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 6.)

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 3
2. AG ED 200 Agricultural Applications of Educational Technology or 3
3. Arts and Humanities (Non-Lit.) Requirement 1
4. AVS 150 Introduction to Animal Science 3
5. AVS 151 Introduction to Animal Science Lab. 3
6. BIOL 103 General Biology I 3
7. BIOL 105 General Biology Lab. 1 15

Second Semester
1. AG ED 100 Orientation and Field Experience 3
2. AG ED 103 Multiculturalism in Agric. Ed. 3
3. AP EC 202 Agricultural Economics 4
4. BIOL 104 General Biology II 3
5. BIOL 106 General Biology Lab. II 3
6. ENGL 103 Accelerated Composition 3
7. Social Science Requirement 1 17

Sophomore Year

First Semester
1. AG ED 201 Intro. to Agricultural Education 3
2. AG ED 203 Teaching Agriscience 3
3. AG ED 204 Applied Agriculture Calculations 4
4. CH 101 General Chemistry or 4
5. CH 105 Chemistry in Context I 4
6. HORT 212 Introduction to Turfgrass Culture 1 17
7. HORT 213 Turfgrass Culture Lab. 1

Second Semester
1. AG ED 355 Team and Organizational Leadership in Food and Fiber Systems 3
2. AG M 205 Principles of Fabrication 3
3. BIOL 201 Biotechnology and Society or 3
4. BIOL 200 Biology in the News 3
5. CH 102 General Chemistry II or 4
6. CH 109 Chemistry in Context II 4
7. COMM 101 Communication Academic and Professional Development 3
8. Arts and Humanities (Literature) Requirement 1 17

COMMUNICATIONS EMPHASIS AREA

Junior Year

First Semester
1. AG ED 303 Mech. Technology for Agric. Ed. 3
2. AG M 221 Surveying 3
3. COMM 201 Intro. to Communication Studies 4
4. CSENV 202 Soils 4
5. FOR 305 Woodland Management or 3
6. W F B 412 Wildlife Management 3
7. Arts and Humanities (Non-Lit.) Requirement 1 20

Second Semester
1. ED F 302 Educational Psychology 3
2. HORT 305 Plant Propagation 3
3. HORT 306 Plant Propagation Techniques Lab. 3
4. Departmental Communication Requirement 6
5. Oral Communication Requirement 3
6. Elective 16

Senior Year

First Semester
1. ENGL 231 Introduction to Journalism 3
2. HORT 303 Landscape Plants 3
3. Departmental Communication Requirement 6
4. Technical Requirement 2 15

Second Semester
1. AG ED 407 Internship in Extension and Leadership Education 4
2. Elective 12

129 Total Semester Hours

LEADERSHIP EMPHASIS AREA

Junior Year

First Semester
1. AG ED 303 Mech. Technology for Agric. Ed. 3
2. AG M 221 Surveying 3
3. CSENV 202 Soils 4
4. FOR 305 Woodland Management or 3
5. W F B 412 Wildlife Management 3
6. HORT 303 Landscape Plants 3
7. Arts and Humanities (Non-Lit.) Requirement 1 19

Second Semester
1. ED F 302 Educational Psychology 3
2. HORT 305 Plant Propagation 3
3. HORT 306 Plant Propagation Techniques Lab. 3
4. Oral Communication Requirement 3
5. Technical Requirement 3
6. Elective 16
Senior Year
First Semester
3 - AG ED 403 Principles of Adult/Ext. Educ. or
3 - AG ED 440 Prog. Devel. in Adult/Ext. Ed.
3 - AG ED 415 Leadership of Volunteers
3 - AG ED 416 Ethics and Issues in Agriculture
and the Food and Fiber System
3 - MGT 201 Principles of Management
3 - Technical Requirement
12

Second Semester
12 - AG ED 407 Internship in Extension and
Leadership Education
12
127 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 www.clemson.edu/agbioeng/agmech/index.htm.

Freshman Year
First Semester
3 - AG ED 200 Agricultural Applications of
Educational Technology
3 - AG ED 303 Mech. Technology for Agric. Ed.
3 - AG M 221 Surveying
4 - CSENV 202 Soils
3 - FOR 305 Woodland Management or
3 - W F B 412 Wildlife Management
3 - HORT 303 Landscape Plants
19

Second Semester
3 - ED F 302 Educational Psychology
3 - HORT 305 Plant Propagation
1 - HORT 306 Plant Propagation Techniques Lab.
3 - Oral Communication Requirement
3 - Technical Requirement
3 - Elective
16

Senior Year
First Semester
1 - AG ED 400 Supervised Field Experience II
1 - AG ED 401 Instructional Methods in Ag. Ed.
3 - AG ED 403 Principles of Adult/Ext. Educ. or
3 - AG ED 440 Prog. Devel. in Adult/Ext. Ed.
2 - AG ED 423 Curriculum
3 - Technical Requirement
12

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

Second Semester
3 - AG M 206 Machinery Management
3 - AG M 303 Calculations for Mechanized Agric.
4 - CH 106 Chemistry in Context II
4 - CSENV 202 Soils
2 - E G 209 Intro. to Engr./Comp. Graphics
16

Junior Year
First Semester
3 - AG M 221 Surveying
3 - AG M 301 Soil and Water Conservation
3 - AG M 460 Electrical Systems
3 - Arts and Humanities (Literature) Requirement
3 - Agribusiness Requirement
3 - Minor Requirement
18

Second Semester
3 - AG M 406 Mechanical and Hydraulic Systems
3 - COMM 250 Public Speaking
3 - Agribusiness Requirement
3 - Minor Requirement
2 - Elective
15

Senior Year
First Semester
3 - AG M 402 Landscape Drainage and Irrigation
3 - AG M 405 Agricultural Structures and Environmental Control
3 - Minor Requirement
3 - Plant/Crop Science Requirement
3 - Social Science Requirement
15

Second Semester
3 - AG M 410 Precision Agriculture Technology
3 - AG M 452 Mobile Power
3 - AG M 472 Capstone
3 - Agribusiness Requirement
3 - Plant/Crop Science Requirement or
3 - Soil Science Requirement
15
123 Total Semester Hours

1See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.
This course may also be used to satisfy minor requirement.
3See Agricultural Business Management minor or select other approved minor. If requirements for an approved minor have already been satisfied, this course must be any 300-level (or higher) course from an approved program.
4CSENV 403, 404, 446, 452, (ENTOX, GEOL) 485, or 490. This course may also be used to satisfy minor requirement.
ANIMAL AND VETERINARY SCIENCES

Bachelor of Science

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

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

ANIMAL AGRIBUSINESS CONCENTRATION

Freshman Year

First Semester
1. AVS 100 Orientation to Animal and Vet. Sci.
2. AVS 151 Introduction to Animal Science Lab.
3. BIOL 104 General Biology I and
   1. BIOL 105 General Biology Lab. I or
   5. BIOL 111 Principles of Biology I
4. CH 101 General Chemistry
3. Arts and Humanities (Non-Lit.) Requirement
  16-17

Second Semester
3. BIOL 106 General Biology Lab. 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 101 Essen. Math. for Informed Soc. or
3. MTHSC 102 Intro. to Math. Analysis or
4. MTHSC 106 Calculus of One Variable I
2. AVS Techniques Requirement
  16-18

Sophomore Year

First Semester
3. ACCT 201 Financial Accounting Concepts
3. CSENV 423 Field Crops—Forages
3. EX ST 301 Introductory Statistics
3. MGT 201 Principles of Management
2. AVS Techniques Requirement
  14

Second Semester
3. ECON 211 Principles of Microeconomics
3. FIN 306 Corporation Finance
3. Arts and Humanities (Literature) Requirement
2. AVS Evaluation Requirement
2. AVS Techniques Requirement
2. Social Science Requirement
  16

Junior Year

First Semester
4. AVS 301 Anat. and Phys. of Domestic Animals
3. AVS 370 Principles of Animal Nutrition
3. AVS 470 Animal Genetics
3. ECON 212 Principles of Macroeconomics
3. Elective
  16

Second Semester
3. AVS 375 Applied Animal Nutrition
3. AVS 413 Animal Products
3. AVS 453 Animal Reproduction
3. LAW 322 Legal Environment of Business
3. Elective
  16

Senior Year

First Semester
3. MGT 210 Animal Health
3. AVS 441 Contemporary Issues in Animal Sci.
5. MGT 301 Principles of Marketing
3. AVS Experience-Based Activity
2. AVS Techniques Requirement
  14

Second Semester
2. AVS 406 Seminars and Related Topics
3. AVS 410 Domestic Animal Behavior
2. AVS 417 Animal Agribusiness Development
4. AVS 450 Sustainable Livestock Production Sys.
3. AVS Experience-Based Activity
2. Elective
  16

123–126 Total Semester Hours

1See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Require-
2MKT 301 Principles of Marketing
ment.
2. AVS Techniques Requirement
5. MTHSC 110 Intro. to Math. Analysis or
3. MTHSC 106 Calculus of One Variable I
2. AVS Techniques Requirement
2. Social Science Requirement
  16

EQUINE BUSINESS CONCENTRATION

Freshman Year

First Semester
1. AVS 100 Orientation to Animal and Vet. Sci.
3. AVS 151 Introduction to Animal Science Lab.
3. BIOL 103 General Biology I and
1. BIOL 105 General Biology Lab. I or
5. BIOL 111 Principles of Biology II
3. 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. MTHSC 101 Essen. Math. for Informed Soc. or
3. MTHSC 102 Intro. to Math. Analysis or
4. MTHSC 106 Calculus of One Variable I
2. AVS Techniques Requirement
  16-18

Sophomore Year

First Semester
3. AVS 309 Principles of Equine Evaluation
3. ECON 211 Principles of Microeconomics
3. FIN 306 Corporation Finance
3. Arts and Humanities (Literature) Requirement
2. AVS Techniques Requirement
2. Social Science Requirement
  16

