

COLLEGE OF AGRICULTURE, FORESTRY AND LIFE SCIENCES

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

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

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

The College of Agriculture, Forestry and Life Sciences is impacting the world one graduate at a time—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 60.)

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 - AG ED 200 Agricultural Applications of Educational Technology¹ *or*
 - 3 - Arts and Humanities (Non-Lit.) Requirement¹
 - 3 - AVS 150 Introduction to Animal Science
 - 1 - AVS 151 Introduction to Animal Science Lab.
 - 3 - BIOL 103 General Biology I
 - 1 - BIOL 105 General Biology Lab. I
 - 3 - Mathematics Requirement²
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Second Semester

- 1 - AG ED 100 Orientation and Field Experience
 - 3 - AG ED 103 Multiculturalism in Agric. Ed.
 - 3 - AP EC 202 Agricultural Economics
 - 3 - BIOL 104 General Biology II
 - 1 - BIOL 106 General Biology Lab. II
 - 3 - ENGL 103 Accelerated Composition
 - 3 - Social Science Requirement³
-

Sophomore Year

First Semester

- 3 - AG ED 201 Intro. to Agricultural Education
 - 3 - AG ED 203 Teaching Agriscience
 - 3 - AG ED 204 Applied Agriculture Calculations
 - 4 - CH 101 General Chemistry *or*
 - 4 - CH 105 Chemistry in Context I
 - 3 - HORT 212 Introduction to Turfgrass Culture
 - 1 - HORT 213 Turfgrass Culture Lab.
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Second Semester

- 3 - AG ED 355 Team and Organizational Leadership in Food and Fiber Systems
 - 3 - AG M 205 Principles of Fabrication
 - 3 - BIOL 201 Biotechnology and Society *or*
 - 3 - BIOSC 200 Biology in the News
 - 4 - CH 102 General Chemistry *or*
 - 4 - CH 106 Chemistry in Context II
 - 1 - COMM 101 Communication Academic and Professional Development⁴
 - 3 - Arts and Humanities (Literature) Requirement³
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¹Students in the Communications and Leadership Emphasis Areas must take AG ED 200. Students in the Teaching Emphasis Area must take a course to satisfy the Arts and Humanities (Non-Literature) Requirement. See General Education Requirements.

²MTHSC 101, 102, 106, or 203

³See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement. Note: GEOG 103 or HIST 193 is recommended to satisfy the Social Science Requirement.

⁴Required of students in Communications Emphasis Area only.

COMMUNICATIONS EMPHASIS AREA

Junior Year

First Semester

- 3 - AG ED 303 Mech. Technology for Agric. Ed.
 - 2 - AG M 221 Surveying
 - 4 - COMM 201 Intro. to Communication Studies
 - 4 - CSENV 202 Soils
 - 3 - FOR 305 Woodland Management *or*
 - 3 - W F B 412 Wildlife Management
 - 3 - Arts and Humanities (Non-Lit.) Requirement¹
-

Second Semester

- 3 - ED F 302 Educational Psychology
 - 3 - HORT 305 Plant Propagation
 - 1 - HORT 306 Plant Propagation Techniques Lab.
 - 3 - Departmental Communication Requirement²
 - 3 - Oral Communication Requirement³
 - 3 - Elective
-

Senior Year

First Semester

- 3 - ENGL 231 Introduction to Journalism
 - 3 - HORT 303 Landscape Plants
 - 6 - Departmental Communication Requirement²
 - 3 - Technical Requirement²
-

Second Semester

- 12 - AG ED 407 Internship in Extension and Leadership Education⁴
-

128 Total Semester Hours

¹See General Education Requirements.

²See advisor.

³See General Education Requirements. COMM 150 or 250 is recommended.

⁴Internship must meet departmental requirements for Communications Emphasis Area. See advisor.

LEADERSHIP EMPHASIS AREA

Junior Year

First Semester

- 3 - AG ED 303 Mech. Technology for Agric. Ed.
 - 2 - 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
 - 3 - Arts and Humanities (Non-Lit.) Requirement¹
-

Second Semester

- 3 - ED F 302 Educational Psychology
 - 3 - HORT 305 Plant Propagation
 - 1 - HORT 306 Plant Propagation Techniques Lab.
 - 3 - Oral Communication Requirement²
 - 3 - Technical Requirement³
 - 3 - Elective
-

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 Requirement³
15

Second Semester

- 12 - AG ED 407 Internship in Extension and
Leadership Education
12

126 Total Semester Hours

¹See General Education Requirements.²See General Education Requirements. COMM 150 or 250 is recommended.³See advisor.**TEACHING EMPHASIS AREA****Junior Year****First Semester**

- 3 - AG ED 200 Agricultural Applications of
Educational Technology¹
3 - AG ED 303 Mech. Technology for Agric. Ed.
2 - 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
18

Second Semester

- 3 - ED F 302 Educational Psychology
3 - HORT 305 Plant Propagation
1 - HORT 306 Plant Propagation Techniques Lab.
3 - Oral Communication Requirement²
3 - Technical Requirement³
3 - Elective
16

Senior Year**First Semester**

- 1 - AG ED 400 Supervised Field Experience II
3 - AG ED 401 Instructional Methods in Ag. Ed.
3 - AG ED 403 Principles of Adult/Ext. Educ. *or*
3 - AG ED 440 Prog. Devel. in Adult/Ext. Ed.
2 - AG ED 423 Curriculum
3 - Technical Requirement³
12

Second Semester

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

125 Total Semester Hours

¹ED F 315 may be substituted. In this case, ED F 425 must be taken in the semester immediately prior to directed teaching.²See General Education Requirements. COMM 150 or 250 is recommended.³See advisor.**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
1 - AG M 101 Intro. to Ag. Mech. and Business
3 - AG M 205 Principles of Fabrication
3 - BIOL 103 General Biology I
1 - BIOL 105 General Biology Lab. I
3 - MTHSC 102 Intro. to Mathematical Analysis
14

Second Semester

- 3 - ACCT 201 Financial Accounting Concepts
3 - BIOL 104 General Biology II
1 - BIOL 106 General Biology Lab. II
3 - ENGL 103 Accelerated Composition
3 - EX ST 301 Introductory Statistics
3 - Elective
16

Sophomore Year**First Semester**

- 3 - AP EC 202 Agricultural Economics
4 - CH 105 Chemistry in Context I
4 - PHYS 200 Introductory Physics *or*
3 - PHYS 207 General Physics I and
1 - PHYS 209 General Physics I Lab.
3 - Arts and Humanities (Non-Lit.) Requirement¹
14

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**

- 2 - AG M 221 Surveying
2 - AG M 301 Soil and Water Conservation
3 - AG M 460 Electrical Systems
3 - Arts and Humanities (Literature) Requirement¹
3 - Agribusiness Requirement²
3 - Minor Requirement³
16

Second Semester

- 3 - AG M 406 Mechanical and Hydraulic Systems
3 - COMM 250 Public Speaking
3 - Agribusiness Requirement²
3 - Minor Requirement³
3 - Elective
15

Senior Year**First Semester**

- 3 - AG M 402 Drainage, Irrigation and Waste
Management
3 - AG M 405 Agricultural Structures and
Environmental Control
3 - Minor Requirement³
3 - Plant/Crop Science Requirement⁴
3 - Social Science Requirement¹
15

Second Semester

- 3 - AG M 410 Precision Agriculture Technology
3 - AG M 452 Mobile Power
3 - AG M 472 Capstone
3 - Agribusiness Requirement²
3 - Plant/Crop Science Requirement⁴ *or*
3 - Soil Science Requirement⁵
15

121 Total Semester Hours

¹See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.²AP EC 302, 308, 309, 319, 351, 402, 409, 433, 452, 456, or 460. 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 405, 407, 417, 421, 422, 423, 425, (AP EC) 426, HORT 212, 305, (CSENV) 433, 455, 456, PL PA 310, (ENT) 406, 411, or 459. This course may also be used to satisfy minor requirement.⁵CSENV 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 professions such 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.
 - 3 - AVS 150 Introduction to Animal Science
 - 1 - AVS 151 Introduction to Animal Science Lab.
 - 3 - BIOL 103 General Biology I *and*
 - 1 - BIOL 105 General Biology Lab. I *or*
 - 5 - BIOL 110 Principles of Biology I
 - 4 - CH 101 General Chemistry
 - 3 - Arts and Humanities (Non-Lit.) Requirement¹
- 16-17

Second Semester

- 3 - BIOL 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 Requirement²
- 16-18

Sophomore Year

First Semester

- 3 - ACCT 201 Financial Accounting Concepts
 - 3 - AP EC 202 Agricultural Economics
 - 3 - AVS 312 Forages and Grazing Systems *or*
 - 3 - CSENV 423 Field Crops—Forages
 - 3 - Arts and Humanities (Literature) Requirement¹
 - 2 - AVS Techniques Requirement²
- 14

Second Semester

- 2 - AVS Evaluation Requirement³
 - 2 - AVS Techniques Requirement²
 - 6 - Departmental Requirement⁴
 - 3 - Social Science Requirement¹
 - 3 - Elective
- 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 - AVS Experience-Based Activity⁵
 - 3 - Departmental Requirement⁴
- 16

Second Semester

- 3 - AVS 375 Applied Animal Nutrition
 - 3 - AVS 413 Animal Products
 - 3 - AVS 453 Animal Reproduction
 - 3 - AVS Experience-Based Activity⁵
 - 3 - Departmental Requirement⁴
- 15

Senior Year

First Semester

- 3 - AVS 310 Animal Health
 - 3 - AVS 415 Contemporary Issues in Animal Sci.
 - 3 - AVS Experience-Based Activity⁵
 - 2 - AVS Techniques Requirement²
 - 3 - Elective
- 14

Second Semester

- 2 - AVS 406 Seminars and Related Topics
 - 3 - AVS 410 Domestic Animal Behavior
 - 4 - AVS 417 Animal Agribusiness Development
 - 4 - AVS 450 Animal Production Systems
 - 3 - AVS Experience-Based Activity⁵
- 16

123–126 Total Semester Hours

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

²AVS 200, 201, 203, 204, 206, or 209

³AVS 302, 309, 311, or 323

⁴Select 12 hours from any graded (not pass/fail) 300- or 400-level course and/or any of the following courses: CSENV 202, ECON 212, LAW 322, MGT 201, 307, MKT 301, SPAN 101, 102

⁵AVS 360, 441, 442, 443, or 491

EQUINE BUSINESS CONCENTRATION

Freshman Year

First Semester

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

Second Semester

- 2 - AVS 204 Horse Care Techniques
 - 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
- 16-18

Sophomore Year

First Semester

- 3 - ACCT 201 Financial Accounting Concepts
 - 3 - AP EC 202 Agricultural Economics
 - 3 - AVS 312 Forages and Grazing Systems *or*
 - 3 - CSENV 423 Field Crops—Forages
 - 3 - Arts and Humanities (Literature) Requirement¹
 - 2 - AVS Techniques Requirement²
- 14

Second Semester

- 2 - AVS 309 Principles of Equine Evaluation
 - 2 - AVS Techniques Requirement²
 - 6 - Departmental Requirement³
 - 3 - Social Science Requirement¹
 - 3 - Elective
- 16

Junior Year

First Semester

- 2 - AVS 205 Horsemanship I *or*
 - 2 - AVS 207 Horsemanship II
 - 4 - AVS 301 Anat. and Phys. of Domestic Animals
 - 3 - AVS 310 Animal Health
 - 3 - AVS 370 Principles of Animal Nutrition
 - 3 - AVS 470 Animal Genetics
- 15

