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 2,700 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 58.)

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.

Freshman Year

First Semester

1 - AG ED 102 Agric. Ed. Freshman Seminar
3 - AG ED 200 Agric. Appl. Educational Tech.
3 - BIOL 103 General Biology I
1 - BIOL 105 General Biology Lab. I
3 - PHIL 102 Introduction to Logic
2 - Emphasis Area Requirement[1]
3-4 - Mathematics Requirement[2]
16-17

Second Semester

1 - AG ED 100 Orientation and Field Experience
3 - AG ED 103 Multiculturalism in Agric. Ed.
3 - AVS 150 Introduction to Animal Science
1 - AVS 151 Introduction to Animal Science Lab.
3 - BIOL 104 General Biology II
1 - BIOL 106 General Biology Lab. II
3 - ENGL 103 Accelerated Composition
15

Sophomore Year

First Semester

3 - AG ED 201 Intro. to Agricultural Education
3 - AG ED 204 Applied Agriculure Calculations
3 - AG ED 355 Team and Organizational Leadership in Food and Fiber Systems
3 - AP EC 202 Agricultural Economics
4 - CH 105 Chemistry in Context I
16

Second Semester

3 - AG ED 203 Teaching Agriscience
3 - AG M 205 Principles of Fabrication
4 - CH 106 Chemistry in Context II
3 - HORT 212 Introduction to Turfgrass Culture
1 - HORT 213 Turfgrass Culture Lab.
3 - Arts and Humanities (Literature) Requirement[3]
17

Junior Year

First Semester

3 - AG ED 303 Mech. Technology for Agric. Ed.
2 - AG M 221 Surveying
3 - ANTH 201 Introduction to Anthropology
4 - CSENV 202 Soils
3 - ED F 302 Educational Psychology
3 - HORT 303 Landscape Plants
18

Second Semester

1 - AG ED 302 Agric. Education Junior Seminar
3 - COMM 150 Intro. to Human Comm. *or*
3 - COMM 250 Public Speaking
3 - HORT 305 Plant Propagation
3 - Advanced Writing Requirement[3]
6 - Emphasis Area Requirement[1]
16

Senior Year

First Semester

3 - AG ED 401 Instructional Methods in Ag. Ed.
3 - AG ED 404 Biotechnology in Agricultural Ed.
6 - Emphasis Area Requirement[1]
12

Second Semester

12 - AG ED 406 Directed Teaching
2 - Emphasis Area Requirement[1]
14

124–125 Total Semester Hours

[1]See advisor. Select one of the folowing emphasis areas by the end of the sophomore year: Teacher Certification, Leadership, Communication.

[2]MTHSC 101, 102, 106, or 203

[3]See General Education Requirements.

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 - BIOL 103 General Biology I
1 - BIOL 105 General Biology Lab. I
4 - CH 105 Chemistry in Context I
3 - MTHSC 102 Intro. to Mathematical Analysis
15

Second Semester

3 - BIOL 104 General Biology II
1 - BIOL 106 General Biology Lab. II
4 - CH 106 Chemistry in Context II
3 - ENGL 103 Accelerated Composition
3 - EX ST 301 Introductory Statistics
1 - Elective
15

Sophomore Year

First Semester
3 - AG M 205 Principles of Fabrication
3 - AP EC 202 Agricultural Economics
4 - PHYS 200 Introductory Physics *or*
3 - PHYS 207 General Physics I *and*
1 - PHYS 209 General Physics I Lab.
3 - Arts and Humanities (Literature) Requirement[1]
2 - Elective
15

Second Semester
3 - ACCT 201 Financial Accounting Concepts
3 - AG M 206 Machinery Management
3 - AG M 303 Calculations for Mechanized Agric.
3 - COMM 250 Public Speaking
2 - E G 209 Intro. to Engr./Comp. Graphics
3 - Minor Requirement[2]
17