Second Semester
2. AVS 309 Principles of Equine Evaluation
3. ECON 211 Principles of Microeconomics
3. FIN 306 Corporation Finance
3. Arts and Humanities (Literature) Requirement
2. AVS Techniques Requirement
2. Social Science Requirement
  16

Junior Year

First Semester
4. AVS 301 Anat. and Phys. of Domestic Animals
3. AVS 370 Principles of Animal Nutrition
3. AVS 470 Animal Genetics
3. ECON 212 Principles of Macroeconomics
2. AVS Techniques Requirement
  15

Second Semester
3. AVS 375 Applied Animal Nutrition
3. AVS 413 Animal Products
3. AVS 453 Animal Reproduction
3. LAW 322 Legal Environment of Business
3. Elective
  15
Senior Year
First Semester
- AVS 310 Animal Health
- AVS 406 Seminars and Related Topics
- AVS 416 Equine Exercise Physiology
- AVS Experience-Based Activity¹
- Elective

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

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

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

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

Second Semester
- AVS 375 Applied Animal Nutrition
- AVS 453 Animal Reproduction
- GEN 300 Fundamental Genetics¹
- GEN 301 Fundamental Genetics Lab.¹
- MICRO 305 General Microbiology²

Senior Year
First Semester
- AVS 413 Animal Products
- AVS 410 Domestic Animal Behavior
- Elective

Second Semester
- AVS 360, 441, 442, 443, or 491

PREVETERINARY AND SCIENCE CONCENTRATION
Freshman Year
First Semester
- AVS 100 Orientation to Animal and Vet. Sci.
- AVS 150 Introduction to Animal Science
- AVS 151 Intro. to Animal Science Lab.
- BIOL 103 General Biology I and
  - BIOL 105 General Biology Lab. I or 5
  - BIOL 110 Principles of Biology I
  - CH 101 General Chemistry
- Arts and Humanities (Non-Lit.) Requirement¹

Second Semester
- BIOL 104 General Biology II and
  - BIOL 106 General Biology Lab. II or 5
  - BIOL 111 Principles of Biology II
  - CH 102 General Chemistry
- ENGL 101 Principles of Biology I
- MTHSC 102 Intro. to Math. Analysis or
  - MTHSC 106 Calculus of One Variable I
- AVS Techniques Requirement²

Sophomore Year
First Semester
- AVS 150 Orientation to Animal and Vet. Sci.
- AVS 310 Animal Health
- AVS 151 Intro. to Animal Science Lab.
- BIOL 103 General Biology I and
  - Elective

Second Semester
- AVS 153 Intro. to Animal Science Lab.
- AVS 310 Animal Health
- AVS 370 Principles of Animal Nutrition
- BIOCH 301 Molecular Biochemistry or
  - BIOCH 305 Essential Elements of Bioch. or
  - BIOCH 406 Physiological Chemistry
- Departmental Requirement⁴

Junior Year
First Semester
- AVS 413 Animal Products
- AVS 410 Domestic Animal Behavior
- Elective

Second Semester
- AVS 360, 441, 442, 443, or 491

Second Semester
- AVS 375 Applied Animal Nutrition
- AVS 453 Animal Reproduction
- GEN 300 Fundamental Genetics¹
- GEN 301 Fundamental Genetics Lab.¹
- MICRO 305 General Microbiology²

Senior Year
First Semester
- AVS 413 Animal Products
- AVS 410 Domestic Animal Behavior
- Elective

Second Semester
- AVS 360, 441, 442, 443, or 491

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

¹AVS 200, 201, 203, 206, 209 or 455
²AVS 360, 441, 442, 443, or 491

APPLIED ECONOMICS AND STATISTICS
Bachelor of Science

The Applied Economics and Statistics curriculum helps the student build a strong understanding of economic principles as applied in agribusiness, community and economic development, and other fields. Courses in applied statistics and quantitative methods help build decision-making and problem-solving skills and acquaint the student with tools for data analysis.

In the Agribusiness Emphasis Area, core courses focus on agribusiness management, leadership, marketing and sales, finance, accounting, and other business skill development. Employment opportunities for Agribusiness graduates are many and diverse. Private sector opportunities include agribusiness management, banking, finance, sales, marketing, and public relations. Public sector opportunities include positions in organizations that promote food, agriculture, and natural resource interests; government agencies; and educational institutions.

The Economic and Statistical Analysis Emphasis Area contains most of the same courses as the Agribusiness Emphasis Area with increased requirements in calculus, matrix algebra, and probability theory. This more rigorous mathematics preparation provides a stronger foundation for graduate study or career skill development in quantitative economics or probability and statistics.

In the Community and Economic Development Concentration, core courses focus on community development methods, regional economic development, leadership, experiential learning, communication skills, and behavioral science principles. Employment opportunities for Community and Economic Development graduates include positions in social science administration, management, and research. Other careers include community development and economic development specialist positions with local, county, and state governments. Additional opportunities exist in a variety of agencies, research and consulting firms, foundations and councils, financial institutions, public and private utilities, and organizations looking for entrepreneurial skills.

In all three plans of study, there is an increasing emphasis on globalization and information technology. Students are encouraged to participate on a creative inquiry student research team and to take advantage of an internship and/or study abroad opportunity. All three study options provide an excellent background for professional or graduate study in several disciplines.

For students interested in economics and natural resources, the Department of Applied Economics and Statistics also administers the Natural Resource and Economic Policy Concentration within the Environmental and Natural Resources degree program. See page 50 for program details.

See page 50 for program details.
### AGRIBUSINESS EMPHASIS AREA

**Freshman Year**

**First Semester**
- 3 - AP EC 205 Agriculture and Society
- 2 - C U 101 University Success Skills
- 3 - MTHSC 102 Intro. to Mathematical Analysis
- 4 - Natural Science Requirement
- 3 - Oral Communication Requirement
- 15

**Second Semester**
- 3 - AP EC 202 Agricultural Economics
- 3 - ENGL 103 Accelerated Composition
- 3 - EX ST 222 Statistics in Everyday Life
- 3 - Arts and Humanities (Non-Lit.) Requirement
- 3 - Elective
- 15

**Sophomore Year**

**First Semester**
- 3 - ACCT 201 Financial Accounting Concepts
- 3 - EX ST 301 Introductory Statistics
- 3 - MGT 201 Principles of Management
- 3 - Arts and Humanities (Literature) Requirement
- 3 - Elective
- 15

**Second Semester**
- 3 - ACCT 202 Managerial Accounting Concepts
- 3 - AP EC 302 Economics of Farm Management
- 3 - AP EC 308 Quantitative Applied Economics
- 3 - ECON 212 Principles of Macroeconomics
- 3 - Social Science Requirement
- 15

**Junior Year**

**First Semester**
- 3 - AP EC 309 Econ. of Agricultural Marketing or
- 3 - MKT 301 Principles of Marketing
- 3 - AP EC 402 Production Economics
- 3 - ECON (MGT) 306 Managerial Economics or
- 3 - ECON 314 Intermediate Microeconomics
- 3 - ENGL 314 Technical Writing
- 3 - Agribusiness Requirement
- 15

**Second Semester**
- 3 - AP EC 319 Agribusiness Management
- 3 - AP EC 421 Globalization or
- 3 - ECON 310 International Economy
- 3 - C R D 335 Leadership in Organizations and Communities
- 3 - EX ST 462 Statistics Applied to Economics
- 3 - MTHSC 400 Theory of Probability
- 15

**Senior Year**

**First Semester**
- 3 - AP EC 315 Intermediate Macroeconomics
- 3 - ECON 302 Money and Banking or
- 3 - AP EC 319 Agribusiness Management
- 3 - AP EC 456 Prices
- 3 - AP EC 490 Selected Topics
- 6 - Agribusiness Requirement
- 15

**Second Semester**
- 3 - AP EC 452 Agricultural Policy
- 3 - AP EC 456 Prices
- 3 - AP EC 460 Agricultural Finance
- 3 - AP EC 409 Commodity Futures Markets
- 3 - AP EC 460 Agricultural Finance
- 3 - LAW 322 Legal Environment of Business
- 3 - Agribusiness Requirement
- 15

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### ECONOMIC AND STATISTICAL ANALYSIS EMPHASIS AREA

**Freshman Year**

**First Semester**
- 3 - AP EC 205 Agriculture and Society
- 2 - C U 101 University Success Skills
- 4 - MTHSC 106 Calculus of One Variable I
- 4 - Natural Science Requirement
- 3 - Oral Communication Requirement
- 16

**Second Semester**
- 3 - AP EC 202 Agricultural Economics
- 3 - ENGL 103 Accelerated Composition
- 3 - EX ST 222 Statistics in Everyday Life
- 3 - Arts and Humanities (Non-Lit.) Requirement
- 4 - MTHSC 108 Calculus of One Variable II
- 16

**Sophomore Year**

**First Semester**
- 3 - EX ST 301 Introductory Statistics
- 3 - MGT 201 Principles of Management
- 3 - Arts and Humanities (Literature) Requirement
- 3 - Elective
- 16

**Second Semester**
- 3 - ACCT 201 Financial Accounting Concepts
- 3 - ENGL 103 Accelerated Composition
- 4 - MTHSC 206 Calculus of Several Variables
- 3 - Arts and Humanities (Non-Lit.) Requirement
- 3 - ECON 212 Principles of Macroeconomics
- 3 - Social Science Requirement
- 15

**Junior Year**

**First Semester**
- 3 - AP EC 309 Econ. of Agricultural Marketing or
- 3 - MKT 301 Principles of Marketing
- 3 - AP EC 402 Production Economics
- 3 - ECON (MGT) 306 Managerial Economics or
- 3 - ECON 314 Intermediate Microeconomics
- 3 - ENGL 304 Business Writing or
- 3 - ENGL 314 Technical Writing
- 3 - MTHSC 210 Applied Matrix Algebra
- 15

**Second Semester**
- 3 - AP EC 319 Agribusiness Management
- 3 - AP EC 421 Globalization or
- 3 - ECON 310 International Economy
- 3 - C R D 335 Leadership in Organizations and Communities
- 3 - EX ST 462 Statistics Applied to Economics
- 3 - MTHSC 400 Theory of Probability
- 15