Second Semester

- 3 - AVS 375 Applied Animal Nutrition
 - 3 - AVS 453 Animal Reproduction
 - 2 - AVS Experience-Based Activity⁴
 - 2 - AVS Techniques Requirement²
 - 3 - Departmental Requirement³
 - 3 - Elective
- 16

Senior Year**First Semester**

- 2 - AVS 406 Seminars and Related Topics
 - 3 - AVS 415 Contemporary Issues in Animal Sci.
 - 3 - AVS Experience-Based Activity⁴
 - 3 - Departmental Requirement³
 - 3 - Elective
-
- 14

Second Semester

- 3 - AVS 410 Domestic Animal Behavior
 - 4 - AVS 412 Advanced Equine Management
 - 4 - AVS 416 Equine Exercise Physiology
 - 4 - AVS 417 Animal Agribusiness Development
-
- 15

122–125 Total Semester Hours

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

²AVS 200, 201, 203, 206, or 209

³Select 12 hours from any graded (not pass/fail) 300- or 400-level course and/or any of the following courses: AVS 208, 385, 386, 444, CSENV 202, ECON 212, LAW 322, MGT 201, 307, MKT 301, SPAN 101, 102

⁴AVS 360, 441, 442, 443, or 491

PREVETERINARY AND SCIENCE CONCENTRATION**Freshman Year****First Semester**

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

Second Semester

- 3 - BIOL 104 General Biology II *and*
 - 1 - BIOL 106 General Biology Lab. II *or*
 - 5 - BIOL 111 Principles of Biology II
 - 4 - CH 102 General Chemistry
 - 3 - ENGL 103 Accelerated Composition
 - 3 - MTHSC 102 Intro. to Math. Analysis *or*
 - 4 - MTHSC 106 Calculus of One Variable I
 - 2 - AVS Techniques Requirement²
-
- 16-18

Sophomore Year**First Semester**

- 3 - CH 223 Organic Chemistry
 - 1 - CH 227 Organic Chemistry Lab.
 - 3 - PHYS 207 General Physics I
 - 1 - PHYS 209 General Physics I Lab.
 - 3 - Arts and Humanities (Literature) Requirement¹
 - 2 - AVS Techniques Requirement²
 - 3 - Social Science Requirement¹
-
- 16

Second Semester

- 3 - CH 224 Organic Chemistry
 - 1 - CH 228 Organic Chemistry Lab.
 - 3 - EX ST 301 Introductory Statistics *or*
 - 3 - MTHSC 203 Elem. Statistical Inference
 - 3 - PHYS 208 General Physics II
 - 1 - PHYS 210 General Physics II Lab.
 - 2 - AVS Evaluation Requirement³ *or*
 - 3 - Oral Communication Requirement¹
 - 2 - AVS Techniques Requirement²
-
- 15-16

Junior Year**First Semester**

- 4 - AVS 301 Anat. and Phys. of Domestic Animals
 - 3 - AVS 310 Animal Health
 - 3 - AVS 370 Principles of Animal Nutrition
 - 3 - BIOCH 301 Molecular Biochemistry *or*
 - 3 - BIOCH 305 Essential Elements of Bioch. *or*
 - 3 - BIOCH 406 Physiological Chemistry
 - 3 - Departmental Requirement⁴
-
- 16

Second Semester

- 3 - AVS 375 Applied Animal Nutrition
 - 3 - AVS 453 Animal Reproduction
 - 3 - GEN 300 Fundamental Genetics⁵
 - 1 - GEN 301 Fundamental Genetics Lab.⁵
 - 4 - MICRO 305 General Microbiology⁵
-
- 14

Senior Year**First Semester**

- 2 - AVS 406 Seminars and Related Topics
 - 3 - AVS 415 Contemporary Issues in Animal Sci.
 - 2 - AVS Techniques Requirement²
 - 3 - Departmental Requirement⁴
 - 3 - Elective
-
- 13

Second Semester

- 3 - AVS 410 Domestic Animal Behavior
 - 3 - AVS 413 Animal Products
 - 3 - AVS Experience-Based Activity⁶
 - 3 - Departmental Requirement⁴
 - 3 - Social Science Requirement¹
-
- 15

121–125 Total Semester Hours

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

²AVS 200, 201, 203, 204, 206, or 209

³AVS 302, 309, 311, and 323 satisfy Oral Communication requirement. Students applying to veterinary school early (junior year) must have received credit for the Oral Communication requirement.

⁴Select nine hours from any graded (not pass/fail) 300- or 400-level course and/or any of the following 100- or 200-level courses: ACCT 201, AP EC 202 *or* ECON 211, ECON 212, CSENV 202, MGT 201, BIOSC 222, 223, SPAN 101, 102

⁵May be taken either semester of the junior year.

⁶AVS 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.

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 both 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. Both the Agribusiness and Community and Economic Development 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 49 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 Requirement¹
 - 3 - Oral Communication Requirement¹
-
- 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.) Requirement¹
 - 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) Requirement¹
 - 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 Requirement¹
- 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 Requirement²
- 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 - Agribusiness Requirement²
- 15

Senior Year**First Semester**

- 3 - AP EC 409 Commodity Futures Markets
 - 3 - AP EC 460 Agricultural Finance
 - 3 - ECON 302 Money and Banking *or*
3 - ECON 315 Intermediate Macroeconomics
 - 3 - LAW 322 Legal Environment of Business
 - 3 - Agribusiness Requirement²
- 15

Second Semester

- 3 - AP EC 452 Agricultural Policy
 - 3 - AP EC 456 Prices
 - 3 - AP EC 490 Selected Topics
 - 6 - Agribusiness Requirement²
- 15

120 Total Semester Hours

¹See General Education Requirements.²See advisor.**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.) Requirement¹
 - 3 - Science and Tech. in Society Requirement¹
 - 3 - Social Science Requirement²
- 15

Second Semester

- 3 - ACCT 201 Financial Accounting Concepts
 - 3 - ENGL 103 Accelerated Composition
 - 4 - Natural Science Requirement¹
 - 5 - Elective
- 15

Sophomore Year**First Semester**

- 3 - EX ST 301 Introductory Statistics
 - 3 - Arts and Humanities (Literature) Requirement¹
 - 3 - Microeconomics Requirement³
 - 3 - Oral Communication Requirement¹
 - 3 - Elective
- 15

Second Semester

- 3 - C R D (AP EC) 357 Natural Res. Economics
 - 3 - ECON 212 Principles of Macroeconomics
 - 3 - PO SC 302 State and Local Government
 - 3 - ENGL 314 Technical Writing
 - 3 - Behavioral Science Requirement⁴
- 15

Junior Year**First Semester**

- 3 - C R D 335 Leadership in Organizations and Communities
 - 3 - ECON (MGT) 306 Managerial Economics *or*
3 - ECON 314 Intermediate Microeconomics
 - 3 - Behavioral Science Requirement⁴
 - 3 - Emphasis Area Requirement⁵
 - 3 - Marketing Requirement⁶
- 15

Second Semester

- 3 - AP EC 352 Public Finance
 - 3 - C R D 336 Community Development Methods
 - 3 - Behavioral Science Requirement⁴
 - 3 - Emphasis Area Requirement⁵
 - 3 - Planning Requirement⁵
- 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 Requirement⁵
- 15

Second Semester

- 3 - C R D (AP EC) 412 Regional Economic Development Theory and Policy
 - 3 - Behavioral Science Requirement⁴
 - 3 - Comm. and Econ. Dev. Practice/Applications⁷
 - 6 - Emphasis Area Requirement⁵
- 15

120 Total Semester Hours

¹See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.²PO SC 101, 102, or SOC 201³AP EC 202, 257, or ECON 211⁴Select from 300-400-level courses in ANTH, AP EC, C R D, C R P, ECON, MGT, MKT, PO SC, PSYCH, or SOC.⁵See advisor.⁶AP EC 309, 351, or MKT 301⁷AP EC 490, C R D (AP EC) 491, or 492**BIOCHEMISTRY****Bachelor of Science**

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

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

Freshman Year**First Semester**

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

Second Semester

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

Sophomore Year**First Semester**

- 3 - CH 223 Organic Chemistry
- 1 - CH 227 Organic Chemistry Lab.
- 3 - GEN 302 Molecular and General Genetics
- 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 Requirement¹

15-16

Second Semester

- 3 - BIOCH 301 Molecular Biochemistry
 - 3 - CH 224 Organic Chemistry
 - 1 - CH 228 Organic Chemistry Lab.
 - 3 - COMM 150 Intro. to Human Comm. *or*
3 - COMM 250 Public Speaking
 - 3 - PHYS 221 Physics with Calculus II
 - 1 - PHYS 223 Physics Lab. II
 - 3 - Arts and Humanities (Literature) Requirement²
-

Junior Year**First Semester**

- 3 - BIOCH 431 Physical Approach to Biochem.
 - 2 - BIOCH 433 General Biochemistry Lab. I
 - 3 - CH 330 Introduction to Physical Chemistry³
 - 3 - Science Requirement⁴
 - 5 - Elective
-

Second Semester

- 3 - BIOCH 432 Biochemistry of Metabolism
 - 2 - BIOCH 434 General Biochemistry Lab. II
 - 3 - BIOCH 436 Molecular Biol.: Genes to Proteins
 - 3 - PHIL 326 Science and Values
 - 3 - Science Requirement⁴
-

Senior Year**First Semester**

- 3 - BIOSC 461 Cell Biology
 - 3 - GEN (BIOCH) 440 Bioinformatics
 - 3 - Social Science Requirement²
 - 5 - Elective⁵
-

Second Semester

- 2 - BIOCH 493 Senior Seminar
 - 3 - Science Requirement⁴
 - 3 - Social Science Requirement²
 - 6 - Elective⁵
-

120-121 Total Semester Hours

¹EX ST 301, MTHSC 206, 301, or 302²See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.³CH 331 may be substituted.⁴BIOCH 222, 223, or any courses at 300 level or above in BIOCH, BIO E, BIOSC, CH, EX ST, GEN, MICRO, MTHSC, and PHYS. A maximum of three credit hours may be selected from undergraduate research courses (491, creative inquiry, or similar courses). Other courses must be approved by advisor.⁵A two-semester sequence of a foreign language is 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 higher.
2. A minimum grade of C is required in all science and mathematics courses. No student may exceed a maximum of two attempts, excluding a W, to complete successfully any science or mathematics course.

BIOLOGICAL SCIENCES**Bachelor of Science**

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

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

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

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

Freshman Year**First Semester**

- 5 - BIOL 110 Principles of Biology I¹
 - 1 - BIOSC 101 Frontiers in Biology I
 - 4 - CH 101 General Chemistry
 - 3 - COMM 150 Intro. to Human Communication
 - 4 - MTHSC 106 Calculus of One Variable I
-

Second Semester

- 5 - BIOL 111 Principles of Biology II¹
 - 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 Requirement²
 - 3 - Arts and Humanities (Literature) Requirement³
 - 4 - Biochemistry or Genetics Requirement⁴
-

Second Semester

- 3 - CH 224 Organic Chemistry *or*
3 - Major Requirement⁵
 - 4 - Animal or Plant Diversity Requirement²
 - 4 - Biochemistry or Genetics Requirement⁴
 - 4 - Major Requirement⁵
-

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.) Requirement³
 - 5 - Major Requirement⁵
 - 3 - Social Science Requirement³
-

Senior Year**First Semester**

- 2 - BIOSC 493 Senior Seminar
 - 13 - Major Requirement⁵
-

Second Semester

- 12 - Major Requirement⁵
 - 3 - Social Science Requirement³
-

124 Total Semester Hours

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

²At least one lecture and associated laboratory must be completed for both animal diversity (BIOSC 302/306 or BIOSC 303/307) and for plant diversity (BIOSC 304/308, BIOSC 305/309, BIOSC 320, or BIOSC 406/407).