Junior Year

First Semester
2 - AG M 221 Surveying
2 - AG M 301 Soil and Water Conservation
3 - AG M 460 Electrical Systems
3 - AP EC 302 Economics of Farm Management
3 - ENGL 304 Business Writing *or*
3 - ENGL 314 Technical Writing
3 - Minor Requirement[2]
16

Second Semester
3 - AG M 406 Mechanical and Hydraulic Systems
3 - AP EC 309 Econ. of Agricultural Marketing
4 - CSENV 202 Soils
3 - Arts and Humanities (Non-Lit.) Requirement[1]
3 - Minor Requirement[2]
16

Senior Year

First Semester
3 - AG M 402 Drainage, Irrigation and Waste Management
3 - AP EC 319 Agribusiness Management
3 - Agriculture Requirement[3]
3 - Social Science Requirement[4]
12

Second Semester
3 - AG M 405 Agricultural Structures and Environmental Control
3 - AG M 410 Precision Agriculture Technology
3 - AG M 452 Mobile Power
3 - AG M 472 Capstone
3 - Minor Requirement[2]
15

121 Total Semester Hours

[1]See General Education Requirements.

[2]See Agricultural Business Management minor or select other approved minor.

[3]See advisor.

[4]See General Education Requirements. This course must also satisfy the Cross-Cultural Awareness 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 AVS
3 - AVS 150 Introduction to Animal Science
1 - AVS 151 Intro. to Animal Science Lab.
3 - BIOL 103 General Biology I *and*
1 - BIOL 105 General Biology Lab. I *or*
5 - BIOL 110 Principles of Biology I
4 - CH 101 General Chemistry
3 - Arts and Humanities (Non-Lit.) Requirement[1]
16-17

Second Semester
3 - BIOL 104 General Biology II *and*
1 - BIOL 106 General Biology Lab. II *or*
5 - BIOL 111 Principles of Biology II
4 - CH 102 General Chemistry
3 - ENGL 103 Accelerated Composition
3 - MTHSC 101 Essen. Math. for Informed Soc. *or*
3 - MTHSC 102 Intro. to Math. Analysis *or*
4 - MTHSC 106 Calculus of One Variable I
2 - AVS Techniques Requirement[2]
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) Requirement[1]
2 - AVS Techniques Requirement[2]
14

Second Semester
2 - AVS Evaluation Requirement[3]
2 - AVS Techniques Requirement[2]
6 - Departmental Requirement[4]
3 - Social Science Requirement[1]
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 Activity[5]
3 - Departmental Requirement[4]
16

Second Semester
3 - AVS 375 Applied Animal Nutrition
3 - AVS 413 Animal Products
3 - AVS 453 Animal Reproduction
3 - AVS Experience-Based Activity[5]
3 - Departmental Requirement[4]
15

Senior Year

First Semester
3 - AVS 310 Animal Health
4 - AVS 417 Animal Agribusiness Development
3 - AVS Experience-Based Activity[5]
2 - AVS Techniques Requirement[2]
3 - Advanced Writing Requirement[1]
15

Second Semester
2 - AVS 406 Seminars and Related Topics
3 - AVS 410 Domestic Animal Behavior
3 - AVS 415 Contemporary Issues in Animal Sci.
4 - AVS 450 Animal Production Systems
3 - AVS Experience-Based Activity[5]
15

123–126 Total Semester Hours

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

[2]AVS 200, 201, 203, 204, 206, or 209

[3]AVS 302, 309, 311, or 323

[4]AG M 402, 405, 410, AP EC 302, 309, 319, 351, 409, 421, 433, 452, 456, 460, AVS 444, 455, CSENV 202, ECON 212, MGT 201, 307, MKT 301, SPAN 101, or 102. Twelve credit hours are required.