**Senior Year**

**First Semester**
- 3 - AP EC 409 Commodity Futures Markets
- 3 - AP EC 460 Agricultural Finance
- 3 - ENGL 314 Technical Writing
- 3 - PO SC 302 State and Local Government
- 3 - Behavioral Science Requirement
- 15

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### COMMUNITY AND ECONOMIC DEVELOPMENT CONCENTRATION

**Freshman Year**

**First Semester**
- 3 - CP SC 120 Intro. to Information Technology
- 3 - MTHSC 102 Intro. to Mathematical Analysis
- 3 - Arts and Humanities (Non-Lit.) Requirement
- 3 - Science and Tech. in Society Requirement
- 3 - Social Science Requirement
- 15

**Second Semester**
- 3 - ACCT 201 Financial Accounting Concepts
- 3 - ENGL 103 Accelerated Composition
- 4 - Natural Science Requirement
- 5 - Elective
- 15

**Sophomore Year**

**First Semester**
- 3 - EX ST 301 Introductory Statistics
- 3 - MGT 201 Principles of Management
- 3 - Arts and Humanities (Literature) Requirement
- 3 - Microeconomics Requirement
- 3 - Oral Communication Requirement
- 3 - Elective
- 15

**Second Semester**
- 3 - C R D (AP EC) 357 Natural Res. Economics
- 3 - ECON 212 Principles of Macroeconomics
- 3 - ENGL 314 Technical Writing
- 3 - PO SC 302 State and Local Government
- 3 - Behavioral Science Requirement
- 15
Junior Year
First Semester
3 - C R D 335 Leadership in Organizations and Communities
3 - ECON (MGMT) 306 Managerial Economics or ECON 314 Intermediate Microeconomics
3 - Behavioral Science Requirement
3 - Emphasis Area Requirement
3 - Marketing Requirement
15
Second Semester
3 - AP EC 392 Public Finance
3 - C R D 336 Community Development Methods
3 - Behavioral Science Requirement
3 - Emphasis Area Requirement
3 - Planning Requirement
15
Senior Year
First Semester
3 - C R D (AP EC) 411 Regional Impact Analysis
3 - EX ST 462 Statistics Applied to Economics
3 - R S SOC 459 The Community
6 - Emphasis Area Requirement
15
Second Semester
3 - C R D (AP EC) 412 Regional Economic Development Theory and Policy
3 - Behavioral Science Requirement
3 - Comm. and Econ. Dev. Practice/Applications
6 - Emphasis Area Requirement
15
120 Total Semester Hours

Freshman Year
First Semester
1 - BIOC 103 Careers in Biochem. and Genetics
5 - BIOL 110 Principles of Biology I
4 - CH 101 General Chemistry
4 - MTHSC 106 Calculus of One Variable I
14
Second Semester
5 - BIOL 111 Principles of Biology II
4 - CH 102 General Chemistry
3 - ENGL 103 Accelerated Composition
4 - MTHSC 108 Calculus of One Variable II
16
Sophomore Year
First Semester
3 - CH 223 Organic Chemistry
1 - CH 227 Organic Chemistry Lab.
3 - GEN 302 Molecular and General Genetics
1 - 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
15-16
Second Semester
3 - BIOC 301 Molecular Biochemistry
3 - CH 224 Organic Chemistry
1 - CH 228 Organic Chemistry Lab.
3 - COMM 150 Introduction to Human Communication or COMM 250 Public Speaking
3 - PHYS 221 Physics with Calculus II
1 - PHYS 223 Physics Lab. II
3 - Arts and Humanities (Literature) Requirement
17
Junior Year
First Semester
3 - BIOC 331 Physical Approach to Biochem.
2 - BIOC 333 General Biochemistry Lab. I
3 - CH 330 Introduction to Physical Chemistry
5 - Science Requirement
14
Second Semester
3 - BIOC 432 Biochemistry of Metabolism
2 - BIOC 434 General Biochemistry Lab. II
3 - BIOC 436 Molecular Biol.: Genes to Proteins
3 - PHIL 326 Science and Values
3 - Science Requirement
14
Senior Year
First Semester
3 - BIOC 461 Cell Biology
3 - GEN (BIOC) 440 Bioinformatics
3 - Social Science Requirement
5 - Elective
14
Second Semester
2 - BIOC 493 Senior Seminar
3 - Science Requirement
3 - Social Science Requirement
6 - Elective
14
120–121 Total Semester Hours

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.

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

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

Combined Bachelor of Science in Biological Sciences/Master of Science in Bioengineering
Under this plan, students may reduce the time necessary to earn both degrees by applying graduate credits to both undergraduate and graduate program requirements. See Academic Regulations in this catalog for enrollment guidelines and procedures. Students are encouraged to obtain the specific requirements for the dual degree from the Department of Biological Sciences or Bioengineering as early as possible in their undergraduate program as a number of required courses have prerequisites not normally taken by Biological Sciences majors.
Freshman Year
First Semester
5 - BIOL 110 Principles of Biology I
1 - 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

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

Junior Year
First Semester
3 - BIOSC 335 Evolutionary Biology
3 - BIOSC 461 Cell Biology
2 - BIOSC 462 Cell Biology Lab.
3 - ENGL 315 Scientific Writing and Comm.
3 - PHYS 207 General Physics I and
1 - PHYS 209 General Physics I Lab. or
3 - PHYS 122 Physics with Calculus I and
1 - PHYS 124 Physics Lab. I

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
2 - BIOSC 493 Senior Seminar
13 - Major Requirement

Second Semester
12 - Major Requirement
3 - Social Science Requirement

124 Total Semester Hours

Senior Year
First Semester
3 - BIOSC 461 Cell Biology
2 - BIOSC 462 Cell Biology Lab.
2 - BIOSC 493 Senior Seminar
4 - Entomology Requirement
4 - Major Requirement

Second Semester
3 - Entomology Requirement
3 - Major Requirement
3 - Social Science Requirement

124 Total Semester Hours

PREPHARMACY EMPHASIS AREA
Freshman Year
First Semester
3 - BIOL 103 General Biology I
1 - BIOL 105 General Chemistry Lab. I
1 - BIOL 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 Requirement
3 - Arts and Humanities (Literature) Requirement
3 - Biochemistry or Genetics Requirement
3 - Social Science Requirement

124 Total Semester Hours
Second Semester
3 - CH 224 Organic Chemistry
1 - CH 228 Organic Chemistry Lab.
4 - MICRO 305 General Microbiology
4 - Animal or Plant Diversity Requirement
3 - Biochemistry or Genetics Requirement
3 - PHYS 122 Physics with Calculus I
1 - PHYS 124 Physics Lab. I
14

Junior Year
First Semester
4 - BIOSC 315 Functional Human Anatomy
3 - ENG 315 Scientific Writing and Comm.
3 - PHYS 207 General Physics I and
1 - PHYS 209 General Physics I Lab. or
3 - PHYS 122 Physics with Calculus I and
1 - PHYS 124 Physics Lab. I
14

Second Semester
3 - PHYS 208 General Physics II and
1 - PHYS 210 General Physics II Lab. or
3 - PHYS 221 Physics with Calculus II and
1 - PHYS 223 Physics Lab. II
3 - PSYCH 201 Introduction to Psychology
4 - Animal Physiology Requirement
3 - Economics Requirement
3 - Major Requirement
17

Senior Year
First Semester
3 - BIOSC 461 Cell Biology
2 - BIOSC 462 Cell Biology Lab.
2 - BIOSC 493 Senior Seminar
8 - Major Requirement
15

Second Semester
3 - Arts and Humanities (Non-Lit.) Requirement
11 - Major Requirement
14
124 Total Semester Hours

QUALITATIVE 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 Requirement
3 - Biochemistry or Genetics Requirement
3 - Partial Differential Equations Requirement
14

Second Semester
3 - CH 224 Organic Chemistry and
1 - CH 228 Organic Chemistry Laboratory or
4 - Major Requirement
3 - EX ST 301 Introductory Statistics I
4 - Animal or Plant Diversity Requirement
3 - Biochemistry or Genetics Requirement
3 - Major Requirement
17

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 I and
1 - PHYS 124 Physics Lab. I
3 - Major Requirement
16

Second Semester
4 - BIOSC 428 Quantitative Biology
3 - BIOSC 461 Cell Biology
2 - BIOSC 462 Cell Biology Lab.
2 - PHYS 207 General Physics II and
1 - PHYS 209 General Physics II Lab. or
3 - PHYS 221 Physics with Calculus II and
1 - PHYS 223 Physics Lab. II
3 - Social Science Requirement
16

Senior Year
First Semester
2 - BIOSC 493 Senior Seminar
3 - GEN 440 Bioinformatics
3 - Arts and Humanities (Literature) Requirement
8 - Major Requirement
16

Second Semester
1 - BIOSC 491 Undergraduate Research
3 - Arts and Humanities (Non-Lit.) Requirement
5 - Major Requirement
3 - Social Science Requirement
12
125 Total Semester Hours

ECON 200, 211, or 212

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

Sophomore Year
First Semester
3 - BIOSC 210 Introduction to Toxicology
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 - Biochemistry or Genetics Requirement
14

Second Semester
3 - CH 224 Organic Chemistry and
1 - CH 228 Organic Chemistry Laboratory or
4 - Major Requirement
3 - EX ST 301 Introductory Statistics I
4 - Animal or Plant Diversity Requirement
3 - Biochemistry or Genetics Requirement
3 - Major Requirement
17

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 I and
1 - PHYS 124 Physics Lab. I
3 - Major Requirement
16

Second Semester
4 - BIOSC 428 Quantitative Biology
3 - BIOSC 461 Cell Biology
2 - BIOSC 462 Cell Biology Lab.
2 - PHYS 207 General Physics II and
1 - PHYS 209 General Physics II Lab. or
3 - PHYS 221 Physics with Calculus II and
1 - PHYS 223 Physics Lab. II
3 - Social Science Requirement
16

Senior Year
First Semester
2 - BIOSC 493 Senior Seminar
3 - GEN 440 Bioinformatics
3 - Arts and Humanities (Literature) Requirement
8 - Major Requirement
16

Second Semester
1 - BIOSC 491 Undergraduate Research
3 - Arts and Humanities (Non-Lit.) Requirement
5 - Major Requirement
3 - Social Science Requirement
12
125 Total Semester Hours

1At least one lecture and associated laboratory must be completed for both animal diversity (BIOSC 302/306 or BIOSC 303/307) and for plant diversity (BIOSC 304/308, BIOSC 305/309, BIOSC 320, or BIOSC 406/407).