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

⁴At least one lecture and associated laboratory must be completed for both biochemistry (BIOCH 301/302 or 305/306) and for genetics (GEN 300/301 or 302/303). CH 228 may be substituted for BIOCH 302 or 306.

⁵See advisor. Select one lecture/lab combination from each of the following fields:

Ecology—BIOSC 443/444, 441/445, 446/447, 470/471

Physiology—BIOSC 401/402, 459/460, 475/476

The remaining courses may be selected from BIOCH 302, MTHSC 301, or BIOSC or MICRO courses at the 300 level or higher.

ENTOMOLOGY EMPHASIS AREA

See Bachelor of Science curriculum for freshman year requirements.

Sophomore Year

First Semester

- 3 - CH 223 Organic Chemistry *and*
 - 1 - CH 227 Organic Chemistry Lab. *or*
 - 4 - CH 201 Survey of Organic Chemistry
 - 4 - ENT (BIOSC) 301 Insect Biol. and Diversity
 - 3 - Arts and Humanities (Literature) Requirement¹
 - 4 - Biochemistry or Genetics Requirement²
- 15

Second Semester

- 3 - BIOSC 304 Biology of Plants *and*
 - 1 - BIOSC 308 Biology of Plants Practicum *or*
 - 3 - BIOSC 305 Biology of Algae and Fungi *and*
 - 1 - BIOSC 309 Algae/Fungi Practicum
 - 3 - CH 224 Organic Chemistry *or*
 - 3 - Major Requirement³
 - 4 - Biochemistry or Genetics Requirement²
 - 4 - Major Requirement³
- 15

Junior Year

First Semester

- 3 - BIOSC 335 Evolutionary Biology
 - 3 - ENGL 315 Scientific Writing and Comm.
 - 3 - PHYS 207 General Physics I *and*
 - 1 - PHYS 209 General Physics I Lab. *or*
 - 3 - PHYS 122 Physics with Calculus I *and*
 - 1 - PHYS 124 Physics Lab. I
 - 4 - Entomology Requirement⁴
- 14

Second Semester

- 3 - PHYS 208 General Physics II *and*
 - 1 - PHYS 210 General Physics II Lab. *or*
 - 3 - PHYS 221 Physics with Calculus II *and*
 - 1 - PHYS 223 Physics Lab. II
 - 3 - Arts and Humanities (Non-Lit.) Requirement¹
 - 3 - Entomology Requirement⁴
 - 3 - Major Requirement³
 - 3 - Social Science Requirement¹
- 16

Senior Year

First Semester

- 3 - BIOSC 461 Cell Biology
 - 2 - BIOSC 462 Cell Biology Lab.
 - 2 - BIOSC 493 Senior Seminar
 - 4 - Entomology Requirement⁴
 - 4 - Major Requirement³
- 15

Second Semester

- 3 - Entomology Requirement⁴
 - 9 - Major Requirement³
 - 3 - Social Science Requirement¹
- 15

124 Total Semester Hours

¹See General Education Requirements. Six of these credits hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

²At least one lecture and associated laboratory must be completed for both biochemistry (BIOCH 301/302 or 305/306) and for genetics (GEN 300/301 or 302/303). CH 228 may be substituted for BIOCH 302 or 306.

³See advisor. Select one lecture/lab combination from each of the following fields. BIOSC 475 and 476 are recommended to satisfy the Physiology Requirement.

Ecology—BIOSC 443/444, 441/445, 446/447, 470/471

Physiology—BIOSC 401/402, 459/460, 475/476

The remaining courses may be selected from BIOCH 302, MTHSC 301, or any BIOSC or MICRO courses at the 300 level or higher.

⁴ENT (BIOSC) 400, (BIOSC) 415, and seven additional credits selected from ENT 300, 308, 401, 404/409, 407, (BIOSC) 436, (BIOSC) 455, (BIOSC, W F B) 469, 490, (GEN) 495, PL PA (ENT) 406

PREPHARMACY EMPHASIS AREA

Freshman Year

First Semester

- 3 - BIOL 103 General Biology I¹
 - 1 - BIOL 105 General Biology Lab. I¹
 - 1 - BIOSC 101 Frontiers in Biology I
 - 4 - CH 101 General Chemistry
 - 3 - COMM 150 Intro. to Human Communication
 - 4 - MTHSC 106 Calculus of One Variable I
- 16

Second Semester

- 3 - BIOL 104 General Biology II¹
 - 1 - BIOL 106 General Biology Lab. II¹
 - 1 - BIOSC 102 Frontiers in Biology II
 - 4 - CH 102 General Chemistry
 - 3 - ENGL 103 Accelerated Composition
 - 4 - MTHSC 111 Calculus II for Biologists
- 16

Sophomore Year

First Semester

- 3 - CH 223 Organic Chemistry
 - 1 - CH 227 Organic Chemistry Lab.
 - 4 - Animal or Plant Diversity Requirement²
 - 3 - Arts and Humanities (Literature) Requirement³
 - 3-4 - Biochemistry or Genetics Requirement⁴
- 14-15

Second Semester

- 3 - CH 224 Organic Chemistry
 - 1 - CH 228 Organic Chemistry Lab.
 - 4 - MICRO 305 General Microbiology
 - 4 - Animal or Plant Diversity Requirement²
 - 4-3 - Biochemistry or Genetics Requirement⁴
- 16-15

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
- 15

Second Semester

- 3 - PHYS 208 General Physics II *and*
 - 1 - PHYS 210 General Physics II Lab. *or*
 - 3 - PHYS 221 Physics with Calculus II *and*
 - 1 - PHYS 223 Physics Lab. II
 - 3 - Arts and Humanities (Non-Lit.) Requirement³
 - 3 - Economics Requirement⁵
 - 6 - Major Requirement⁶
- 16

Senior Year

First Semester

- 4 - BIOSC 315 Functional Human Anatomy
 - 2 - BIOSC 493 Senior Seminar
 - 10 - Major Requirement⁶
- 16

Second Semester

- 4 - Animal Physiology Requirement⁷
 - 8 - Major Requirement⁶
 - 3 - Social Science Requirement³
- 15

124 Total Semester Hours

¹Prepharmacy programs require BIOL 103/105 and 104/106 or equivalent; however, BIOL 110 and 111 may substitute. The additional 1-2 credit hours will be subtracted from Major Requirement credits.

²At least one lecture and associated laboratory must be completed for both animal diversity (BIOSC 302/306 or BIOSC 303/307) and for plant diversity (BIOSC 304/308, BIOSC 305/309, BIOSC 320, or BIOSC 406/407).

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

⁴One lecture must be completed for biochemistry (BIOCH 301 or 305) and one lecture and associated laboratory for genetics (GEN 300/301 or 302/303).

⁵ECON 200, 211, or 212

⁶See advisor. Select one lecture/lab combination in ecology (BIOSC 443/444, 441/445, 446/447, 470/471). The remaining courses may be selected from BIOCH 302, MTHSC 301, or any BIOSC or MICRO courses at the 300 level or higher.

⁷BIOSC 316, 459/460, or 475/476

QUANTITATIVE BIOLOGY EMPHASIS AREA

See Bachelor of Science curriculum for freshman year requirements.

Sophomore Year

First Semester

- 3 - CH 223 Organic Chemistry *and*
 - 1 - CH 227 Organic Chemistry Lab. *or*
 - 4 - CH 201 Survey of Organic Chemistry
 - 4 - Animal or Plant Diversity Requirement¹
 - 4 - Biochemistry or Genetics Requirement²
 - 3 - Partial Differential Equations Requirement³
- 15

Second Semester

- 3 - CH 224 Organic Chemistry *or*
 - 3 - Major Requirement⁴
 - 3 - EX ST 301 Introductory Statistics I
 - 4 - Animal or Plant Diversity Requirement¹
 - 4 - Biochemistry or Genetics Requirement²
 - 3 - Major Requirement⁴
- 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 122 Physics with Calculus I *and*
 - 1 - PHYS 124 Physics Lab. I
 - 3 - Major Requirement⁴
-
- 16

Second Semester

- 4 - BIOSC 428 Quantitative Biology
 - 3 - BIOSC 461 Cell Biology
 - 2 - BIOSC 462 Cell Biology Lab.
 - 3 - PHYS 208 General Physics II *and*
 - 1 - PHYS 210 General Physics II Lab. *or*
 - 3 - PHYS 221 Physics with Calculus II *and*
 - 1 - PHYS 223 Physics Lab. II
 - 3 - Social Science Requirement⁵
-
- 16

Senior Year**First Semester**

- 2 - BIOSC 493 Senior Seminar
 - 3 - GEN 440 Bioinformatics
 - 3 - Arts and Humanities (Literature) Requirement⁵
 - 7 - Major Requirement⁴
-
- 15

Second Semester

- 1 - BIOSC 491 Undergraduate Research
 - 3 - Arts and Humanities (Non-Lit.) Requirement⁵
 - 5 - Major Requirement⁴
 - 3 - Social Science Requirement⁵
-
- 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 and associated laboratory must be completed for both biochemistry (BIOCH 301/302 or 305/306) and for genetics (GEN 300/301 or 302/303). CH 228 may be substituted for BIOCH 302 or 306.

³See advisor.

⁴See advisor. Select one lecture/lab combination from each of the following fields:

Ecology—BIOSC 443/444, 441/445, 446/447, 470/471

Physiology—BIOSC 401/402, 459/460, 475/476

The remaining courses may be selected from BIOCH 302, or BIOSC or MICRO courses at the 300 level or higher.

⁵See General Education Requirements. Six of these credits must also satisfy the Cross-Cultural Awareness and the Science and Technology in Society Requirements.

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 Chemistry¹ *and*
 - 1 - CH 227 Organic Chemistry Lab.¹ *or*
 - 4 - CH 201 Survey of Organic Chemistry
 - 4 - Animal or Plant Diversity Requirement²
 - 4 - Biochemistry or Genetics Requirement³
-
- 15

Second Semester

- 3 - CH 224 Organic Chemistry¹ *or*
 - 3 - Major Requirement⁴
 - 4 - Animal or Plant Diversity Requirement²
 - 4 - Biochemistry or Genetics Requirement³
 - 4 - Major Requirement⁴
-
- 15

Junior Year**First Semester**

- 3 - BIOSC 335 Evolutionary Biology
 - 3 - ENGL 315 Scientific Writing and Comm.
 - 3 - PHYS 207 General Physics I *and*
 - 1 - PHYS 209 General Physics I Lab. *or*
 - 3 - PHYS 122 Physics with Calculus I *and*
 - 1 - PHYS 124 Physics Lab. I
 - 3 - Major Requirement⁴
-
- 16

Second Semester

- 3 - PHYS 208 General Physics II *and*
 - 1 - PHYS 210 General Physics II Lab. *or*
 - 3 - PHYS 221 Physics with Calculus II *and*
 - 1 - PHYS 223 Physics Lab. II
 - 3 - Arts and Humanities (Literature) Requirement⁵
 - 4 - Major Requirement⁴
 - 3 - Social Science Requirement⁵
-
- 14

Senior Year**First Semester**

- 3 - BIOSC 461 Cell Biology
 - 2 - BIOSC 462 Cell Biology Lab.
 - 2 - BIOSC 493 Senior Seminar
 - 3 - CH 313 Quantitative Analysis
 - 1 - CH 317 Quantitative Analysis Lab.
 - 3 - Major Requirement⁴
-
- 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.) Requirement⁵
 - 4 - Major Requirement⁴
 - 3 - Social Science Requirement⁵
 - 3 - Toxicology Requirement⁶
-
- 16

124 Total Semester Hours

¹CH 223/227 and 224 are recommended.