[5]AVS 360, 441, 442, 443, or 491

EQUINE BUSINESS CONCENTRATION

Freshman Year

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

Second Semester
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) Requirement[1]
2 - AVS Techniques Requirement[2]
14

Second Semester
2 - AVS 309 Principles of Equine Evaluation
2 - AVS Techniques Requirement[2]
6 - Departmental Requirement[3]
3 - Social Science Requirement[1]
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 Activity[4]
2 - AVS Techniques Requirement[2]
3 - Advanced Writing Requirement[1]
3 - Departmental Requirement[3]
16

Senior Year

First Semester
2 - AVS 406 Seminars and Related Topics
4 - AVS 417 Animal Agribusiness Development
3 - AVS Experience-Based Activity[4]
3 - Departmental Requirement[3]
3 - Elective
15

Second Semester
3 - AVS 410 Domestic Animal Behavior
4 - AVS 412 Advanced Equine Management
3 - AVS 415 Contemporary Issues in Animal Sci.
4 - AVS 416 Equine Exercise Physiology
14

122–125 Total Semester Hours

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

[2]AVS 200, 201, 203, 206, or 209

[3]AG M 402, 405, 410, AP EC 302, 309, 319, 351, 409, 420, 421, 433, 452, 456, 460, AVS 208, 385, 386, 444, CSENV 202, ECON 212, MGT 201, 307, MKT 301, SPAN 101, or 102. Twelve credit hours are required.

[4]AVS 360, 441, 442, 443, or 491

PREVETERINARY AND SCIENCE CONCENTRATION

Freshman Year

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

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

Sophomore Year

First Semester
3 - CH 223 Organic Chemistry
1 - CH 227 Organic Chemistry Lab.
3 - PHYS 207 General Physics I
1 - PHYS 209 General Physics I Lab.
3 - Arts and Humanities (Literature) Requirement[1]
2 - AVS Techniques Requirement[2]
3 - Social Science Requirement[1]
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 Requirement[3] *or*
3 - Oral Communication Requirement[1]
2 - AVS Techniques Requirement[2]
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 Requirement[4]
16

Second Semester
3 - AVS 375 Applied Animal Nutrition
3 - AVS 453 Animal Reproduction
3 - GEN 300 Fundamental Genetics[5]
1 - GEN 301 Fundamental Genetics Lab.[5]
4 - MICRO 305 General Microbiology
14

Senior Year

First Semester
2 - AVS 406 Seminars and Related Topics
3 - Advanced Writing Requirement[1]
3 - AVS Experienced-Based Activity[6]
2 - AVS Techniques Requirement[2]
3 - Departmental Requirement[4]
13

Second Semester
3 - AVS 410 Domestic Animal Behavior
3 - AVS 413 Animal Products
3 - AVS 415 Contemporary Issues in Animal Sci.
3 - Departmental Requirement[4]
3 - Social Science Requirement[1]
15

121–125 Total Semester Hours

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

[2]AVS 200, 201, 203, 204, 206, or 209

[3]Select AVS 302, 309, 311, or 323. One of these courses in combination with AVS 406 will satisfy the General Education Oral Communication Requirement.

[4]ACCT 201, AP EC 202 or ECON 211, BIOSC 222, 223, CSENV 202, ECON 212, MGT 201, SPAN 101, 102, or any graded (not pass/fail) 300–400-level course with advisor's consent.

[5]May be taken either semester of the junior year

[6]AVS 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 which 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 47 for program details.

AGRIBUSINESS EMPHASIS AREA

Freshman Year

First Semester
3 - AP EC 205 Agriculture and Society
2 - C U 101 University Success Skills
3 - MTHSC 102 Intro. to Mathematical Analysis
4 - Natural Science Requirement[1]
3 - Oral Communication Requirement[1]
15

Second Semester
3 - AP EC 202 Agricultural Economics
3 - ENGL 103 Accelerated Composition
3 - EX ST 222 Statistics in Everyday Life
3 - Arts and Humanities (Non-Lit.) Requirement[1]
3 - Elective
15

Sophomore Year

First Semester
3 - ACCT 201 Financial Accounting Concepts
3 - EX ST 301 Introductory Statistics
3 - MGT 201 Principles of Management
3 - Arts and Humanities (Literature) Requirement[1]
3 - Elective
15

Second Semester
3 - ACCT 202 Managerial Accounting Concepts
3 - AP EC 302 Economics of Farm Management
3 - AP EC 308 Quantitative Applied Economics
3 - ECON 212 Principles of Macroeconomics
3 - Social Science Requirement[1]
15