2At least one lecture course must be completed for both biochemistry (BIOCH 301 or 303) and for genetics (GEN 300 or 302).

3See advisor.

4BIOSC 434 may be substituted for CH 228.

5See advisor. Select one lecture/lab combination from each of the following fields:
Physiology—BIOSC 316, 401/402, 459/460, 475/476

6See General Education Requirements. Six of these credits must also satisfy the Cross-Cultural Awareness and the Science and Technology in Society Requirements.

Engineering Courses may be selected from BIOCH 302, EX ST 301, 302, 303, or any BIOCH, BIOSC, BOT, GEN, or MICRO courses at the 300 level or higher.
Senior Year
First Semester
3 - BIOSC 461 Cell Biology
2 - BIOSC 462 Cell Biology Lab.
3 - BIOSC 493 Senior Seminar
3 - CH 313 Quantitative Analysis
1 - CH 317 Quantitative Analysis Lab.
3 - Major Requirement
14
Second Semester
3 - CH 413 Chemistry of Aqueous Systems or
3 - ENTOX 421 Chemical Sources and Fate in Environmental Systems
3 - Arts and Humanities (Non-Lit.) Requirement
4 - Major Requirement
3 - Social Science Requirement
3 - Toxicology Requirement
16
124 Total Semester Hours
1CH 223 and 224 are recommended.
2At least one lecture and associated laboratory must be completed for both animal diversity (BIOSC 302/306 or BIOSC 305/307) and for plant diversity (BIOSC 304/308, BIOSC 305/309, BIOSC 320, or BIOSC 406/407).
3At least one lecture course must be completed for both biochemistry (BIOCH 301 or 303) and for genetics (GEN 300 or 302).
4BIOSC 474 may be substituted for CH 228.
5See advisor. Select one lecture course from each of the following fields. BIOSC 495/460 or 475/476 are recommended to satisfy the Physiology Requirement.
6Four semesters (through 202) in the same modern foreign language are required.
7Any 400-level ENTOX course.

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 109 for the curriculum.

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
17

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
3 - Mathematical Sciences Requirement
16-17

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
4 - Animal or Plant Diversity Requirement
4 - Biochemistry or Genetics Requirement
4 - Foreign Language Requirement
4 - Major Requirement
15

Junior Year
First Semester
3 - BIOSC 335 Evolutionary Biology
3 - BIOSC 461 Cell Biology
2 - BIOSC 462 Cell Biology Laboratory
3 - ENGL 315 Scientific Writing and Comm.
3 - Foreign Language Requirement
3 - Minor Requirement
17
Second Semester
3 - Arts and Humanities (Non-Lit.) Requirement
3 - Foreign Language Requirement
4 - Major Requirement
3 - Minor Requirement
15

Senior Year
First Semester
2 - BIOSC 493 Senior Seminar
1 - PHYS 207 General Physics I
1 - PHYS 209 General Physics I Lab.
3 - Major Requirement
3 - Minor Requirement
3 - Social Science Requirement
15
Second Semester
3 - PHYS 208 General Physics II
1 - PHYS 210 General Physics II Lab.
3 - Arts and Humanities (Literature) Requirement
2 - Major Requirement
3 - Minor Requirement
3 - Social Science Requirement
15
125–126 Total Semester Hours


c
1See advisor. Select one lecture course from each of the following fields:
  - Ecology—BIOSC 441, 443, 446, 470
  - Physiology—BIOSC 316, 401, 459, 475
  - Biochemistry (BIOCH 301 or 305) and for genetics (GEN 300 or 302).
2At least one lecture course must be completed for both biochemistry (BIOCH 301 or 303) and for genetics (GEN 300 or 302).
3Any 400-level ENTOX course.

PREREHABILITATION SCIENCES
EMPHASIS AREA

Freshman Year
First Semester
3 - BIOL 103 General Biology I
1 - BIOL 105 General Biology Lab. I
1 - BIOSC 101 Frontiers in Biology I
4 - CH 101 General Chemistry
3 - COMM 150 Intro. to Human Communication or
3 - COMM 250 Public Speaking
4 - MTHSC 106 Calculus of One Variable I
16
Second Semester
3 - BIOL 104 General Biology II
1 - BIOL 106 General Biology Lab. II
1 - BIOSC 102 Frontiers in Biology II
4 - CH 102 General Chemistry
3 - ENGL 103 Accelerated Composition
3 - EX ST 301 Introductory Statistics
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
4 - Animal or Plant Diversity Requirement
3 - Biochemistry or Genetics Requirement
4 - Foreign Language Requirement
6 - Minor Requirement
17

Junior Year
First Semester
4 - BIOSC 315 Functional Human Anatomy
4 - BIOSC 316, 401, 459, 476
—BIOSC 441, 443, 446, 470
—BIOSC 316, 401, 459, 475
The remaining courses may be selected from: BIOCH 301 or 305, BIOL 106 General Biology Lab. II, BIOSC 302/306 or BIOSC 303/307 and for genetics (GEN 300 or 302).

2Four semesters (through 202) in the same modern foreign language are required.

3At least one lecture and associated laboratory must be completed for both biochemistry (BIOCH 301 or 303) and for genetics (GEN 300 or 302).

4At least one lecture course must be completed for both biochemistry (BIOCH 301 or 303) and for genetics (GEN 300 or 302).

5At least one lecture course must be completed for both biochemistry (BIOCH 301 or 303) and for genetics (GEN 300 or 302).

6Four semesters (through 202) in the same modern foreign language are required.

7See advisor. Select one lecture course from each of the following fields:
  - Ecology—BIOSC 441, 443, 446, 470
  - Physiology—BIOSC 316, 401, 459, 475
  - Biochemistry (BIOCH 301 or 305) and for genetics (GEN 300 or 302).

8Any 400-level ENTOX course.

9See page 61 for approved minors.

See advisor. Select one lecture course from each of the following fields:
  - Ecology—BIOSC 441, 443, 446, 470
  - Physiology—BIOSC 316, 401, 459, 475
  - Biochemistry (BIOCH 301 or 305) and for genetics (GEN 300 or 302).

At least one lecture course must be completed for both biochemistry (BIOCH 301 or 303) and for genetics (GEN 300 or 302).

Any 400-level ENTOX course.

See advisor. Select one lecture course from each of the following fields:
  - Ecology—BIOSC 441, 443, 446, 470
  - Physiology—BIOSC 316, 401, 459, 475
  - Biochemistry (BIOCH 301 or 305) and for genetics (GEN 300 or 302).

At least one lecture course must be completed for both biochemistry (BIOCH 301 or 303) and for genetics (GEN 300 or 302).

Any 400-level ENTOX course.

At least one lecture course must be completed for both biochemistry (BIOCH 301 or 303) and for genetics (GEN 300 or 302).

Any 400-level ENTOX course.

At least one lecture course must be completed for both biochemistry (BIOCH 301 or 303) and for genetics (GEN 300 or 302).

Any 400-level ENTOX course.

At least one lecture course must be completed for both biochemistry (BIOCH 301 or 303) and for genetics (GEN 300 or 302).

Any 400-level ENTOX course.
ENIRONMENTAL AND NATURAL RESOURCES

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

Three concentrations are offered within the Environmental and Natural Resources major. The Conservation Biology Concentration is oriented toward students who desire a greater exposure to taxa, their habitats, and their interrelationships. The Natural Resources Management Concentration emphasizes both resource management and negotiation skills. These two concentrations are administered by the Department of Forestry and Natural Resources. The Natural Resource and Economic Policy Concentration provides more in-depth study in economics and policy applications and is administered by the Department of Applied Economics and Statistics.

Graduates in Environmental and Natural Resources are well-prepared for further graduate studies in natural resources and related fields. Potential public sector employers of graduates include federal, state, and municipal resource management agencies, private industries impacting land and water resources, environmental management consulting firms, and various environmental advocacy groups.

CONSERVATION BIOLOGY CONCENTRATION

Sophomore Year
First Semester
1. AP EC 257 Natural Resources, Environment, and Economics
2. 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
1. GEN 300 Fundamental Genetics
2. W F B (BIOSC) 313 Conservation Biology
3. Arts and Humanities (Literature) Requirement
4. Physical Environment Requirement
5. Taxonomy/Habitat Requirement
15

Junior Year
First Semester
1. BIOSC 335 Evolutionary Biology
2. Arts and Humanities (Non-Lit.) Requirement
3. Ecology Requirement
4. Natural Resource Economics Requirement
5. Taxonomy/Habitat Requirement
15

Second Semester
1. ENGL 314 Technical Writing
2. E N R 302 Natural Resources Measurements
3. Ecology Requirement
4. Physiology Requirement
5. Taxonomy/Habitat Requirement
15

Senior Year
First Semester
1. FOR (E N R) 434 GIS for Landscape Planning
2. Conservation Policy/Law Requirement
3. Internship, Creative Inquiry or Directed Research Requirement
4. Social Science Requirement
5. Taxonomy/Habitat Requirement
15

Second Semester
1. E N R (BIOSC) 413 Restoration Ecology
2. E N R 450 Conservation Issues
   1. FOR 498 Senior Portfolio or
   1. W F B 498 Senior Portfolio
3. Taxonomy/Habitat Requirement
   2. Elective
15

120 Total Semester Hours

1See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.
2GEOG 106, GEOL 101, or PHYS 240

BIOSYSTEMS ENGINEERING

Bachelor of Science
The Biosystems Engineering program is administered jointly with the College of Engineering and Science. See page 89 for the curriculum.