²At least one lecture and associated laboratory must be completed for both biochemistry (BIOCH 302/306 or BIOSC 303/307) and for plant diversity (BIOSC 304/308, BIOSC 305/309, BIOSC 320, or BIOSC 406/407).

³At least one lecture and associated laboratory must be completed for both biochemistry (BIOCH 301/302 or 305/306) and for genetics (GEN 300/301 or 302/303). CH 228 may be substituted for BIOCH 302 or 306.

⁴See advisor. Select one lecture/lab combination from each of the following fields. BIOSC 459/460 or 475/476 are recommended to satisfy the Physiology Requirement.

Ecology—BIOSC 443/444, 441/445, 446/447, 470/471

Physiology—BIOSC 401/402, 459/460, 475/476

The remaining courses may be selected from BIOCH 302, MTHSC 301, or any BIOSC or MICRO courses at the 300 level or higher.

⁵See General Education Requirements. Six of these credits hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

⁶Any 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/Secondary Education

The Bachelor of Arts Degree in Biological Sciences and Secondary Education—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 108 for the curriculum.

Freshman Year**First Semester**

- 5 - BIOL 110 Principles of Biology I¹
 - 1 - BIOSC 101 Frontiers in Biology I
 - 4 - CH 101 General Chemistry
 - 3 - COMM 150 Intro. to Human Communication
 - 4 - MTHSC 106 Calculus of One Variable I
-
- 17

Second Semester

- 5 - BIOL 111 Principles of Biology II¹
 - 1 - BIOSC 102 Frontiers in Biology II
 - 4 - CH 102 General Chemistry
 - 3 - ENGL 103 Accelerated Composition
 - 3-4 - Mathematical Sciences Requirement²
-
- 16-17

Sophomore Year**First Semester**

- 4 - CH 201 Survey of Organic Chemistry³
 - 4 - Animal or Plant Diversity Requirement⁴
 - 4 - Biochemistry or Genetics Requirement⁵
 - 4 - Foreign Language Requirement⁶
-
- 16

Second Semester

- 4 - Animal or Plant Diversity Requirement⁴
 - 4 - Biochemistry or Genetics Requirement⁵
 - 4 - Foreign Language Requirement⁶
 - 3 - Minor Requirement⁷
-
- 15

Junior Year**First Semester**

- 3 - BIOSC 335 Evolutionary Biology
 - 3 - BIOSC 461 Cell Biology
 - 3 - ENGL 315 Scientific Writing and Comm.
 - 3 - Foreign Language Requirement⁶
 - 3 - Major Requirement⁸
-
- 15

Second Semester

- 3 - Arts and Humanities (Non-Lit.) Requirement⁹
 - 3 - Foreign Language Requirement⁶
 - 3 - Major Requirement⁸
 - 6 - Minor Requirement⁷
-
- 15

Senior Year**First Semester**

- 2 - BIOSC 493 Senior Seminar
- 3 - PHYS 207 General Physics I
- 1 - PHYS 209 General Physics I Lab.
- 3 - Major Requirement⁸
- 3 - Minor Requirement⁷
- 3 - Social Science Requirement⁹

15

Second Semester

- 3 - PHYS 208 General Physics II
- 1 - PHYS 210 General Physics II Lab.
- 3 - Arts and Humanities (Literature) Requirement⁹
- 3 - Major Requirement⁸
- 3 - Minor Requirement⁷
- 3 - Social Science Requirement⁹

16

125–126 Total Semester Hours

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

²EX ST 301, MTHSC 111 or 301

³CH 223, 227, and 224 may be substituted for CH 201. Most professional health sciences schools require two semesters of organic chemistry with laboratory.

⁴At 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).

⁵At least one lecture and associated laboratory must be completed for both biochemistry (BIOCH 301/302 or 305/306) and for genetics (GEN 300/301 or 302/303). CH 228 may be substituted for BIOCH 302 or 306.

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

⁷See page 60 for approved minors.

⁸See advisor. Select one lecture course from each of the following fields:

Ecology—BIOSC 441, 443, 446, 470

Physiology—BIOSC 316, 401, 459, 475

The remaining courses must be selected from MICRO 305 or any BIOSC courses at the 300 level or higher.

⁹See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

PREREHABILITATION SCIENCES EMPHASIS AREA**Freshman Year****First Semester**

- 3 - BIOL 103 General Biology I¹
- 1 - BIOL 105 General Biology Lab. I¹
- 1 - BIOSC 101 Frontiers in Biology I
- 4 - CH 101 General Chemistry
- 3 - COMM 150 Intro. to Human Communication
- 4 - MTHSC 106 Calculus of One Variable I

16

Second Semester

- 3 - BIOL 104 General Biology II¹
- 1 - BIOL 106 General Biology Lab. II¹
- 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 Requirement²
- 4 - Biochemistry or Genetics Requirement³
- 4 - Foreign Language Requirement⁴

16

Second Semester

- 4 - Animal or Plant Diversity Requirement²
- 4 - Biochemistry or Genetics Requirement³
- 4 - Foreign Language Requirement⁴
- 3 - Minor Requirement⁵

15

Junior Year**First Semester**

- 4 - BIOSC 315 Functional Human Anatomy
- 3 - BIOSC 335 Evolutionary Biology
- 3 - BIOSC 461 Cell Biology
- 3 - ENGL 315 Scientific Writing and Comm.
- 3 - Foreign Language Requirement⁴

16

Second Semester

- 4 - BIOSC 316 Human Physiology
- 3 - Arts and Humanities (Non-Lit.) Requirement⁶
- 3 - Foreign Language Requirement⁴
- 6 - Minor Requirement⁵

16

Senior Year**First Semester**

- 2 - BIOSC 493 Senior Seminar
- 3 - PHYS 207 General Physics I
- 1 - PHYS 209 General Physics I Lab.
- 3 - Major Requirement⁷
- 3 - Minor Requirement⁵
- 3 - Social Science Requirement⁶

15

Second Semester

- 3 - PHYS 208 General Physics II
- 1 - PHYS 210 General Physics II Lab.
- 3 - Arts and Humanities (Literature) Requirement⁶
- 3 - Major Requirement⁷
- 3 - Minor Requirement⁵
- 3 - Social Science Requirement⁶

16

125 Total Semester Hours

¹Prerehabilitation programs require BIOL 103/105 and 104/106 or equivalent; however, BIOL 110 and 111 may substitute. The additional 1–2 credit hours will be subtracted from Major Requirement credits.

²At least one lecture and associated laboratory must be completed for both animal diversity (BIOSC 302/306 or BIOSC 303/307) and for plant diversity (BIOSC 304/308, BIOSC 305/309, BIOSC 320, or BIOSC 406/407).

³At least one lecture and associated laboratory must be completed for both biochemistry (BIOCH 301/302 or 305/306) and for genetics (GEN 300/301 or 302/303).

⁴Four semesters (through 202) in the same modern foreign language are required.

⁵See page 60 for approved minors. Psychology is recommended. The Medical University of South Carolina and other Rehabilitation Sciences programs require PSYCH 201, 340, and 383.

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

⁷See advisor. Select one lecture course in ecology (BIOSC 441, 443, 446, 470). The remaining course must be selected from MICRO 305 or any BIOSC course at the 300 level or higher. BIOSC 478 or 479 is recommended.

Notes:

1. HLTH 350 is recommended.

2. American Heart Association Basic Life Support for Health Professionals is required.

BIOSYSTEMS ENGINEERING**Bachelor of Science**

The Biosystems Engineering program is administered jointly with the College of Engineering and Science. See page 88 for the curriculum.

ENVIRONMENTAL AND NATURAL RESOURCES**Bachelor of Science**

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

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

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

Freshman Year**First Semester**

- 3 - BIOL 103 General Biology I
- 1 - BIOL 105 General Biology Lab. I
- 4 - CH 105 Chemistry in Context I¹
- 1 - E N R 101 Intro. to Env. and Natural Res. I
- 3 - MTHSC 102 Intro. to Mathematical Analysis
- 3 - Elective

15

Second Semester

- 3 - BIOL 104 General Biology II
 - 1 - BIOL 106 General Biology Lab. II
 - 4 - CH 106 Chemistry in Context II¹
 - 3 - ENGL 103 Accelerated Composition
 - 1 - F N R 102 FNR Freshman Portfolio
 - 3 - Computer Science Requirement²
- 15

¹Students planning to take Organic Chemistry should substitute CH 101 and 102 and must satisfy the General Education Science and Technology in Society Requirement through another course.

²AG ED 200, CP SC 120, or other course approved by advisor

CONSERVATION BIOLOGY CONCENTRATION

Sophomore Year**First Semester**

- 3 - AP EC 257 Natural Resources, Environment, and Economics
 - 4 - BIOSC 320 Field Botany *or*
2 - FOR 205 Dendrology *and*
3 - FOR 221 Forest Biology
 - 3 - EX ST 301 Introductory Statistics
 - 3 - Arts and Humanities (Literature) Requirement¹
 - 3 - Oral Communication Requirement¹
- 16-17

Second Semester

- 4 - CSENV 202 Soils
 - 3 - GEN 300 Fundamental Genetics
 - 3 - W F B (BIOSC) 313 Conservation Biology
 - 3 - Physical Environment Requirement²
 - 3 - Taxonomy/Habitat Requirement³
- 16

Junior Year**First Semester**

- 3 - ENGL 314 Technical Writing
 - 3 - Arts and Humanities (Non-Lit.) Requirement¹
 - 3 - Ecology Requirement⁴
 - 3 - Physiology Requirement⁵
 - 3 - Taxonomy/Habitat Requirement³
- 15

Second Semester

- 3 - BIOSC 335 Evolutionary Biology
 - 3 - E N R 302 Natural Resources Measurements
 - 3 - Ecology Requirement⁴
 - 3 - Natural Resource Economics Requirement⁶
 - 3 - Taxonomy/Habitat Requirement³
- 15

Senior Year**First Semester**

- 3 - E N R (BIOSC) 413 Restoration Ecology
 - 3 - FOR (E N R) 434 GIS for Landscape Planning
 - 3 - Conservation Policy/Law Requirement⁷
 - 3 - Internship or Directed Research⁸
 - 3 - Taxonomy/Habitat Requirement³
- 15

Second Semester

- 3 - E N R 450 Conservation Issues
 - 1 - FOR 498 Senior Portfolio *or*
1 - W F B 498 Senior Portfolio
 - 3 - Social Science Requirement¹
 - 6 - Taxonomy/Habitat Requirement³
- 13
- 120-121 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

³AG M 301, BIOSC 302/306, 303/307, 304/308, 305/309, 320, 406/407, 410/411, 442, 464, 468, 472, 477, CSENV 404, ENT (BIOSC) 301, (BIOSC, W F B) 469, FOR 251, 406, GEOL 112, 210, 403, MICRO 403, W F B 418, 440, or 462. At least four of the courses must be laboratories or courses with a required laboratory component.

⁴BIOSC 441, 442, 443, 446, or 470

⁵AVS 301, BIOSC 401/402, 458, 475, or (AVS) 480

⁶AP EC 433, (W F B) 475, C R D (AP EC) 357, or FOR 304

⁷E N R 429, 450, or W F B 430

⁸See advisor.