Junior Year

First Semester
3 - AP EC 309 Econ. of Agricultural Marketing *or*
    3 - MKT 301 Principles of Marketing
3 - AP EC 402 Production Economics
3 - ECON (MGT) 306 Managerial Economics *or*
    3 - ECON 314 Intermediate Microeconomics
3 - ENGL 304 Business Writing *or*
    3- ENGL 314 Technical Writing
3 - Agribusiness Requirement[2]
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 Requirement[2]
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 Requirement[2]
15

Second Semester
3 - AP EC 452 Agricultural Policy
3 - AP EC 456 Prices
3 - AP EC 490 Selected Topics
6 - Agribusiness Requirement[2]
15

120 Total Semester Hours

[1]See General Education Requirements.

[2]See 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.) Requirement[1]
3 - Science and Tech. in Society Requirement[1]
3 - Social Science Requirement[2]
15

Second Semester
3 - ACCT 201 Financial Accounting Concepts
3 - ENGL 103 Accelerated Composition
4 - Natural Science Requirement[1]
5 - Elective
15

Sophomore Year

First Semester
3 - EX ST 301 Introductory Statistics
3 - Arts and Humanities (Literature) Requirement[1]
3 - Microeconomics Requirement[3]
3 - Oral Communication Requirement[1]
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 - Advanced Writing Requirement[1]
3 - Behavioral Science Requirement[4]
15

Junior Year

First Semester
3 - C R D 335 Leadership in Organiztions and Communities
3 - ECON (MGT) 306 Managerial Economics *or*
    3 - ECON 314 Intermediate Microeconomics
3 - Behavioral Science Requirement[4]
3 - Emphasis Area Requirement[5]
3 - Marketing Requirement[6]
15

Second Semester
3 - AP EC 352 Public Finance
3 - C R D 336 Community Development Methods
3 - Behavioral Science Requirement[4]
3 - Emphasis Area Requirement[5]
3 - Planning Requirement[5]
15

Senior Year

First Semester
3 - C R D (AP EC) 411 Regional Impact Analysis
3 - EX ST 462 Statistics Applied to Economics
3 - R S (SOC) 459 The Community
6 - Emphasis Area Requirement[5]
15

Second Semester
3 - C R D (AP EC) 412 Regional Economic Development Theory and Policy
3 - Behavioral Science Requirement[4]
3 - Comm. and Econ. Dev. Practice/Applications[7]
6 - Emphasis Area Requirement[5]
15

120 Total Semester Hours

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

[2]PO SC 101, 102, or SOC 201

[3]AP EC 202, 257, or ECON 211

[4]Select from 300–400-level courses in ANTH, AP EC , C R D, C R P, ECON, MGT, MKT, PO SC, PSYCH, or SOC.

[5]See advisor.

[6]AP EC 309, 351, or MKT 301

[7]AP 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 Requirement[1]
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) Requirement[2]
17

Junior Year

First Semester
3 - BIOCH 431 Physical Approach to Biochem.
2 - BIOCH 433 General Biochemistry Lab. I
3 - CH 330 Introduction to Physical Chemistry[3]
3 - ENGL 314 Technical Writing
3 - Science Requirement[4]
2 - Elective
16

Second Semester
3 - BIOCH 432 Biochemistry of Metabolism
2 - BIOCH 434 General Biochemistry Lab. II
3 - BIOCH 436 Nucleic Acid and Protein Biosyn.
3 - PHIL 326 Science and Values
3 - Science Requirement[4]
14

Senior Year

First Semester
3 - BIOCH 491 Directed Research in Biochemistry[5]
3 - BIOSC 461 Cell Biology
3 - GEN (BIOCH) 440 Bioinformatics
3 - Social Science Requirement[2]
4 - Elective[6]
16

Second Semester
3 - BIOCH 491 Directed Research in Biochemistry[5]
2 - BIOCH 493 Senior Seminar
3 - Social Science Requirement[2]
6 - Elective[6]
14

122–123 Total Semester Hours

[1]EX ST 301, MTHSC 206, 301, or 302

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

[3]CH 331 may be substituted.