Notes:
1. HLT 350 is recommended.
2. American Heart Association Basic Life Support for Health Professionals is required.
NATURAL RESOURCE AND ECONOMIC POLICY CONCENTRATION

Sophomore Year
First Semester
3 - AP EC 257 Natural Resources, Environment, and Economics
3 - PO SC 101 American National Government or
3 - PO SC 102 Intro. to International Relations
3 - Geography Requirement¹
3 - Natural Science Requirement² or
3 - Minor Requirement
3 - Elective

Second Semester
3 - C R D (AP EC) 357 Natural Res. Economics
3 - ECON 212 Principles of Macroeconomics
3 - AP EC 433, (W F B) 475, C R D (AP EC) 357, or FOR 304
3 - BIOSC 401, BIOSC 402, 458, 475, or (AVS) 480
3 - E N R 429, FOR 400, 416, or W F B 430
3 - Internship (F N R 490), Creative Inquiry (F N R 470), Directed Research (W F B 463); or Senior Honors Thesis (F N R H491).

Junior Year
First Semester
3 - ECON 314 Intermediate Microeconomics
3 - C R D (AP EC) 357 Natural Res. Economics
3 - EN SP 400 Studies in Environmental Science
3 - Elective
3 - Minor Requirement
3 - Elective

Second Semester
3 - C R D (AP EC) 357 Natural Res. Economics
3 - W F B 300 Wildlife Biology
3 - AP EC 433, (W F B) 475, C R D (AP EC) 357, or FOR 304
3 - BIOSC 401, BIOSC 402, 458, 475, or (AVS) 480
3 - E N R 429, FOR 400, 416, or W F B 430
3 - Internship (F N R 490), Creative Inquiry (F N R 470), Directed Research (W F B 463); or Senior Honors Thesis (F N R H491).

Senior Year
First Semester
3 - AP EC 457 Nat. Res. Use, Technology and Policy
3 - BIOSC 319 Environmental Economics
3 - Applied Economics Requirement⁴ or
3 - Applied Economics Requirement⁴ and
3 - Minor Requirement
3 - Internship, Creative Inquiry or Directed Research Requirement⁶

Second Semester
3 - E N R 450 Conservation Issues
6 - Applied Economics Requirement⁴
3 - Community Development Requirement²
3 - Elective or
3 - Minor Requirement
15
120 Total Semester Hours
3 - GEOL 101, 103, or 106
3 - Select from any BIOSC, CSENV, E N R, EE&S, EN SP, ENTOX, FOR, GEOL or W F B courses numbered 300 or higher.
3 - See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.
3 - Select from any AP EC courses numbered 300 or higher.
3 - ECON 302, 310 or 315
3 - Internship (AP EC 491), Creative Inquiry (AP EC 494), or Directed Research (AGRIC H491 or H492).
3 - C R D 335 or 336 or RS 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) Requirement¹
15

Second Semester
3 - E N R 302 Natural Resources Measurements
3 - F N R 206 Forest Ecology
3 - W F B 300 Principles of Fish and Wildlife Biol.
3 - Arts and Humanities (Non-Lit.) Requirement¹ or
3 - Social Science Requirement¹
15

Junior Year
First Semester
3 - AP EC 257 Natural Resources, Environment, and Economics
4 - BIOSC 320 Field Botany or
3 - BIOSC 406 Intro. Plant Taxonomy and
1 - BIOSC 407 Plant Taxonomy Lab.
3 - E N R 429 Environmental Law and Policy or
3 - FOR 400 Public Relations in Natural Res.
3 - Minor Requirement²
3 - Elective
16

Second Semester
3 - C R D (AP EC) 357 Natural Res. Economics
1 - GEOL 103 Physical Geology Lab.
3 - W F B (BIOSC) 313 Conservation Biology
6 - Minor Requirement⁶
16

Senior Year
First Semester
3 - FOR (E N R) 416 Forest Policy and Admin.
3 - FOR (E N R) 434 GIS for Landscape Planning
3 - Internship, Creative Inquiry or Directed Research Requirement³
3 - Minor Requirement²
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 Requirement²
15
122 Total Semester Hours
3 - See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.
3 - A minor is required and must be selected from the following: Biological Sciences; Chemistry; Crop and Soil Environmental Science; Environmental Science and Policy; Forest Resource Management; Geology; Horticulture; Legal Studies; Microbiology; Natural Resource Economics; Nonprofit Leadership; Park and Protected Area Management; Therapeutic Recreation; Travel and Tourism; Urban Forestry; Wildlife and Fisheries Biology.
3 - Internship (F N R 490), Creative Inquiry (F N R 470), or Directed Research (W F B 463 or F N R H491).

FOOD SCIENCE

Bachelor of Science

Food Science majors apply principles of basic and applied sciences to the design, creation, manufacture, packaging, distribution, and utilization of safe, nutritious, and enjoyable foods and food products. 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 Culinology™), engineering, food packaging, and additional sciences that complement requirements of the Institute of Food Technologists.

The Nutrition and Dietetics Concentration emphasizes nutrition and related areas. It is currently initially accredited by the Commission on Accreditation for Dietetics Education of the American Dietetic Association.

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. With the Nutrition and Dietetics Concentration, employment opportunities include dietitians, nutritionists, consultants, and food specialists. Placement rates are high for all of these fields, and graduates are also well prepared to pursue graduate study in many areas.
The Department of Food Science and Human Nutrition 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 Science and Human Nutrition or at www.clemson.edu/foodscience.

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 101 Epochs in Man’s Struggle for Food
3 - FD SC 214 Food Resources and Society
1 - FD SC 450 Creative Inquiry
3 - Emphasis Area Requirement
15

Sophomore Year
First Semester
4 - CH 227 Organic Chemistry Lab.
3 - FD SC 306 Food Service Operations or
3 - FD SC 307 Restaurant Food Service Mgr.
4 - 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
16

Second Semester
4 - FD SC 402 Food Chemistry II
4 - FD SC 407 Food Process Engineering
3 - FD SC 101 Principles of Biology I
1 - FD SC 450 Creative Inquiry
3 - Emphasis Area Requirement
15

Junior Year
First Semester
4 - BIOSC 223 Human Anatomy and Phys. I and
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 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 - NUTR 451 Human Nutrition
2 - Elective
15

NUTRITION AND DIETETICS CONCENTRATION

Freshman 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
4 - FD SC 410 Food Product Development
1 - FD SC 450 Creative Inquiry
4 - MICRO 407 Food and Dairy Microbiology
3 - Emphasis Area Requirement
15

Junior Year
First Semester
1 - FD SC 450 Creative Inquiry
3 - ENGL 314 Technical Writing
4 - 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
4 - FD SC 402 Food Chemistry II
4 - FD SC 407 Food Process Engineering
3 - FD SC 101 Principles of Biology I
1 - FD SC 450 Creative Inquiry
3 - Emphasis Area Requirement
15

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 - BIOL 104 General Biology II and
1 - BIOL 106 General Biology Lab. II 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 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

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

Second Semester
3 - BIOCCH 305 Essential Elements of Biochem.
3 - EX ST 301 Introductory Statistics
3 - FD SC 214 Food Resources and Society
1 - FD SC 450 Creative Inquiry
3 - Arts and Humanities (Non-Lit.) Requirement
2 - Elective
15

Junior Year
First Semester
4 - BIOSC 223 Human Anatomy and Phys. I and
1 - FD SC 301 Food Regulations and Policy
1 - FD SC 450 Creative Inquiry
4 - MICRO 305 General Microbiology
3 - NUTR 451 Human Nutrition
2 - Elective
15

Second Semester
4 - BIOSC 223 Human Anatomy and Phys. II
3 - ENGL 304 Business Writing or
3 - ENGL 314 Technical Writing
1 - FD SC 450 Creative Inquiry
4 - MICRO 407 Food and Dairy Microbiology
3 - NUTR 455 Nutrition and Metabolism
15

Senior Year
First Semester
3 - FD SC 306 Food Service Operations
4 - FD SC 401 Food Chemistry I
3 - FD SC 404 Food Preservation and Processing
2 - FD SC 407 Quantity Food Production
1 - NUTR 418 Professional Devel. in Dietetics or
1 - NUTR 419 Professional Devel. in Nutrition
4 - NUTR 424 Medical Nutrition Therapy I
17
### Bachelor of Science in Forest Resource Management

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

For foresters, 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 may select a minor (see page 6). 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 49-50 for program details.