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 - Ecology Requirement¹ *or*
3 - Minor Requirement
 - 3 - Geography Requirement²
 - 3 - Oral Communication Requirement³
- 15

Second Semester

- 3 - C R D (AP EC) 357 Natural Res. Economics
 - 3 - ECON 212 Principles of Macroeconomics
 - 3 - EX ST 301 Introductory Statistics
 - 3 - Arts and Humanities (Literature) Requirement³
 - 3 - Arts and Humanities (Non-Lit.) Requirement³
- 15

Junior Year**First Semester**

- 3 - E N R 429 Environmental Law and Policy
 - 3 - ECON 314 Intermediate Microeconomics
 - 3 - ENGL 314 Technical Writing
 - 3 - W F B (BIOSC) 313 Conservation Biology *or*
3 - Minor Requirement
 - 3 - Applied Economics Requirement⁴
- 15

Second Semester

- 3 - AP EC 457 Natural Resource Use, Technology, and Policy
 - 3 - ECON 319 Environmental Economics
 - 3 - FOR (E N R) 434 GIS for Landscape Planning
 - 3 - Ecology Requirement II³ *or*
3 - Minor Requirement
 - 3 - Macroeconomics Requirement⁶
- 15

Senior Year**First Semester**

- 3 - C R D (AP EC) 491 Internship, Agribusiness, and Community and Rural Development *or*
3 - Minor Requirement
 - 3 - EX ST 462 Statistics Applied to Economics
 - 9 - Applied Economics Requirement⁴ *or*
6 - Applied Economics Requirement⁴ *and*
3 - Minor Requirement
- 15

Second Semester

- 3 - E N R 450 Conservation Issues
 - 6 - Applied Economics Requirement⁴
 - 3 - Community Development Requirement⁷
 - 4 - Elective *or*
3 - Minor Requirement *and*
1 - Elective
- 16

121 Total Semester Hours

¹BIOSC 441, CSENV 202, EN SP 200, FOR 206, 315, W F B 300, 350, 412, or 416

²GEOG 101, 103, or 106

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

⁴AP EC 313, 352, 402, 409, 413, 433, 452, 456, 458, (W F B) 475, 490, C R D (AP EC) 411, (AP EC) 412, or (AP EC) 491

⁵Select from remaining courses in footnote 1 or BIOSC 302/306, 303/307, 304/308, 305/309, 320, 406/407, 410/411, 464, 468, 472, 477, CSENV 404, ENT (BIOSC) 301, (BIOSC, W F B) 469, FOR 205, 251, 415, GEOL 300, MICRO 403, W F B 418, 430, 440, 450.

⁶ECON 302, 310 or 315

⁷C R D 335 or 336

NATURAL RESOURCES MANAGEMENT CONCENTRATION

Sophomore Year**First Semester**

- 3 - AP EC 257 Natural Resources, Environment, and Economics
 - 4 - CSENV 202 Soils
 - 2 - FOR 205 Dendrology
 - 3 - FOR 221 Forest Biology
 - 3 - Arts and Humanities (Literature) Requirement¹
- 15

Second Semester

- 3 - FOR 206 Forest Ecology
 - 3 - W F B (BIOSC) 313 Conservation Biology
 - 3 - Arts and Humanities (Non-Lit.) Requirement¹
 - 3 - Oral Communication Requirement¹
 - 3 - Social Science Requirement¹
- 15

Junior Year**First Semester**

- 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 - FOR (E N R) 434 GIS for Landscape Planning
 - 5 - Minor Requirement²
- 15

Second Semester

- 3 - C R D (AP EC) 357 Natural Res. Economics
 - 3 - E N R 302 Natural Resources Measurements
 - 3 - GEOL 101 Physical Geology
 - 1 - GEOL 103 Physical Geology Lab.
 - 3 - W F B 350 Principles of Fish and Wildlife Biol.
 - 3 - Minor Requirement²
-
- 16

Senior Year**First Semester**

- 3 - FOR (E N R) 416 Forest Policy and Admin.
 - 3 - W F B 418 Fishery Conservation
 - 3 - W F B 462 Wetland Wildlife Biology
 - 3 - Conservation Colloquium or Internship³
 - 4 - Minor Requirement²
-
- 16

Second Semester

- 3 - E N R 450 Conservation Issues
 - 3 - ENGL 314 Technical Writing
 - 3 - EX ST 301 Introductory Statistics
 - 2 - FOR 406 Forested Watershed Management
 - 1 - FOR 498 Senior Portfolio *or*
 - 1 - W F B 498 Senior Portfolio
 - 3 - Minor Requirement²
-
- 15

122 Total Semester Hours

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

²A minor is required and must be selected from the following: Biochemistry; Biological Sciences; Chemistry; Crop and Soil Environmental Science; Environmental Science and Policy; Forest Resource Management; Geology; Horticulture; Legal Studies; Microbiology; Natural Resource Economics; Nonprofit Leadership; Park and Protected Area Management; Therapeutic Recreation; Travel and Tourism; Urban Forestry; Wildlife and Fisheries Biology.

³See advisor.

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 102 Perspectives in Food and Nutrition Sciences
 - 1 - FD SC 450 Creative Inquiry
 - 3 - PSYCH 201 Introduction to Psychology
-
- 16-17

Sophomore Year**First Semester**

- 4 - CH 201 Survey of Organic Chemistry *or*
 - 3 - CH 223 Organic Chemistry *and*
 - 1 - CH 227 Organic Chemistry Lab.
 - 1 - FD SC 450 Creative Inquiry
 - 3 - PHYS 122 Physics with Calculus I *and*
 - 1 - PHYS 124 Physics Lab. I *or*
 - 4 - PHYS 200 Introductory Physics *or*
 - 3 - PHYS 207 General Physics I *and*
 - 1 - PHYS 209 General Physics I Lab.
 - 3 - Arts and Humanities (Literature) Requirement¹
 - 3 - Social Science Requirement^{1,2}
-
- 15

Second Semester

- 3 - BIOCH 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.) Requirement¹
 - 2 - Elective
-
- 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 Requirement³
 - 2 - Emphasis Area Requirement⁴
-
- 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 Requirement⁴
-
- 15

Senior Year**First Semester**

- 3 - FD SC 306 Food Service Operations *or*
 - 3 - FD SC 307 Restaurant Food Service Mgt.
 - 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 Requirement⁴
-
- 16

Second Semester

- 4 - FD SC 402 Food Chemistry II
 - 4 - FD SC 408 Food Process Engineering
 - 3 - FD SC (PKGSC) 409 Total Quality Mgt. for the Food and Packaging Industries
 - 1 - FD SC 450 Creative Inquiry
 - 3 - Emphasis Area Requirement⁴
-
- 15

122-125 Total Semester Hours

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

²For students undecided on concentration area, AP EC 202, ECON 211, or 212 is recommended.

³FD SC 430 or AVS 413

⁴See advisor.

NUTRITION AND DIETETICS CONCENTRATION

Freshman Year

First Semester

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

Second Semester

- 3 - BIOL 104 General Biology II *and*
 1 - BIOL 106 General Biology Lab. II *or*
 5 - BIOL 111 Principles of Biology II
 4 - CH 102 General Chemistry
 3 - ENGL 103 Accelerated Composition
 1 - FD SC 102 Perspectives in Food and
 Nutrition Sciences
 3 - PSYCH 201 Introduction to Psychology
 15-16

Sophomore Year

First Semester

- 3 - AP EC 202 Agricultural Economics *or*
 3 - ECON 211 Principles of Microeconomics *or*
 3 - ECON 212 Principles of Macroeconomics
 4 - CH 201 Survey of Organic Chemistry *or*
 3 - CH 223 Organic Chemistry *and*
 1 - CH 227 Organic Chemistry Lab.
 1 - NUTR 216 Current Issues in Nutrition
 3 - PHYS 122 Physics with Calculus I *and*
 1 - PHYS 124 Physics Lab. I *or*
 4 - PHYS 200 Introductory Physics *or*
 3 - PHYS 207 General Physics I *and*
 1 - PHYS 209 General Physics I Lab.
 3 - Arts and Humanities (Literature) Requirement¹
 15

Second Semester

- 3 - BIOCH 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.) Requirement¹
 2 - Elective
 15

Junior Year

First Semester

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

Second Semester

- 4 - BIOSC 223 Human Anatomy and Phys. II
 3 - ENGL 304 Business Writing *or*
 3 - ENGL 314 Technical Writing
 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 Nutrition²
 4 - NUTR 424 Medical Nutrition Therapy I
 17

Second Semester

- 4 - FD SC 402 Food Chemistry II
 3 - FD SC (PKGSC) 409 Total Quality Mgt. for
 the Food and Packaging Industries
 1 - FD SC 450 Creative Inquiry
 4 - NUTR 425 Medical Nutrition Therapy II
 3 - NUTR 426 Community Nutrition
 15

122-125 Total Semester Hours

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

²NUTR 419 is recommended for students not pursuing registered dietitian (RD) status.

FOREST RESOURCE MANAGEMENT

Bachelor of Science

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

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

The curriculum, accredited by the Society of American Foresters, provides a strong program in the basic knowledge and skills required of a professional forester. Forest Resource Management majors will select a minor. (See page 60.) 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 page 49 for program details.

Freshman Year

First Semester

- 3 - BIOL 103 General Biology I
 1 - BIOL 105 General Biology Lab. I
 4 - CH 105 Chemistry in Context I¹
 1 - E N R 101 Intro. to Environ. and Natural Res. I
 3 - MTHSC 102 Intro. to Mathematical Analysis
 3 - Oral Communication Requirement²
 15

Second Semester

- 3 - BIOL 104 General Biology II
 1 - BIOL 106 General Biology Lab. II
 3 - ENGL 103 Accelerated Composition
 3 - EX ST 301 Introductory Statistics
 1 - F N R 102 FNR Freshman Portfolio
 4 - Departmental Science Requirement³
 15

Sophomore Year

First Semester

- 4 - F N R 204 Soil Information Systems
 2 - FOR 205 Dendrology
 3 - FOR 221 Forest Biology
 3 - Arts and Humanities (Literature) Requirement²
 3 - Economics Requirement⁴
 15

Second Semester

- 3 - ENGL 314 Technical Writing
 3 - FOR 206 Forestry Ecology
 3 - Arts and Humanities (Non-Lit.) Requirement²
 3 - Social Science Requirement²
 3 - Minor Requirement⁵
 15

Forestry Summer Camp

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

Junior Year

First Semester

- 2 - FOR 302 Forest Biometrics
 3 - FOR 304 Forest Resource Economics
 3 - FOR 341 Wood Procurement Practices in
 the Forest Industry
 4 - FOR 413 Integrated Forest Pest Management
 3 - FOR (E N R) 434 GIS for Landscape Planning
 1 - Internship, Creative Inquiry or Directed
 Research Requirement⁶
 16

Second Semester

- 2 - FOR 308 Remote Sensing in Forestry
 3 - FOR 408 Wood and Paper Products
 3 - FOR 418 Forest Resource Valuation
 4 - FOR 465 Silviculture
 3 - Minor Requirement⁵
 1 - Internship, Creative Inquiry or Directed
 Research Requirement⁶
 16

Senior Year**First Semester**

- 4 - FOR 410 Harvesting Processes
- 3 - FOR (E N R) 416 Forest Policy and Admin.
- 3 - FOR 417 Forest Resource Mgt. and Regulation
- 2 - FOR 431 Rec. Resource Planning in Forest Mgt.
- 3 - Minor Requirement⁵
- 1 - Internship, Creative Inquiry or Directed Research Requirement⁶

16

Second Semester

- 1 - F N R 499 Natural Resources Seminar
- 2 - FOR 406 Forested Watershed Management
- 3 - FOR 415 Forest Wildlife Management
- 2 - FOR 425 Forest Resource Management Plans
- 1 - FOR 498 Senior Portfolio
- 6 - Minor Requirement⁵

15

131 Total Semester Hours

¹CH 101 may be substituted; however, students selecting this option may be required to use elective hours to satisfy the General Education Science and Technology in Society Requirement.

