil Science.
BIOSC 441, CSENV 421, 422, 423, (AP EC) 426, or HORT 456.
AG M 410, FOR 433, or other course approved by advisor.
AG M 402, ENT 401, 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. Grassed 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 interns experience 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 Requirement1
14

Second Semester
3 - BIOL 104 General Biology II
1 - BIOL 106 General Biology Laboratory II
4 - CH 102 General Chemistry
3 - ENGL 103 Accelerated Composition
1 - HORT 102 Experience Horticulture
4 - Related Science Requirement1
16

See General Education Requirements.
1Alternative course may be taken as an emphasis area requirement. See advisor.

College of Agriculture, Forestry and Life Sciences
Sophomore Year

First Semester

1 - HORT 212 Introduction to Turfgrass Culture
1 - HORT 213 Turfgrass Culture Lab.
3 - CSENV 303 Landscape Plants
3 - MTHSC 101 Essential Math for Informed Soc.
4 - PSA 104 Plant Biology Requirement1

Second Semester

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

15

Summer

3 - HORT 271 Internship3 or
3 - HORT 471 Advanced Internship3

Junior Year

First Semester

3 - Arts and Humanities (Non-Lit.) Requirement2
3 - Business Requirement1
6 - Related Science Requirement1
3 - Social Science Requirement1
1 - Elective
16

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
16

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 Requirement1
15

Second Semester

3 - HORT (CSENV) 433 Landscape and Turf Weed Management
3 - Horticulture Specialization Requirement1
3 - Related Science Requirement1
3 - Soils Requirement1
12

123 Total Semester Hours

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, water, 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
3 - Oral Communication Requirement1
15

Second Semester

3 - BIOL 104 General Biology II
1 - BIOL 106 General Biology Lab. II
4 - 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 FNR Freshman Portfolio
15

Sophomore Year

First Semester

4 - F N R 204 Soil Information Systems
2 - FOR 205 Dendrology
3 - FOR 221 Forest Biology
3 - W F B 300 Wildlife Biology
1 - W F B 301 Wildlife Biology Lab.
3 - Arts and Humanities (Non-Lit.) Requirement1
16

Second Semester

3 - ENGL 314 Technical Writing
3 - FOR 206 Forestry Ecology
3 - GEN 300 Fundamental Genetics
3 - W F B 350 Principles of Fish and Wildlife Biol.
3 - Social Science Requirement1
15

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
16

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
15

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
15

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
15

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.
3Internship must be completed in one or two semesters. Internship may be done fall, spring, or summer after completing HORT 212/213. Prior approval is required for internships, and a 2.0 grade-point ratio is required for registration.
4Note: 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.