### Freshman Year

<table>
<thead>
<tr>
<th>Course Code</th>
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### Sophomore Year

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<td>2 - FOR 205</td>
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### Junior Year

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<td>2 - FOR 302</td>
<td>Forest Biometrics</td>
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<tr>
<td>3 - FOR 304</td>
<td>Forest Resource Economics</td>
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<td>3 - FOR 341</td>
<td>Wood Procurement Practices in the Forest Industry</td>
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<td>3 - FOR 411</td>
<td>Integrated Forest Pest Management</td>
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<td>3 - FOR 434</td>
<td>GIS for Landscape Planning</td>
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### Senior Year

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<td>4 - FOR 410</td>
<td>Harvesting Processes</td>
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<tr>
<td>3 - FOR 416</td>
<td>Forest Policy and Admin.</td>
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<tr>
<td>3 - FOR 417</td>
<td>Forest Resource Mgt. and Regulation</td>
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<td>2 - FOR 431</td>
<td>Recreation Resource Planning in Forest Management</td>
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### LAND SURVEYING

### EMPHASIS AREA

### Freshman Year

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<td>General Biology Lab. I</td>
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<td>4 - CH 105</td>
<td>Chemistry in Context</td>
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### Sophomore Year

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<tr>
<td>4 - F N R 204</td>
<td>Soil Information Systems</td>
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<tr>
<td>3 - FOR 205</td>
<td>Forest Operations</td>
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<td>4 - FOR 206</td>
<td>Forest Ecology</td>
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<td>4 - Departmental Science Requirement²</td>
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### Forestry Summer Camp

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<td>Forest Communities</td>
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<tr>
<td>2 - FOR 252</td>
<td>Forest Operations</td>
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<tr>
<td>4 - FOR 253</td>
<td>Forest Mensuration</td>
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<td>1 - F N R 499</td>
<td>Natural Resources Seminar</td>
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<td>2 - FOR 406</td>
<td>Forested Watershed Management</td>
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<td>3 - FOR 415</td>
<td>Forest Wildlife Management</td>
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<td>2 - FOR 425</td>
<td>Forest Resource Management Plans</td>
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<td>1 - FOR 498</td>
<td>Senior Portfolio</td>
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Junior Year
First Semester
2 - FOR 302 Forest Biometrics
3 - FOR 304 Forest Resource Economics
3 - FOR 341 Wood Procurement Practices in the Forest Industry
4 - FOR 413 Integrated Forest Pest Management
3 - FOR (E N R) 434 GIS for Landscape Planning

Second Semester
3 - AG M 221 Surveying: Earthwork and Area Measurements
2 - FOR 308 Remote Sensing in Forestry
3 - FOR 408 Wood and Paper Products
3 - FOR 418 Forest Resource Valuation
4 - FOR 465 Silviculture

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

Senior Year
First Semester
4 - FOR 410 Harvesting Processes
3 - FOR (E N R) 461 Forest Policy and Admin.
3 - FOR 417 Forest Resource Mgt. and Regulation
3 - FOR 433 GPS Applications

Second Semester
3 - B E 322 Small Watershed Hydrology and Sedimentology
1 - F N R 499 Natural Resources Seminar
2 - FOR 450 Forested Watershed Management
3 - FOR 415 Forest Wildlife Management
2 - FOR 425 Forest Resource Management Plans
1 - FOR 498 Senior Portfolio
3 - LAW 333 Real Estate Law

15

130 Total Semester Hours

Bachelor of Science

GENETICS

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

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

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

Sophomore Year
First Semester
3 - CH 223 Organic Chemistry
1 - CH 227 Organic Chemistry Lab.
3 - COMMA 550 Intro to Human Comm. or COMM 250 Public Speaking
2 - GEN 302 Molecular and General Genetics
3 - PHYS 122 Physics with Calculus I
1 - PHYS 124 Physics Lab I
1

Second Semester
3 - BIOL 401 Molecular Biochemistry
2 - BIOL 402 Molecular Biochemistry Lab.
3 - CH 224 Organic Chemistry
1 - CH 228 Organic Chemistry Lab.
3 - EX ST 301 Introductory Statistics
1 - Arts and Humanities (Literature) Requirement2
3 - Social Science Requirement2

Junior Year
First Semester
3 - BIOSC 461 Cell Biology
3 - GEN 410 Fundamentals of Genetics I
2 - GEN 411 Fundamentals of Genetics I Lab.
3 - Science Requirement3
3 - Elective4

Second Semester
3 - GEN 420 Fundamentals of Genetics II
2 - GEN 421 Fundamentals of Genetics II Lab.
3 - GEN (BIOCCH) 440 Bioinformatics
3 - PHIL 326 Science and Values
3 - Genetics Requirement5
3 - Elective4

Senior Year
First Semester
3 - GEN 450 Comparative Genetics
3 - Science Requirement7
3 - Social Science Requirement2
6 - Elective4

Second Semester
2 - GEN 493 Senior Seminar
6 - Genetics Requirement1
3 - Science Requirement1
4 - Elective4

123 Total Semester Hours

Students are strongly recommended.

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

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 or CH 105 Chemistry in Context
3 - HORT 101 Horticulture
4 - Spanish Language Requirement
15
Second Semester
4 - CH 102 General Chemistry or CH 106 Chemistry in Context
3 - ENGL 103 Accelerated Composition
1 - HORT 102 Experience Horticulture
3 - BIOSC 102 Intro. to Mathematical Analysis
4 - Related Science Requirement
15
Sophomore Year
First Semester
3 - HORT 303 Landscape Plants
3 - MTHSC 101 Essential Math. for Informed Soc.
3 - Arts and Humanities (Non-Lit.) Requirement
3 - Business Requirement
2 - Plant Biology Requirement
16
Second Semester
3 - HORT 305 Plant Propagation
1 - HORT 306 Plant Propagation Techniques Lab.
3 - Arts and Humanities (Literature) Requirement
3 - Horticulture Specialization Requirement
2 - Social Science Requirement
13
Summer
3 - HORT 271 Internship or HORT 471 Advanced Internship

Junior Year
First Semester
4 - CSENV 202 Soils
3 - Horticulture Specialization Requirement
2 - Oral Communication Requirement
2 - Business Requirement
1 - Elective
16
Second Semester
3 - BIOSC 412 Bacterial Physiology
1 - HORT 409 Seminar
3 - Business Requirement
2 - Horticulture Specialization Requirement
2 - Related Science Requirement
14
Senior Year
First Semester
3 - Business Requirement
6 - Horticulture Specialization Requirement
6 - Related Science Requirement
15
Second Semester
6 - Horticulture Specialization Requirement
6 - Related Science Requirement
1 - Elective
13
120 Total Semester Hours

Sophomore Year
First Semester
3 - CH 223 Organic Chemistry
1 - CH 227 Organic Chemistry Lab.
4 - MICRO 305 General Microbiology
3 - Arts and Humanities (Non-Lit.) Requirement
3 - Business Requirement
3 - Elective
17
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
2 - Biochemistry Requirement
2 - Microbiology Requirement
15
Junior Year
First Semester
3 - BIOSC 461 Cell Biology
4 - MICRO 401 Microbial Diversity and Ecology
3 - PHYS 207 General Physics I and
1 - PHYS 209 General Physics I Lab. or
3 - PHYS 222 Physics with Calculus I and
1 - PHYS 224 Physics Lab. I
3 - Microbiology Requirement
14
Second Semester
3 - ENGL 315 Scientific Writing and Comm.
4 - MICRO 412 Bacterial Physiology
3 - Microbiology Requirement
3 - Virology Requirement
3 - Elective
15
Second Semester
2 - BIOSC 493 Senior Seminar
4 - Microbiology Requirement
2 - Elective
15
124–126 Total Semester Hours

Microbiology
Bachelor of Science
Microbiology deals with the study of bacteria, viruses, yeasts, filamentous fungi, prototaxa, 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 also concern themselves with their roles in human and plant life, their interactions with other organisms, and their economic importance.

The Microbiology major provides thorough training in the basic microbiological sciences. Further, students receive instruction in mathematics, physics, chemistry, and biochemistry, all essential to the training of a modern microbiologist. Students can prepare for a variety of careers through a wide choice of electives. The microbiology curriculum with a Biomedicine Concentration is recommended for students planning postgraduate programs. Microbiology graduates may enter graduate school in microbiology, biochemistry, bioengineering, or related disciplines; they may enter medical or dental schools or pursue careers in one of the many industries or public service departments dependent upon microbiology. Some of these are the fermentation and drug industries, medical and public health microbiology, various food industries, and agriculture.

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

Freshman Year
First Semester
5 - BIOL 110 Principles of Biology I
4 - CH 101 General Chemistry
3 - COMM 150 Intro. to Human Communication or COMM 250 Public Speaking
1 - MICRO 101 Microbes and Human Affairs
4 - MTHSC 106 Calculus of One Variable
17
Second Semester
5 - BIOL 111 Principles of Biology II
4 - CH 102 General Chemistry
3 - ENGL 103 Accelerated Composition
3 - Mathematics Requirement
15-16

Microbiology
Bachelor of Science
Microbiology deals with the study of bacteria, viruses, yeasts, filamentous fungi, prototaxa, 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 also concern themselves with their roles in human and plant life, their interactions with other organisms, and their economic importance.

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Freshman Year
First Semester
5 - BIOL 110 Principles of Biology I
4 - CH 101 General Chemistry
3 - COMM 150 Intro. to Human Communication or COMM 250 Public Speaking
1 - MICRO 101 Microbes and Human Affairs
4 - MTHSC 106 Calculus of One Variable
17
Second Semester
5 - BIOL 111 Principles of Biology II
4 - CH 102 General Chemistry
3 - ENGL 103 Accelerated Composition
3 - Mathematics Requirement
15-16

Sophomore Year
First Semester
4 - CH 223 Organic Chemistry
1 - CH 227 Organic Chemistry Lab.
4 - MICRO 305 General Microbiology
3 - Arts and Humanities (Non-Lit.) Requirement
3 - Business Requirement
3 - Elective
17
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
2 - Biochemistry Requirement
2 - Microbiology Requirement
15
Junior Year
First Semester
3 - BIOSC 461 Cell Biology
4 - MICRO 401 Microbial Diversity and Ecology
3 - PHYS 207 General Physics I and
1 - PHYS 209 General Physics I Lab. or
3 - PHYS 222 Physics with Calculus I and
1 - PHYS 224 Physics Lab. I
3 - Microbiology Requirement
14
Second Semester
3 - ENGL 315 Scientific Writing and Comm.
4 - MICRO 412 Bacterial Physiology
3 - Microbiology Requirement
3 - Virology Requirement
3 - Elective
15
Second Semester
2 - BIOSC 493 Senior Seminar
4 - Microbiology Requirement
2 - Elective
15
124–126 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 higher. See advisor.