²See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement. (Note: Social Science Requirement must be in an area other than economics or applied economics.)

³See advisor.

⁴AP EC 257, ECON 200, 211, or 212

⁵To be selected by the middle of the sophomore year

⁶F N R 470, 490, or FOR 419

LAND SURVEYING EMPHASIS AREA**Freshman Year****First Semester**

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

15

Second Semester

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

15

Sophomore Year**First Semester**

- 4 - F N R 204 Soil Information Systems
- 2 - FOR 205 Dendrology
- 3 - FOR 221 Forest Biology
- 3 - Arts and Humanities (Literature) Requirement¹
- 3 - Economics Requirement³

15

Second Semester

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

Forestry Summer Camp

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

8

Junior Year**First Semester**

- 2 - FOR 302 Forest Biometrics
- 3 - FOR 304 Forest Resource Economics
- 3 - FOR 341 Wood Procurement Practices in the Forest Industry
- 4 - FOR 413 Integrated Forest Pest Management
- 3 - FOR (E N R) 434 GIS for Landscape Planning

15

Second Semester

- 2 - 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

14

Summer

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

Senior Year**First Semester**

- 4 - FOR 410 Harvesting Processes
- 3 - FOR (E N R) 416 Forest Policy and Admin.
- 3 - FOR 417 Forest Resource Mgt. and Regulation
- 2 - FOR 431 Rec. Resource Plan. in Forest Mgt.
- 3 - FOR 433 GPS Applications

15

Second Semester

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

15

129 Total Semester Hours

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

²See advisor.

³AP EC 257, ECON 200, 211, or 212

⁴Summer internship must be in land surveying.

GENETICS**Bachelor of Science**

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

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

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 - COMM 150 Intro. to Human Comm. or 3 - COMM 250 Public Speaking
- 3 - GEN 302 Molecular and General Genetics
- 3 - PHYS 122 Physics with Calculus I¹
- 1 - PHYS 124 Physics Lab. I¹

14

Second Semester

- 3 - BIOCH 301 Molecular Biochemistry
- 1 - BIOCH 302 Molecular Biochemistry Lab.
- 3 - CH 224 Organic Chemistry
- 1 - CH 228 Organic Chemistry Lab.
- 3 - EX ST 301 Introductory Statistics
- 3 - Arts and Humanities (Literature) Requirement²
- 3 - Social Science Requirement²

17

Junior Year**First Semester**

- 3 - BIOSC 461 Cell Biology
 - 2 - BIOSC 462 Cell Biology Lab.
 - 3 - GEN 410 Fundamentals of Genetics I
 - 1 - GEN 411 Fundamentals of Genetics I Lab.
 - 3 - Science Requirement³
 - 3 - Elective⁴
-
- 15

Second Semester

- 3 - GEN 420 Fundamentals of Genetics II
 - 1 - GEN 421 Fundamentals of Genetics II Lab.
 - 3 - GEN (BIOCH) 440 Bioinformatics
 - 3 - PHIL 326 Science and Values
 - 3 - Genetics Requirement⁵
 - 3 - Elective⁴
-
- 16

Senior Year**First Semester**

- 3 - GEN 450 Comparative Genetics
 - 3 - Science Requirement³
 - 3 - Social Science Requirement²
 - 4 - Elective⁴
-
- 13

Second Semester

- 2 - GEN 493 Senior Seminar
 - 6 - Genetics Requirement⁵
 - 3 - Science Requirement³
 - 4 - Elective⁴
-
- 15

120 Total Semester Hours

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

²See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

³BIOSC 222, 223, PHYS 221, 223, or any courses at 300 level or above in BIOCH, BIO E, BIOSC, CH, EX ST, GEN, MTHSC, MICRO, and PHYS. A maximum of three credit hours may be selected from undergraduate research courses (491, creative inquiry, or similar courses). Other courses must be approved by advisor.

⁴Two semesters of a foreign language are strongly recommended.

⁵AVS 470, BIOCH 436, BIOSC 335, 440, 450, 454, 456, 457, CSENV 405, GEN 470, HORT (BIOSC, GEN) 465, MICRO 415

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 maximum 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
 - 3 - HORT 101 Horticulture
 - 3 - MTHSC 102 Intro. to Mathematical Analysis
 - 3 - Arts and Humanities (Non-Lit.) Requirement¹
 - 3 - Social Science Requirement¹
-
- 16

Second Semester

- 3 - ENGL 103 Accelerated Composition
 - 1 - HORT 102 Experience Horticulture
 - 3 - MTHSC 101 Essential Math. for Informed Soc.
 - 4 - Laboratory Science Requirement²
 - 3 - Social Science Requirement¹
-
- 14

Sophomore Year**First Semester**

- 4 - CH 105 Chemistry in Context I
 - 3 - HORT 303 Landscape Plants
 - 3 - Business Requirement²
 - 4 - Plant Biology Requirement²
-
- 14

Second Semester

- 4 - CH 106 Chemistry in Context II
 - 3 - HORT 304 Annuals and Perennials
 - 3 - HORT 305 Plant Propagation
 - 1 - HORT 306 Plant Propagation Techniques Lab.
 - 3 - Arts and Humanities (Literature) Requirement¹
-
- 14

Summer

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

Junior Year**First Semester**

- 4 - CSENV 202 Soils
 - 3 - Horticulture Specialization Requirement²
 - 3 - Oral Communication Requirement¹
 - 3 - Spanish Language Requirement²
 - 3 - Elective
-
- 16

Second Semester

- 3 - BIOSC 401 Plant Physiology
 - 1 - BIOSC 402 Plant Physiology Lab.
 - 1 - HORT 409 Seminar
 - 3 - Applied Science Requirement²
 - 3 - Business Requirement²
 - 3 - Horticulture Specialization Requirement²
-
- 14

Senior Year**First Semester**

- 6 - Applied Science Requirement²
 - 3 - Business Requirement²
 - 6 - Horticulture Specialization Requirement²
-
- 15

Second Semester

- 3 - Applied Science Requirement²
 - 6 - Horticulture Specialization Requirement²
 - 4 - Laboratory Science Requirement²
 - 1 - Elective
-
- 14

120 Total Semester Hours

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

²See advisor. Select from department-approved list.

³Internship must be completed in one or two semesters. Internship may be done fall, spring, or summer after completing HORT 303. Prior approval is required for internships, and a 2.0 grade-point ratio is required for registration.

Note: Horticulture majors must make a C or better in all HORT-designated courses. Courses may be repeated as often as necessary to achieve the minimum grade.

MICROBIOLOGY**Bachelor of Science**

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

The Microbiology major provides a thorough training in the basic microbiological skills. Further, students receive instruction in mathematics, physics, chemistry, and biochemistry, all essential to the training of a modern microbiologist. Students can prepare for a variety of careers through a wide choice of electives. The Microbiology curriculum with a Biomedicine Concentration is recommended for students planning postgraduate programs. Microbiology graduates may enter graduate school in microbiology, biochemistry, bioengineering, or related disciplines; they may

enter medical or dental schools or pursue careers in one of the many industries or public service departments dependent upon microbiology. Some of these are the fermentation and drug industries, medical and public health microbiology, various food industries, and agriculture.

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

Freshman Year

First Semester

- 5 - BIOL 110 Principles of Biology I¹
 - 4 - CH 101 General Chemistry
 - 3 - COMM 150 Intro. to Human Communication
 - 1 - MICRO 101 Microbes and Human Affairs
 - 4 - MTHSC 106 Calculus of One Variable I
-
- 17

Second Semester

- 5 - BIOL 111 Principles of Biology II¹
 - 4 - CH 102 General Chemistry
 - 3 - ENGL 103 Accelerated Composition
 - 3-4 - Mathematics Requirement²
-
- 15-16

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) Requirement³
 - 3 - Elective⁴
-
- 14

Second Semester

- 3 - BIOCH 301 Molecular Biochemistry⁵
 - 1 - BIOCH 302 Molecular Biochemistry Lab.
 - 3 - CH 224 Organic Chemistry
 - 1 - CH 228 Organic Chemistry Lab.
 - 3 - Arts and Humanities (Non-Lit.) Requirement³
 - 3 - Microbiology Requirement⁶
 - 3 - Social Science Requirement³
-
- 17

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 122 Physics with Calculus I and
 - 1 - PHYS 124 Physics Lab. I
 - 4 - Microbiology Requirement⁶
-
- 15

Second Semester

- 3 - ENGL 315 Scientific Writing and Comm.
 - 4 - MICRO 412 Bacterial Physiology
 - 3 - Microbiology Requirement⁶
 - 3 - Virology Requirement⁷
 - 3-4 - Elective^{4,5}
-
- 16-17

Senior Year

First Semester

- 4 - MICRO 415 Microbial Genetics
 - 4 - Microbiology Requirement⁶
 - 3 - Social Science Requirement³
 - 4 - Elective⁴
-
- 15

Second Semester

- 2 - BIOSC 493 Senior Seminar
 - 4 - Microbiology Requirement⁶
 - 9 - Elective⁴
-
- 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.

²MTHSC 111, 301, or EX ST 301

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

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

⁵BIOCH 305 does not substitute for BIOCH 301.

⁶See advisor. Minimum of 18 credits is required. At least one course must be selected from each of the following fields:

Biomedicine—BIOSC 456/457, GEN 302/303, HLTH 380, MICRO 400, 411, (AVS, BIOSC) 414, 417

Environmental—BIOSC (PL PA) 425, MICRO 402, 403, 410

Food Safety, Industrial, and Technology—GEN (BIOSC, MICRO) 418, MICRO 407, 413

⁷BIOSC 454 or MICRO 416

⁸Students planning on applying to medical/dental schools should take PHYS 208 and 210 during the second semester of the junior year.