[4]BIOSC 222, 223, or any courses at 300 level or above in BIO E, BIOSC, CH, EX ST, GEN, MICRO, MTHSC, and PHYS. Other courses must be approved by advisor.

[5]To be taken over two semesters with the same faculty member

[6]A 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 I[1]
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 II[1]
1 - BIOSC 102 Frontiers in Biology II
4 - CH 102 General Chemistry
3 - ENGL 103 Accelerated Composition
4 - MTHSC 108 Calculus of One Variable II
17

Sophomore Year

First Semester
3 - CH 223 Organic Chemistry *and*
1 - CH 227 Organic Chemistry Lab. *or*
4 - CH 201 Survey of Organic Chemistry
4 - Animal or Plant Diversity Requirement[2]
3 - Arts and Humanities (Literature) Requirement[3]
4 - Biochemistry or Genetics Requirement[4]
15

Second Semester
3 - CH 224 Organic Chemistry *or*
3 - Major Requirement[5]
4 - Animal or Plant Diversity Requirement[2]
4 - Biochemistry or Genetics Requirement[4]
4 - Major Requirement[5]
15

Junior Year

First Semester
3 - BIOSC 335 Evolutionary Biology
3 - BIOSC 461 Cell Biology
2 - BIOSC 462 Cell Biology Lab.
3 - ENGL 314 Technical Writing
3 - PHYS 207 General Physics I *and*
1 - PHYS 209 General Physics I Lab. *or*
3 - PHYS 122 Physics with Calculus I *and*
1 - PHYS 124 Physics Lab. I
15

Second Semester
3 - PHYS 208 General Physics II *and*
1 - PHYS 210 General Physics II Lab. *or*
3 - PHYS 221 Physics with Calculus II *and*
1 - PHYS 223 Physics Lab. II
3 - Arts and Humanities (Non-Lit.) Requirement[3]
5 - Major Requirement[5]
3 - Social Science Requirement[3]
15

Senior Year

First Semester
2 - BIOSC 493 Senior Seminar
13 - Major Requirement[5]
15

Second Semester
12 - Major Requirement[5]
3 - Social Science Requirement[3]
15

124 Total Semester Hours

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

[2]At 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 or BIOSC 305/309).

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

[4]At 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.

[5]See 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) Requirement[1]
4 - Biochemistry or Genetics Requirement[2]
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 Requirement[3]
4 - Biochemistry or Genetics Requirement[2]
4 - Major Requirement[3]
15

Junior Year

First Semester
3 - BIOSC 335 Evolutionary Biology
3 - ENGL 314 Technical Writing
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 Requirement[4]
14

Second Semester
3 - PHIL 324 Philosophy of Technology *or*
3 - PHIL 326 Science and Values
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 - Entomology Requirement[4]
3 - Major Requirement[3]
3 - Social Science Requirement[1]
16

Senior Year

First Semester
3 - BIOSC 461 Cell Biology
2 - BIOSC 462 Cell Biology Lab.
2 - BIOSC 493 Senior Seminar
4 - Entomology Requirement[4]
4 - Major Requirement[3]
15

Second Semester
3 - Entomology Requirement[4]
9 - Major Requirement[3]
3 - Social Science Requirement[1]
15

124 Total Semester Hours

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

[2]At 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.

[3]See 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, MICRO 305, or any BIOSC or BOT courses at the 300 level or higher.