3MTHSC 111, 203, 301, or EX ST 301
BIOMEDICINE

CONCENTRATION

Freshman Year
First Semester
5 - BIOL 110 Principles of Biology I \(^1\)
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
3 - CH 104 General Chemistry
Second Semester
5 - BIOL 111 Principles of Biology II \(^1\), or 4 - BIOSC 315 Functional Human Anatomy
4 - CH 102 General Chemistry
3 - ENGL 103 Accelerated Composition
34 - Mathematics Requirement \(^2\)
14-16

Sophomore Year
First Semester
3 - CH 223 Organic Chemistry
1 - CH 227 Organic Chemistry Lab.
4 - MICRO 305 General Microbiology
3 - Arts and Humanities (Literature) Requirement \(^3\)
4 - Elective
15
Second Semester
3 - CH 224 Organic Chemistry
1 - CH 228 Organic Chemistry Lab.
3 - Arts and Humanities (Non-Lit.) Requirement \(^3\)
3 - Biochemistry Requirement \(^4\)
3 - Biomedicine Requirement \(^5\)
3 - Social Science Requirement \(^6\)
16

Junior Year
First Semester
3 - GEN 300 Fundamental Genetics
4 - MICRO 401 Microbial Diversity and Ecology
4 - MICRO (AVS, BIOSC) 414 Basic Immunology
3 - PHYS 207 General Physics I and 1 - PHYS 209 General Physics I Lab. or 3 - PHYS 221 Physics with Calculus I and 1 - PHYS 210 General Physics II Lab. or 3 - PHYS 223 Physics Lab. II
4 - Elective

Second Semester
3 - ENGL 315 Scientific Writing and Comm.
3 - MICRO 412 Bacterial Physiology
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
4 - Elective

Senior Year
First Semester
3 - BIO 461 Cell Biology
2 - BIO 462 Cell Biology Lab.
4 - MICRO 415 Microbial Genetics
3 - MICRO 416 Introductory Virology
3 - Social Science Requirement \(^7\)
15
Second Semester
4 - MICRO 411 Pathogenic Bacteriology
3 - MICRO 417 Molecular Mechanisms of Carcinogenesis and Aging
2 - MICRO 493 Senior Seminar
3 - Biomedicine Requirement \(^5\)
3 - Elective
15
122-124 Total Semester Hours

Students planning on applying to medical/dental schools should take PHYS 208 and 210 during the second semester of the junior year.

PACKAGING SCIENCE

Bachelor of Science
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 economies, 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 or approved minors allow students to select courses to improve career preparation for specific industry segments, including distribution and transportation, engineering technology, food and health care packaging, package design and graphics, materials, international packaging, marketing/finance, business administration, entrepreneurship, environmental engineering, environmental science and policy, and management.

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

Freshman Year
First Semester
3 - BIOL 103 General Biology I
1 - BIO 103 General Biology I Lab.
1 - CH 101 General Chemistry
4 - CH 102 General Chemistry
4 - ENGL 103 Accelerated Composition
2 - PKGS 102 Intro. to Packaging Science
1 - PKGS 103 Packaging Science ePortfolio
14
Second Semester
3 - BIOL 104 General Biology II
1 - BIOL 104 General Biology II Lab.
4 - MTHSC 106 Calculus of One Variable
1 - PHYS 124 Physics Lab. I
4 - Elective
15

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 and 1 - PHYS 124 Physics Lab. II
4 - PKGS 202 Packaging Materials and Manuf.
2 - PKGS 203 Packaging Research Fundamentals
14
Second Semester
4 - G C 103 Graphic Comm. I for Packaging Sci.
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 - PKGS 201 Packaging Perishable Products
3 - PKGS 204 Container Systems
1 - PKGS 206 Container Systems Lab.
2 - PKGS 220 Package Drawing/CAD
17
Summer
0 - CO-OP 101 Cooperative Education

Junior Year
First Semester
3 - PKGS 320 Package Design Fundamentals
3 - PKGS 368 Packaging and Society
3 - PKGS 404 Mechanical Properties of Packages and Principles of Protective Packaging
3 - PKGS 430 Converting for Flexible Packaging
1 - PKGS 454 Product and Package Eval. Lab.
3 - Emphasis Area Requirement
16
Second Semester
3 - COMM 250 Public Speaking
3 - PKGSC 401 Packaging Machinery
3 - PKGSC 440 Packaging for Distribution
3 - Arts and Humanities (Literature) Requirement
3 - Emphasis Area Requirement
15

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.
2 - 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
1 - PKGSC 420 Package Design and Development
3 - Arts and Humanities (Non-Lit.) Requirement
6 - Emphasis Area Requirement
16

122 Total Semester Hours

A C or better is required in this course for graduation.

See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Require-
ment. Note: Social Science requirement must be in an area other than economics or applied economics. A 200-level or higher foreign language course is recommended to satisfy the
Arts and Humanities (Non-Literature) Requirement.

Students interested in minors or emphasis areas should take
any prerequisites in the sophomore year.

At least one 15-week period (six months preferred) of Cooperative
Education is required.

PKGSC 404 and 454 must be taken concurrently.

Completion of an approved minor or emphasis area is required.
Approved minors are Business Administration, Entrepreneur-
ship, Environmental Engineering, Environmental Science and
Policy, and Management. Emphasis Areas consist of 15 credit
hours selected from one of the following areas: Distribution
and Transportation, Engineering and Technology, Health
Care Packaging, Package Design and Graphics, Materials
International Packaging, and Marketing/Finance. See advisor
for approved emphasis area courses.

PREPROFESSIONAL HEALTH STUDIES

Non-degree
The health professions need individuals with a diver-
sity of educational backgrounds and a wide variety of
talents and interests. The philosophies of education, the
specific preprofessional course requirements, the noncognitive qualifications for enrollment, and
the systems of training vary among the professional
health schools; but all recognize the desirability of
a broad education—a good foundation in the natural
sciences, highly developed communication skills, and a solid background in the humanities and social
sciences. The absolute requirements for admission
to professional health schools are limited to allow
latitude for developing individualized undergraduate
programs of study; however, most schools of medicine and
dentistry require 16 semester hours of chemistry,
including organic chemistry, eight hours of biologi-
cal 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 profes-
sional school.

Undergraduates may also prepare to study otopmetry,
podiatry, and other health professions. While the
basic requirements for these professional schools are
essentially the same as those for schools of medicine
dentistry, specific requirements for individual
schools in these professions vary somewhat; conse-
quently, 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 cur-
rricula. The emphasis is placed on the student’s doing
well in the curriculum chosen, and this becomes crit-
cal 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 upon the pharmacy school of
interest. Upon completion of the program, students
will be eligible to apply to a college of pharmacy, usu-
ally the University of 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 Prephar-
acy program are considered to be enrolled in a
degree-seeking program.

Second Year
First Semester
4 - BIOSC 222 Human Anatomy and Phys. I
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
3 - History or Philosophy Requirement
18

Second Semester
4 - BIOSC 223 Human Anatomy and Phys. II
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 208 General Physics II
1 - PHYS 210 General Physics II Lab.
3 - Science and Tech. in Society Requirement
18

Third Year
72–90 Total Semester Hours

A A H 210 or MUSIC 210
Select any ENGL course from General Education Arts and
Humanities (Literature) Requirement.
See advisor.

See General Education Requirements.
Students 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 con-
centrations in physical therapy, occupational therapy,
communication sciences and disorders programs, as well as in
physician assisting and allied health areas. This cur-
criculum is designed to meet the requirements of the
programs in the College of Health Professions at the
Medical University of South Carolina and other pro-
fessional 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 Prereha-
bilitation Sciences advisor. The following curriculum
fulfills the general requirements for those fields
requiring less than a baccalaureate degree. Electives
should be chosen after consultation with the advisor.
Professional schools may change their requirements
at any time, so it is imperative that students in this
major stay in close contact with their advisor.

For financial aid purposes, students in the Prere-
habilitation 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
3 - PSYC 201 Introduction to Psychology
3 - Arts and Humanities (Non-Lit.) Requirement\(^1\)
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

Second Year

First Semester
4 - BIOSC 222 Human Anatomy and Phys. I
1 - PHYS 207 General Physics I
1 - PHYS 209 General Physics I Lab.
3 - PSYC 340 Lifespan Developmental Psych.
3 - Arts and Humanities (Literature) Requirement\(^2\)
3 - Arts and Humanities Requirement\(^3\)
17

Second Semester
4 - BIOSC 223 Human Anatomy and Phys. II
3 - COMM 150 Intro. to Human Comm. or
3 - COMM 250 Public Speaking
3 - CP SC 120 Intro. to Information Technology
3 - PHYS 208 General Physics II
1 - PHYS 210 General Physics II Lab.
3 - Mathematics Requirement\(^3\)
17

Third Year\(^4\)
90 Total Semester Hours

\(^1\)See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

\(^2\)Select any ENGL course from General Education Arts and Humanities (Literature) Requirement.

\(^3\)See advisor.

\(^4\)Students planning to receive the Bachelor of Science degree upon completion of the program are required to complete an additional 24 credit hours. See advisor for requirements.

PREVETERINARY MEDICINE

Under a regional plan, the South Carolina Prevet-

erinary Advisory Committee coordinates a pro-

gram for South Carolina residents who are interested in pursuing careers in veterinary medicine. South Carolina residents attending any college or university may apply through the Veterinary Medical College Application Service (VMCAS) to the University of Georgia College of Veterinary Medicine. Currently the University of Georgia admits up to 17 students each year through arrangements with the Southern Regional Education Board. The State of South Caro-

lina has a contract with Mississippi State University to admit up to five South Carolina residents. The State of South Carolina also has a contract with 

Tuskegee University to admit up to four South Caro-

lina 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 undergraduate courses: six credits of English, 14 credits of 

humanities and social studies, eight credits of phys-

ics, eight credits of general biology, eight credits of advanced biology, three credits of biochemistry, and 16 credits of organic and inorganic chemistry. (Chem-

istry and physics courses must be at the premedical level; they may not be survey courses.)

To be in the best competitive position, applicants 

should complete courses in animal agriculture, genet-

ics, 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 three 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 Exami-

nation and the Veterinary College Admis-

sion Test.

Since out-of-state students attending Clemson are 

inelligible to apply to the University of Georgia or 
Tuskegee University under the South Carolina quota, they should contact the college(s) of veterinary medi-
cine 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 re-

quirements. 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 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 ecologists, professionals, agritourism industry specialists, extension personnel, or regulatory officers.