BIOMEDICINE CONCENTRATION

Freshman Year

First Semester

- 5 - BIOL 110 Principles of Biology I¹
 - 4 - CH 101 General Chemistry
 - 3 - COMM 150 Intro. to Human Communication
 - 1 - MICRO 101 Microbes and Human Affairs
 - 4 - MTHSC 106 Calculus of One Variable I
-
- 17

Second Semester

- 5 - BIOL 111 Principles of Biology II¹ or
 - 4 - BIOSC 315 Functional Human Anatomy
 - 4 - CH 102 General Chemistry
 - 3 - ENGL 103 Accelerated Composition
 - 3-4 - Mathematics Requirement²
-
- 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) Requirement³
 - 3 - Elective
-
- 14

Second Semester

- 3 - BIOCH 301 Molecular Biochemistry
 - 3 - CH 224 Organic Chemistry
 - 1 - CH 228 Organic Chemistry Lab.
 - 3 - Arts and Humanities (Non-Lit.) Requirement³
 - 3 - Biomedicine Requirement⁴
 - 3 - Social Science Requirement³
-
- 16

Junior Year

First Semester

- 3 - GEN 302 Molecular and General Genetics
 - 1 - GEN 303 Molecular and Gen. Genetics Lab.
 - 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 122 Physics with Calculus I and
 - 1 - PHYS 124 Physics Lab. I
-
- 16

Second Semester

- 3 - ENGL 315 Scientific Writing and Comm.
 - 4 - MICRO 412 Bacterial Physiology
 - 4 - MICRO 415 Microbial Genetics
 - 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
-
- 15

Senior Year

First Semester

- 3 - BIOSC 461 Cell Biology
 - 2 - BIOSC 462 Cell Biology Lab.
 - 3 - MICRO 416 Introductory Virology
 - 3 - Social Science Requirement³
 - 4 - Elective
-
- 15

Second Semester

- 4 - MICRO 411 Pathogenic Bacteriology
 - 3 - MICRO 417 Molecular Mechanisms of Carcinogenesis and Aging
 - 2 - MICRO 493 Senior Seminar
 - 3 - Biomedicine Requirement⁴
 - 3 - Elective
-
- 15
- 122–124 Total Semester Hours

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

²MTHSC 111, 301, or EX ST 301

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

⁴BIOCH 302, 423, 432, BIOSC (PL PA) 425, 456, 457, HLTH 380, MICRO 400, or 491

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 - BIOL 105 General Biology Lab. I
- 4 - CH 101 General Chemistry
- 4 - MTHSC 106 Calculus of One Variable I
- 1 - PKGSC 101 Packaging Orientation¹
- 3 - Social Science Requirement²

16

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
- 2 - PKGSC 102 Intro. to Packaging Science¹
- 1 - PKGSC 103 Packaging Science E-Portfolio

14

Sophomore Year

First Semester³

- 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 - PKGSC 202 Packaging Materials and Manuf.¹
- 2 - PKGSC 203 Packaging Research Fundamentals

14

Second Semester³

- 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 - PKGSC 201 Packaging Perishable Products
- 3 - PKGSC 204 Container Systems¹
- 1 - PKGSC 206 Container Systems Lab.¹
- 2 - PKGSC 220 Package Drawing/CAD

17

Summer

- 0 - CO-OP 101 Cooperative Education⁴

Junior Year

First Semester

- 3 - PKGSC 320 Package Design Fundamentals
- 3 - PKGSC 368 Packaging and Society
- 3 - PKGSC 404 Mechanical Properties of Packages and Principles of Protective Packaging⁷
- 3 - PKGSC 430 Converting for Flexible Packaging
- 1 - PKGSC 454 Product and Package Eval. Lab.⁵
- 3 - Emphasis Area Requirement⁶

16

Second Semester

- 3 - COMM 250 Public Speaking
- 3 - PKGSC 401 Packaging Machinery
- 3 - PKGSC 440 Packaging for Distribution
- 3 - Arts and Humanities (Literature) Requirement²
- 3 - Emphasis Area Requirement⁶

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.
- 3 - Emphasis Area Requirement⁶

14

Second Semester

- 3 - AP EC 202 Agricultural Economics *or*
 - 3 - ECON 211 Principles of Microeconomics
- 1 - PKGSC 403 Packaging Career Preparation
- 3 - PKGSC 420 Package Design and Development
- 3 - Arts and Humanities (Non-Lit.) Requirement²
- 6 - Emphasis Area Requirement⁶

16

122 Total Semester Hours

¹A C or better is required in this course for graduation.

²See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement. *Note:* Social Science Requirement must be in an area other than economics or applied economics. A 200-level or higher foreign language course is recommended to satisfy the Arts and Humanities (Non-Literature) Requirement.

³Students interested in minors or emphasis areas should take any prerequisites in the sophomore year.

⁴At least one 15-week period (six months preferred) of Cooperative Education is required.

⁵PKGSC 404 and 454 must be taken concurrently.

⁶Completion of an approved minor or emphasis area is required. Approved minors are Business Administration, Entrepreneurship, 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, Food and 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 diversity of educational backgrounds and a wide variety of talents and interests. The philosophies of education, the specific preprofessional course requirements, the noncognitive qualifications for enrollment, and the systems of training vary among the professional health schools; but all recognize the desirability of a broad education—a good foundation in the natural sciences, highly developed communication skills, and a solid background in the humanities and social sciences. The absolute requirements for admission to professional health schools are limited to allow latitude for developing individualized undergraduate programs of study; however, most schools of medicine and dentistry require 16 semester hours of chemistry, including organic chemistry, eight hours of biological sciences, eight hours of physics, and six hours of mathematics. These requirements should be balanced with courses in vocabulary building, the humanities, and social sciences. The basic requirements in the natural sciences and as many of the courses in the humanities and social sciences as possible should be completed by the third year so that students will be prepared to take the Dental Admission Test or the Medical College Admission Test prior to applying to a professional school.

Undergraduates may also prepare to study optometry, podiatry, and other health professions. While the basic requirements for these professional schools are essentially the same as those for schools of medicine and dentistry, specific requirements for individual schools in these professions vary somewhat; consequently, interested students are advised to consult with the chief health professionals advisor.

At Clemson, rather than having a separate, organized preprofessional health studies program, students are allowed to major in any curriculum, as long as the basic entrance requirements of the professional health school are fulfilled. These schools are not as concerned about a student's major as they are about academic performance in whichever curriculum the student chooses. Professional health schools have neither preferences nor prejudices concerning any curriculum, which is evidenced by the fact that their entering students represent a broad spectrum of curricula. The emphasis is placed on the student's doing well in the curriculum chosen, and this becomes critical as competition increases for the limited number of places available in professional health schools.

PREPHARMACY

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

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

First Year

First Semester

- 3 - BIOL 103 General Biology I
 - 1 - BIOL 105 General Biology Lab. I
 - 4 - CH 101 General Chemistry
 - 4 - MTHSC 106 Calculus of One Variable I
 - 3 - PSYCH 201 Introduction to Psychology
 - 3 - Arts and Humanities (Non-Lit.) Requirement¹
- 18

Second Semester

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

Second Year

First Semester

- 4 - 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) Requirement²
 - 3 - History or Philosophy Requirement³
- 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 Requirement⁴
- 18

Third Year⁵

72–90 Total Semester Hours

¹A A H 210 *or* MUSIC 210

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

³See advisor.

⁴See General Education Requirements.

⁵Students planning to receive the Bachelor of Science degree upon completion of the program are required to complete a minimum of 18 additional credit hours which must include MICRO 305. See advisor for requirements.

PREREHABILITATION SCIENCES

The Prerehabilitation Sciences major includes concentrations in physical therapy, occupational therapy, communication sciences and disorders, as well as in physician assisting and allied health areas. This curriculum is designed to meet the requirements of the programs in the College of Health Professions at the Medical University of South Carolina and other professional schools. The program requires a minimum of 90 semester hours of undergraduate coursework. In addition, students must apply to a professional school for acceptance into its program.

Because preparation for some of the concentrations, such as the physical therapy, occupational therapy, and communication sciences and disorders programs at MUSC, requires a baccalaureate degree in any area, students are advised to select a major with similar requirements after consultation with the Prerehabilitation 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 Prerehabilitation Sciences program are considered to be enrolled in a degree-seeking program.

First Year

First Semester

- 3 - BIOL 103 General Biology I
 - 1 - BIOL 105 General Biology Lab. I
 - 4 - CH 101 General Chemistry
 - 3 - PSYCH 201 Introduction to Psychology
 - 3 - Arts and Humanities (Non-Lit.) Requirement¹
 - 3 - Science and Technology in Society Req.¹
- 17

Second Semester

- 3 - BIOL 104 General Biology II
 - 1 - BIOL 106 General Biology Lab. II
 - 4 - CH 102 General Chemistry
 - 3 - ENGL 103 Accelerated Composition
 - 3 - EX ST 301 Introductory Statistics
 - 3 - SOC 201 Introduction to Sociology
 - 1 - Elective
- 18

Second Year

First Semester

- 4 - BIOSC 222 Human Anatomy and Phys. I
 - 3 - PHYS 207 General Physics I
 - 1 - PHYS 209 General Physics I Lab.
 - 3 - PSYCH 340 Lifespan Developmental Psych.
 - 3 - Arts and Humanities (Literature) Requirement²
 - 3 - Arts and Humanities Requirement¹
- 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 Requirement³
- 17

Third Year⁴

90 Total Semester Hours

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

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

³See advisor.

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

PREVETERINARY MEDICINE

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

Minimum requirements for admission to a college of veterinary medicine generally include the satisfactory completion of prescribed courses in a well-rounded undergraduate degree program. Specific requirements for admission to the University of Georgia College of Veterinary Medicine include the following undergraduate courses: six credits of English, 14 credits of humanities and social studies, eight credits of physics, eight credits of general biology, eight credits of advanced biology, three credits of biochemistry, and 16 credits of organic and inorganic chemistry. (Chemistry and physics courses must be at the premedical level; they may not be survey courses.)

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

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

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

SOILS AND SUSTAINABLE CROP SYSTEMS

Bachelor of Science

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

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

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

Students with a concentration in Sustainable Crop Production will graduate with comprehensive knowledge to increase farm profits by decreasing the costs of crop and production; build soil tilth and fertility through rotations, multiple cropping, and nutrient cycling; protect the environment by minimizing or

more efficiently using synthetic agrichemicals; manage crop pests and weeds with integrated, ecologically sound strategies; develop strategies for profitable marketing of agricultural commodities; and create a strong, diversified agriculture that is stable through market and weather fluctuations. Graduates can assume positions as self-employed farmers, farm managers, state and federal natural resource managers, research technicians, agricultural industry employees, greenhouse managers, consultants in pest management and sustainable agriculture, field ecology professionals, agritourism industry specialists, extension personnel, or regulatory officers.

Freshman Year

First Semester

- 5 - BIOL 110 Principles of Biology I¹
 - 4 - CH 101 General Chemistry
 - 3 - MTHSC 102 Intro. to Math. Analysis² *or*
4 - MTHSC 106 Calculus of One Variable I²
 - 1 - SSCS 101 Survey of Soils and Sustainable Crop Systems
 - 3 - Arts and Humanities (Non-Lit.) Requirement³
- 16-17

Second Semester

- 5 - BIOL 111 Principles of Biology II¹
 - 4 - CH 102 General Chemistry
 - 3 - ENGL 103 Accelerated Composition
 - 3 - EX ST 301 Introductory Statistics *or*
4 - MTHSC 108 Calculus of One Variable II *or*
4 - MTHSC 207 Multivariable Calculus
 - 1 - SSCS 102 Academic and Professional Dev. I
- 16-17

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

²MTHSC 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.

AGRICULTURAL BIOTECHNOLOGY CONCENTRATION

Sophomore Year

First Semester

- 3 - CH 223 Organic Chemistry
 - 1 - CH 227 Organic Chemistry Lab.
 - 3 - COMM 250 Public Speaking
 - 3 - ECON 200 Economic Concepts¹ *or*
3 - ECON 211 Principles of Microeconomics¹
 - 3 - SSCS 333 Agricultural Genetics
 - 3 - Arts and Humanities (Literature) Requirement²
- 16

Second Semester

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

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 Requirement²
- 16

Second Semester

- 1 - CSENV 350 Practicum
 - 3 - ENGL 315 Scientific Writing and Comm.
 - 3 - PL PA 310 Plant Diseases and People
 - 3 - PL PH (BIOSC) 340 Plant Med. and Magic
 - 1 - SSCS 401 Academic and Professional Dev. II
 - 4 - Emphasis Area Requirement³
- 15

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 Requirement³
- 16

Second Semester

- 2 - CSENV 350 Practicum
 - 3 - CSENV 409 Biology of Invasive Plants
 - 1 - SSCS 451 Agric. Biotech. and Global Society
 - 9 - Emphasis Area Requirement³
- 15

124-126 Total Semester Hours

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

²See General Education Requirements.