[4]ENT (BIOSC) 400, (BIOSC) 415, and seven additional credits selected from ENT 300, 308, 401, 404, 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 I[1]
1 - BIOL 105 General Biology Lab. I[1]
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 II[1]
1 - BIOL 106 General Biology Lab. II[1]
1 - BIOSC 102 Frontiers in 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.
4 - Animal or Plant Diversity Requirement[2]
3 - Arts and Humanities (Literature) Requirement[3]
3-4 - Biochemistry or Genetics Requirement[4]
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 Requirement[2]
4-3 - Biochemistry or Genetics Requirement[4]
16-15

Junior Year

First Semester
3 - BIOSC 335 Evolutionary Biology
3 - BIOSC 461 Cell Biology
2 - BIOSC 462 Cell Biology Lab.
3 - ENGL 314 Technical Writing
3 - PHYS 207 General Physics I *and*
1 - PHYS 209 General Physics I Lab. *or*
3 - PHYS 122 Physics with Calculus I *and*
1 - PHYS 124 Physics Lab. I
15

Second Semester
3 - PHYS 208 General Physics II *and*
1 - PHYS 210 General Physics II Lab. *or*
3 - PHYS 221 Physics with Calculus II *and*
1 - PHYS 223 Physics Lab. II
3 - Arts and Humanities (Non-Lit.) Requirement[3]
3 - Economics Requirement[5]
6 - Major Requirement[6]
16

Senior Year

First Semester
4 - BIOSC 315 Functional Human Anatomy
2 - BIOSC 493 Senior Seminar
10 - Major Requirement[6]
16

Second Semester
4 - Animal Physiology Requirment[7]
8 - Major Requirement[6]
3 - Social Science Requirement[3]
15

124 Total Semester Hours

[1]Prepharmacy 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.

[2]At 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 or BIOSC 305/309).

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

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

[5]ECON 200, 211, or 212

[6]See 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.

[7]BIOSC 316, 459/460, or 475/476

TOXICOLOGY EMPHASIS AREA

See Bachelor of Science curriculum for freshman year requirements.

Sophomore Year

First Semester
3 - BIOSC 210 Introduction to Toxicology
3 - CH 223 Organic Chemistry[1] *and*
1 - CH 227 Organic Chemistry Lab.[1] *or*
4 - CH 201 Survey of Organic Chemistry
4 - Animal or Plant Diversity Requirement[2]
4 - Biochemistry or Genetics Requirement[3]
15

Second Semester
3 - CH 224 Organic Chemistry[1] *or*
3 - Major Requirement[4]
4 - Animal or Plant Diversity Requirement[2]
4 - Biochemistry or Genetics Requirement[3]
4 - Major Requirement[4]
15

Junior Year

First Semester
3 - BIOSC 335 Evolutionary Biology
3 - ENGL 314 Technical Writing
3 - ENTOX (ENT) 430 Toxicology
3 - PHYS 207 General Physics I *and*
1 - PHYS 209 General Physics I Lab. *or*
3 - PHYS 122 Physics with Calculus I *and*
1 - PHYS 124 Physics Lab. I
3 - Major Requirement[4]
16

Second Semester
3 - PHYS 208 General Physics II *and*
1 - PHYS 210 General Physics II Lab. *or*
3 - PHYS 221 Physics with Calculus II *and*
1 - PHYS 223 Physics Lab. II
3 - Arts and Humanities (Literature) Requirement[5]
4 - Major Requirement[4]
3 - Social Science Requirement[5]
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 Requirement[4]
14

Second Semester
3 - CH 413 Chemistry of Aqueous Systems *or*
3- ENTOX 421 Chemical Sources and Fate in Environmental Systems
3 - PHIL 324 Philosophy of Technology *or*
3 - PHIL 326 Science and Values
4 - Major Requirement[4]
3 - Social Science Requirement[5]
3 - Toxicology Requirement[6]
16

124 Total Semester Hours

[1]CH 223/227 and 224 are recommended.

[2]At 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 or BIOSC 305/309).

[3]At 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.

[4]See 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, MICRO 305, or any BIOSC or BOT courses at the 300 level or higher. BIOSC 441 and MICRO 305 are recommended.

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

[6]Any 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 106 for the curriculum.