Freshman Year

First Semester
5 - BIOL 110 Principles of Biology I\(^5\)
4 - CH 101 General Chemistry
3 - MTHSC 102 Intro. to Math. Analysis\(^6\) or
4 - MTHSC 106 Calculus of One Variable I\(^6\)
1 - SSCS 101 Survey of Soils and Sustainable Crop Systems
3 - Arts and Humanities (Non-Lit.) Requirement\(^1\)
16-17

Second Semester
5 - BIOL 111 Principles of Biology II\(^5\)
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
### AGRICULTURAL BIOTECHNOLOGY CONCENTRATION

#### Sophomore Year

**First Semester**
- 3 - CH 223 Organic Chemistry
- 1 - CH 227 Organic Chemistry Lab.
- 1 - CSENV 350 Public Speaking
- 3 - ECON 200 Economic Concepts (or ECON 211 Principles of Microeconomics)
- 3 - SSCS 333 Agricultural Genetics
- 3 - Arts and Humanities (Literature) Requirement

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

#### Junior Year

**First Semester**
- 3 - BIOCH 305 Essential Elements of Biochem.
- 1 - BIOCH 306 Essential Elements of Bioch. Lab.
- 3 - BIOSC 304 Biology of Plants
- 3 - CSENV 422 Major World Crops
- 3 - SSCS 335 Agricultural Biotechnology
- 3 - Social Science Requirement

**Second Semester**
- 3 - CSENV 350 Practicum
- 3 - ENGL 315 Scientific Writing and Comm.
- 3 - Plant Science Requirement
- 3 - Cross-Cultural Awareness Requirement
- 4 - Emphasis Area Requirement

#### Senior Year

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

**Second Semester**
- 2 - CSENV 350 Practicum
- 3 - CSENV 409 Biology of Invasive Plants
- 1 - SSCS 451 Agric. Biotech. and Global Society
- 3 - Emphasis Area Requirement

124–126 Total Semester Hours

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#### SOIL AND WATER ENVIRONMENTAL SCIENCE CONCENTRATION

#### Sophomore Year

**First Semester**
- 3 - CH 223 Organic Chemistry (and CH 227 Organic Chemistry Lab. or CH 201 Survey of Organic Chemistry)
- 4 - CSENV 202 Soils
- 1 - GEOL 103 Physical Geology
- 3 - PHYS 207 General Physics I and PHYS 209 General Physics I Lab.
- 3 - PHYS 122 Physics with Calculus I and PHYS 124 Physics Lab. I

**Second Semester**
- 3 - PHYS 208 General Physics II and PHYS 210 General Physics II Lab.
- 3 - PHYS 221 Physics with Calculus II and PHYS 223 Physics Lab. II
- 3 - Arts and Humanities (Literature) Requirement
- 4 - Emphasis Area Requirement

#### Junior Year

**First Semester**
- 3 - COMA 250 Public Speaking
- 4 - MICRO 305 General Microbiology
- 3 - Plant Science Requirement

**Second Semester**
- 3 - CSENV 475 Soil Physics and Chemistry
- 3 - CSENV 490 Beneficial Soil Organisms in Plant Growth
- 3 - ENGL 315 Scientific Writing and Comm.
- 1 - SSCS 401 Academic and Professional Dev. II
- 3 - Emphasis Area Requirement
- 3 - Social Science Requirement

#### Senior Year

**First Semester**
- 3 - CSENV 350 Practicum
- 3 - CSENV 403 Soil Genesis and Classification
- 3 - I P M 401 Principles of Integrated Pest Mgt.
- 3 - AP EC 205 Agricultural Economics
- 1 - CH 227 Organic Chemistry Lab.
- 4 - CSENV 202 Soils
- 4 - AP EC 301 Agricultural Economics
- 3 - PL PA 301 Plant Diseases and People

**Second Semester**
- 3 - AP EC 205 Agriculture and Society
- 3 - CH 224 Organic Chemistry
- 1 - CH 228 Organic Chemistry Lab.
- 3 - CSENV 250 Public Speaking
- 3 - SSCS 333 Agricultural Genetics
- 3 - Plant Science Requirement

**Junior Year**

**First Semester**
- 4 - ENT (BIOSC) 301 Insect Biology and Diversity
- 3 - I P M 401 Principles of Integrated Pest Mgt.
- 3 - Plant Science Requirement
- 3 - Social Science Requirement

**Second Semester**
- 3 - BIOSC 401 Plant Physiology
- 1 - BIOSC 402 Plant Physiology Lab.
- 3 - CSENV 405 Plant Physiology
- 3 - CSENV 409 Invasive Plants
- 3 - ENGL 315 Scientific Writing and Comm.
- 2 - PL PA 411 Plant Disease Diagnosis I
- 1 - SSCS 401 Academic and Professional Dev. II

**Senior Year**

**First Semester**
- 3 - CSENV 409 Invasive Plants
- 3 - AP EC 205 Agricultural Economics
- 3 - CSENV 405 Plant Physiology
- 3 - CSENV 409 Invasive Plants
- 3 - ENGL 315 Scientific Writing and Comm.
- 2 - PL PA 411 Plant Disease Diagnosis I
- 1 - SSCS 401 Academic and Professional Dev. II

**Second Semester**
- 3 - CSENV 405 Plant Physiology
- 3 - CSENV 409 Invasive Plants
- 3 - ENGL 315 Scientific Writing and Comm.
- 2 - PL PA 411 Plant Disease Diagnosis I
- 1 - SSCS 401 Academic and Professional Dev. II

**Senior Year**

**First Semester**
- 3 - CSENV 475 Soil Physics and Chemistry
- 3 - CSENV 490 Beneficial Soil Organisms in Plant Growth
- 3 - ENGL 315 Scientific Writing and Comm.
- 3 - Field Scale Environmental Mgt. Requirement

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

124–126 Total Semester Hours

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

2MTHE 106 is recommended for students in the Agricultural Biotechnology Concentration.

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

4CONCENTRATION

5Agricultural Economics

6Second Semester

7Junior Year

8General Education Requirements.

9Emphasis Area Requirement

10See General Education Requirements.

11Select from department-approved list. Emphasis Areas include Agricultural Biosystems and Technology; and Agricultural Biotechnology and Global Society.
### Second Semester
- CSENV 350 Practicum
- CSENV 452 Soil Fertility and Management
- CSENV 453 Soil Fertility Lab.
- CSENV 455 Seminar
- Arts and Humanities (Literature) Requirement
- Emphasis Area Requirement
- Total Semester Hours: 17

### Sophomore Year

#### First Semester
- HORT 212 Introduction to Turfgrass Culture
- HORT 213 Turfgrass Culture Lab.
- HORT 303 Landscape Plants
- MTHSC 101 Essential Math for Informed Soc.
- Plant Biology Requirement

#### Second Semester
- Arts and Humanities (Literature) Requirement
- Business Requirement
- Related Science Requirement
- Social Science Requirement
- Total Semester Hours: 14

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

### Junior Year

#### First Semester
- CSENV 202 Soils
- Arts and Humanities (Non-Lit.) Requirement
- Business Requirement
- Related Science Requirement
- Social Science Requirement

#### Second Semester
- BIOSC 401 Plant Physiology
- BIOL 402 Plant Physiology Lab.
- HORT 459 Seminar
- HORT 469 Applied Turfgrass Physiology
- PL PA (ENT) 406 Diseases and Insects of Turfgrasses
- Horticulture Specialization Requirement
- Oral Communication Requirement

#### Maymester
- PL PA (ENT) 408 Diseases and Insects of Turfgrasses Laboratory

### Senior Year

#### First Semester
- HORT 412 Advanced Turfgrass Management
- Business Requirement
- Horticulture Specialization Requirement
- Related Science Requirement
- Soils Requirement

#### Second Semester
- HORT (CSENV) 433 Landscape and Turf Weed Management
- Horticulture Specialization Requirement
- Related Science Requirement
- Soils Requirement

#### Total Semester Hours: 12

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**Note:** Students not taking the CH 105/106 sequence must satisfy the General Education Science and Technology in Society Requirement by selecting a qualifying course from the Related Science Requirement. See advisor. Select from department-approved list. Social Science Requirement by selecting a qualifying course from the Related Science Requirement. See Academic Regulations.

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### 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. The Bachelor of Science degree program in Wildlife and Fisheries Biology provides a solid foundation 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 page 49 for program details.

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### 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 105 Chemistry in Context I
- 1 - E N R 101 Intro. to Env. and Natural Res. I
- 3 - MTHSC 102 Intro. to Mathematical Analysis
- 3 - Oral Communication Requirement

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

## 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.) Requirement

### Second Semester
- 3 - FOR 206 Forestry Ecology
- 3 - W F B (BIOSC) 313 Conservation Biology
- 3 - W F B 350 Principles of Fish and Wildlife Biol.
- 3 - Arts and Humanities (Literature) Requirement
- 3 - Social Science Requirement

## Junior Year
### First Semester
- 3 - BIOSC 303 Vertebrate Biology
- 4 - BIOSC 320 Field Botany
- 3 - ENGL 314 Technical Writing
- 3 - GEN 300 Fundamental Genetics
- 3 - W F B 410 Wildlife Management Techniques

### Second Semester
- 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
- 3 - Approved Requirement

## 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
- 4 - Approved Requirement

### Second Semester
- 1 - F N R 499 Natural Resources Seminar
- 3 - W F B 430 Wildlife Conservation Policy
- 8 - Approved Requirement
- 3 - Policy and Law Requirement
- 15

122 Total Semester Hours

1 Students planning to take organic chemistry should substitute CH 101 and 102.

2 See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement; and, if CH 105 is not selected, three credits must also satisfy the Science and Technology in Society Requirement. (Note: Social Science Requirement must be in an area other than economics or applied economics.)

3 Select from department-approved list.
## 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.

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<td>Crop and Soil Environmental Science</td>
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See pages 36–39 for details.