³Select from department-approved list. Emphasis Areas include Agricultural Biosystems and Technology; and Agricultural Biotechnology and Global Society.

SOIL AND WATER ENVIRONMENTAL SCIENCE CONCENTRATION

Sophomore Year

First Semester

- 3 - CH 223 Organic Chemistry *and*
 - 1 - CH 227 Organic Chemistry Lab. *or*
4 - CH 201 Survey of Organic Chemistry
 - 4 - CSENV 202 Soils
 - 3 - GEOL 101 Physical Geology
 - 1 - GEOL 103 Physical Geology Lab.
 - 3 - PHYS 207 General Physics I *and*
 - 1 - PHYS 209 General Physics I Lab. *or*
3 - PHYS 122 Physics with Calculus I *and*
1 - PHYS 124 Physics Lab. I
- 16

Second Semester

- 3 - PHYS 208 General Physics II *and*
 1 - PHYS 210 General Physics II Lab. *or*
 3 - PHYS 221 Physics with Calculus II *and*
 1 - PHYS 223 Physics Lab. II
 3 - Arts and Humanities (Literature) Requirement¹
 3 - Cross-Cultural Awareness Requirement¹
 4 - Emphasis Area Requirement²
 14

Junior Year**First Semester**

- 3 - COMM 250 Public Speaking
 4 - MICRO 305 General Microbiology
 5 - Emphasis Area Requirement²
 3 - Plant Science Requirement³
 15

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 Requirement²
 3 - Social Science Requirement¹
 16

Senior Year**First Semester**

- 3 - CSENV 350 Practicum
 2 - CSENV 403 Soil Genesis and Classification
 1 - CSENV 455 Seminar
 3 - Applied Spatial Technology Requirement⁴
 3 - Emphasis Area Requirement²
 3 - Field Scale Environmental Mgt. Requirement⁵
 15

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 Requirement²
 3 - Social Science Requirement¹
 16

124–126 Total Semester Hours

¹See General Education Requirements.

²Select from department-approved list. Emphasis Areas include Soil and Water Quality, Soil Management, and Soil Science.

³BIOSC 441, CSENV 421, 422, 423, (AP EC) 426, or HORT 456

⁴AG M 410, FOR 433, or other course approved by advisor

⁵AG M 402, ENTOX 421, or other course approved by advisor

SUSTAINABLE CROP PRODUCTION CONCENTRATION**Sophomore Year****First Semester**

- 3 - AP EC 202 Agricultural Economics
 3 - CH 223 Organic Chemistry¹
 1 - CH 227 Organic Chemistry Lab.¹
 4 - CSENV 202 Soils
 3 - PL PA 310 Plant Diseases and People
 14

Second Semester

- 3 - AP EC 205 Agriculture and Society
 3 - CH 224 Organic Chemistry¹
 1 - CH 228 Organic Chemistry Lab.¹
 3 - COMM 250 Public Speaking
 3 - SSCS 333 Agricultural Genetics
 3 - Plant Science Requirement²
 16

Junior Year**First Semester**

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

Second Semester

- 3 - BIOSC 401 Plant Physiology
 1 - BIOSC 402 Plant Physiology Lab.
 3 - CSENV 405 Plant Breeding
 3 - CSENV 409 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
 16

Senior Year**First Semester**

- 3 - CSENV 490 Beneficial Soil Organisms in
 Plant Growth
 3 - ENT 401 Insect Pests of Ornamental Plants
 and Shade Trees *or*
 4 - ENT 407 Applied Agricultural Entomology
 6 - Emphasis Area Requirement³
 12-13

Second Semester

- 3 - CSENV 350 Practicum
 3 - CSENV 452 Soil Fertility and Management
 1 - CSENV 453 Soil Fertility Lab.
 1 - CSENV 455 Seminar
 3 - Arts and Humanities (Literature) Requirement⁴
 6 - Emphasis Area Requirement³
 17

123–126 Total Semester Hours

¹CH 223/227 and 224/228 are strongly recommended; however, CH 201 and BIOCH 305/306 may be substituted.

²BIOSC 304, CSENV 422, 423, HORT 310, 455, 456, or other course approved by advisor

³Select from department-approved list. Emphasis Areas include Crop Production; and Integrated Pest Management.

⁴See General Education Requirements.

TURFGRASS**Bachelor of Science**

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

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

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

Freshman Year**First Semester**

- 3 - BIOL 103 General Biology I
 1 - BIOL 105 General Biology Lab. I
 3 - HORT 101 Horticulture
 3 - MTHSC 102 Intro. to Mathematical Analysis
 3 - Arts and Humanities (Non-Lit.) Requirement¹
 3 - Social Science Requirement¹
 16

Second Semester

- 3 - ENGL 103 Accelerated Composition
 1 - HORT 102 Experience Horticulture
 3 - MTHSC 101 Essential Math for Informed Soc.
 4 - Laboratory Science Requirement²
 3 - Social Science Requirement¹
 14

Sophomore Year**First Semester**

- 4 - CH 105 Chemistry in Context I
 3 - HORT 212 Introduction to Turfgrass Culture
 1 - HORT 213 Turfgrass Culture Lab.
 3 - HORT 303 Landscape Plants
 4 - Plant Biology Requirement²
 15

Second Semester

- 4 - CH 106 Chemistry in Context II
 3 - Applied Science Requirement²
 3 - Arts and Humanities (Literature) Requirement¹
 3 - Business Requirement²
 3 - Spanish Language Requirement²
 16

Summer

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

Junior Year**First Semester**

- 4 - CSENV 202 Soils
 - 3 - Applied Science Requirement²
 - 3 - Business Requirement²
 - 3 - Elective
- 13

Second Semester

- 3 - BIOSC 401 Plant Physiology
 - 1 - BIOSC 402 Plant Physiology Lab.
 - 1 - HORT 409 Seminar
 - 3 - HORT 420 Applied Turfgrass Physiology
 - 2 - PL PA (ENT) 406 Diseases and Insects of Turfgrasses
 - 3 - Horticulture Specialization Requirement²
 - 3 - Oral Communication Requirement¹
- 16

Maymester

- 1 - PL PA (ENT) 408 Diseases and Insects of Turfgrasses Lab.

Senior Year**First Semester**

- 3 - HORT 412 Advanced Turfgrass Management
 - 3 - Horticulture Specialization Requirement²
 - 4 - Laboratory Science Requirement²
 - 3 - Soils Requirement²
- 13

Second Semester

- 3 - HORT (CSENV) 433 Landscape and Turf Weed Management
 - 3 - Applied Science Requirement²
 - 3 - Business Requirement²
 - 3 - Horticulture Specialization Requirement²
 - 3 - Soils Requirement²
- 15

122 Total Semester Hours

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

²See advisor. Select from department-approved list.

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

Note: Turfgrass majors must make a C or better in all HORT-designated courses. Courses may be repeated as often as necessary to achieve the minimum grade.

WILDLIFE AND FISHERIES BIOLOGY**Bachelor of Science**

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

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

For students interested in conservation biology, water, and natural resources, the Department of Forestry and Natural Resources also administers the Conservation Biology and Natural Resources Management Concentrations within the Environmental and Natural Resources degree program. See page 49 for program details.

Combined Bachelor of Science/ Master of Science Degree Program

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

Freshman Year**First Semester**

- 3 - BIOL 103 General Biology I
 - 1 - BIOL 105 General Biology Lab. I
 - 4 - CH 105 Chemistry in Context I¹
 - 1 - E N R 101 Intro. to Env. and Natural Res. I
 - 3 - MTHSC 102 Intro. to Mathematical Analysis
 - 3 - Oral Communication Requirement²
- 15

Second Semester

- 3 - BIOL 104 General Biology II
 - 1 - BIOL 106 General Biology Lab. II
 - 4 - CH 106 Chemistry in Context II¹ or
 - 4 - PHYS 200 Introductory Physics¹
 - 3 - ENGL 103 Accelerated Composition
 - 3 - EX ST 301 Introductory Statistics
 - 1 - F N R 102 FNR Freshman Portfolio
- 15

Sophomore Year**First Semester**

- 4 - F N R 204 Soil Information Systems
 - 2 - FOR 205 Dendrology
 - 3 - FOR 221 Forest Biology
 - 3 - W F B 300 Wildlife Biology
 - 1 - W F B 301 Wildlife Biology Lab.
 - 3 - Arts and Humanities (Non-Lit.) Requirement²
- 16

Second Semester

- 3 - BIOSC 303 Vertebrate Biology
 - 3 - E N R 302 Natural Resources Measurements
 - 3 - FOR 206 Forestry Ecology
 - 3 - W F B 350 Principles of Fish and Wildlife Biol.
 - 3 - Social Science Requirement²
- 15

Junior Year**First Semester**

- 4 - BIOSC 320 Field Botany
 - 3 - ENGL 314 Technical Writing
 - 3 - GEN 300 Fundamental Genetics
 - 3 - W F B 410 Wildlife Management Techniques
 - 3 - Arts and Humanities (Literature) Requirement²
- 16

Second Semester

- 3 - W F B (BIOSC) 313 Conservation Biology
 - 3 - W F B 412 Wildlife Management
 - 3 - W F B 416 Fishery Biology
 - 3 - W F B 440 Non-Game Wildlife Management
 - 3 - W F B 462 Wetland Wildlife Biology
- 15

Senior Year**First Semester**

- 3 - AP EC 257 Natural Resources, Environment, and Economics
 - 4 - AVS 301 Anat. and Phys. of Domestic Animals
 - 3 - FOR (E N R) 434 GIS for Landscape Planning
 - 1 - W F B 498 Senior Portfolio
 - 4 - Approved Requirement³
- 15

Second Semester

- 1 - F N R 499 Natural Resources Seminar
 - 3 - W F B 430 Wildlife Conservation Policy
 - 8 - Approved Requirement³
 - 3 - Policy and Law Requirement³
- 15

122 Total Semester Hours

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

²See 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.)

³Select 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.

Accounting	Management
Adult/Extension Education	Management Information Systems
Aerospace Studies	Mathematical Sciences
Agricultural Business Management	Microbiology
Agricultural Mechanization and Business	Military Leadership
American Sign Language Studies	Modern Languages
Animal and Veterinary Sciences	Music
Anthropology	Natural Resource Economics
Athletic Leadership	Nonprofit Leadership
Biochemistry	Packaging Science
Bioengineering	Pan African Studies
Biological Sciences	Park and Protected Area Management
Business Administration	Philosophy
Chemistry	Physics
Cluster	Plant Pathology
Communication Studies	Political Science
Computer Science	Psychology
Crop and Soil Environmental Science	Public Policy
East Asian Studies	Religion
Economics	Russian Area Studies
Education	Science and Technology in Society
English	Screenwriting
Entomology	Sociology
Entrepreneurship	Spanish-American Area Studies
Environmental Engineering	Textiles
Environmental Science and Policy	Theatre
Equine Business— <i>not open to Animal and Veterinary Sciences majors</i>	Therapeutic Recreation
Film Studies	Travel and Tourism
Financial Management	Turfgrass— <i>not open to Horticulture majors</i>
Food Science	Urban Forestry
Forest Products	Wildlife and Fisheries Biology
Forest Resource Management	Women's Studies
Genetics	Writing
Geography	
Geology	See pages 36–39 for details.
Global Politics	
Great Works	
History	
Horticulture— <i>not open to Turfgrass majors</i>	
International Engineering and Science	
Legal Studies	