Freshman Year

First Semester
5 - BIOL 110 Principles of Biology I[1]
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 II[1]
1 - BIOSC 102 Frontiers in Biology II
4 - CH 102 General Chemistry
3 - ENGL 103 Accelerated Composition
3-4 - Mathematical Sciences Requirement[2]
16-17

Sophomore Year

First Semester
4 - CH 201 Survey of Organic Chemistry[3]
4 - Animal or Plant Diversity Requirement[4]
4 - Biochemistry or Genetics Requirement[5]
4 - Foreign Language Requirement[6]
16

Second Semester
4 - Animal or Plant Diversity Requirement[4]
4 - Biochemistry or Genetics Requirement[5]
4 - Foreign Language Requirement[6]
3 - Minor Requirement[7]
15

Junior Year

First Semester
3 - BIOSC 335 Evolutionary Biology
3 - BIOSC 461 Cell Biology
3 - ENGL 314 Technical Writing
3 - Foreign Language Requirement[6]
3 - Major Requirement[8]
15

Second Semester
3 - Arts and Humanities (Non-Lit.) Requirement[9]
3 - Foreign Language Requirement[6]
3 - Major Requirement[8]
6 - Minor Requirement[7]
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 Requirement[8]
3 - Minor Requirement[7]
3 - Social Science Requirement[9]
15

Second Semester
3 - PHYS 208 General Physics II
1 - PHYS 210 General Physics II Lab.
3 - Arts and Humanities (Literature) Requirement[9]
3 - Major Requirement[8]
3 - Minor Requirement[7]
3 - Social Science Requirement[9]
16

125–126 Total Semester Hours

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

[2]EX ST 301, MTHSC 108 or 301

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

[4]At 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 or BIOSC 305/309).

[5]At 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.

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

[7]See page 58 for approved minors.

[8]See 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.

[9]See 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 I[1]
1 - BIOL 105 General Biology Lab. I[1]
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 II[1]
1 - BIOL 106 General Biology Lab. II[1]
1 - BIOSC 102 Frontiers in Biology II
4 - CH 102 General Chemistry
3 - ENGL 103 Accelerated Composition
3 - EX ST 301 Introductory Statistics
15

Sophomore Year

First Semester
4 - CH 201 Survey of Organic Chemistry
4 - Animal or Plant Diversity Requirement[2]
4 - Biochemistry or Genetics Requirement[3]
4 - Foreign Language Requirement[4]
16

Second Semester
4 - Animal or Plant Diversity Requirement[2]
4 - Biochemistry or Genetics Requirement[3]
4 - Foreign Language Requirement[4]
3 - Minor Requirement[5]
15

Junior Year

First Semester
4 - BIOSC 315 Functional Human Anatomy
3 - BIOSC 335 Evolutionary Biology
3 - BIOSC 461 Cell Biology
3 - ENGL 314 Technical Writing
3 - Foreign Language Requirement[4]
16

Second Semester
4 - BIOSC 316 Human Physiology
3 - Arts and Humanities (Non-Lit.) Requirement[6]
3 - Foreign Language Requirement[4]
6 - Minor Requirement[5]
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 Requirement[7]
3 - Minor Requirement[5]
3 - Social Science Requirement[6]
15

Second Semester
3 - PHYS 208 General Physics II
1 - PHYS 210 General Physics II Lab.
3 - Arts and Humanities (Literature) Requirement[6]
3 - Major Requirement[7]
3 - Minor Requirement[5]
3 - Social Science Requirement[6]
16

125 Total Semester Hours

[1]Prerehabilitation 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.

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

[3]At 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).

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

[5]See page 58 for approved minors. Psychology is recommended. The Medical University of South Carolina and other Rehabilitation Sciences programs require PSYCH 201, 340, and 483.

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

[7]See 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 86 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 concentations 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 I[1]
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 II[1]
3 - ENGL 103 Accelerated Composition
1 - F N R 102 FNR Freshman Portfolio
3 - Computer Science Requirement[2]
15

[1]Students 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.

[2]AG 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) Requirement[1]
3 - Oral Communication Requirement[1]
16-17

Second Semester
4 - CSENV 202 Soils
3 - GEN 300 Fundamental Genetics
3 - W F B (BIOSC) 313 Conservation Biology
3 - Physical Environment Requirement[2]
3 - Taxonomy/Habitat Requirement[3]
16

Junior Year

First Semester
3 - ENGL 314 Technical Writing
3 - Arts and Humanities (Non-Lit.) Requirement[1]
3 - Ecology Requirement[4]
3 - Physiology Requirement[5]
3 - Taxonomy/Habitat Requirement[3]
15

Second Semester
3 - BIOSC 335 Evolutionary Biology
3 - E N R 302 Natural Resources Measurements
3 - Ecology Requirement[4]
3 - Natural Resource Economics Requirement[6]
3 - Taxonomy/Habitat Requirement[3]
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 Requirement[7]
3 - Internship or Directed Research[8]
3 - Taxonomy/Habitat Requirement[3]
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 Requirement[1]
6 - Taxonomy/Habitat Requirement[3]
13

120–121 Total Semester Hours

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

[2]GEOG 106, GEOL 101, or PHYS 240

[3]AG 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.

[4]BIOSC 441, 442, 443, 446, or 470

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

[6]AP EC 433, 475, C R D (AP EC) 357, or FOR 304

[7]E N R 429, 450, or W F B 430

[8]See 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 Rel.
3 - Ecology Requirement[1] *or*
3 - Minor Requirement
3 - Geography Requirement[2]
3 - Oral Communication Requirement[3]
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) Requirement[3]
3 - Arts and Humanities (Non-Lit.) Requirement[3]
15

Junior Year

First Semester
3 - E N R 429 Environmental Law and Policy
3 - ECON 314 Intermediate Microeconomics
3 - W F B (BIOSC) 313 Conservation Biology *or*
3 - Minor Requirement
3 - Advanced Writing Requirement[3]
3 - Applied Economics Requirement[4]
15

Second Semester
3 - AP EC 457 Natural Resources Economic Theory and Policy
3 - ECON 319 Environmental Economics
3 - FOR (E N R) 434 GIS for Landscape Planning
3 - Ecology Requirement II[5] *or*
3 - Minor Requirement
3 - Macroeconomics Requirement[6]
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 Requirement[4] *or*
6 - Applied Economics Requirement[4] *and*
3 - Minor Requirement
15

Second Semester
3 - E N R 450 Conservation Issues
6 - Applied Economics Requirement[4]
3 - Community Development Requirement[7]
4 - Elective *or*
3 - Minor Requirement *and*
1 - Elective
16

121 Total Semester Hours

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

[2]GEOG 101, 103, or 106

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

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

[5]Select 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.

[6]ECON 302, 310 or 315

[7]C 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) Requirement[1]
15

Second Semester
3 - FOR 206 Forest Ecology
3 - W F B (BIOSC) 313 Conservation Biology
3 - Arts and Humanities (Non-Lit.) Requirement[1]
3 - Oral Communication Requirement[1]
3 - Social Science Requirement[1]
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 Requirement[2]
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 Requirement[2]
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 Internship[3]
4 - Minor Requirement[2]
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 Requirement[2]
15

122 Total Semester Hours

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

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

[3]See 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*.

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
2 - FD SC 102 Perspectives in Food and Nutrition Sciences
3 - PSYCH 201 Introduction to Psychology
16-17

Sophomore Year

First Semster
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.
3 - PHYS 122 Physics with Calculus I *and*
1 - PHYS 124 Physics Lab. I *or*
4 - PHYS 200 Introductory Physics *or*
3 - PHYS 207 General Physics I *and*
1 - PHYS 209 General Physics I Lab.
3 - Arts and Humanities (Literature) Requirement[1]
3 - Arts and Humanities (Non-Lit.) Requirement[1]
17

Second Semester
3 - BIOCH 305 Essential Elements of Biochem.
1 - BIOCH 306 Essential Elements of Bioch. Lab.
3 - EX ST 301 Introductory Statistics
3 - FD SC 214 Food Resources and Society
3 - Elective
13

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

FOOD SCIENCE AND TECHNOLOGY CONCENTRATION

Junior Year

First Semester
1 - FD SC 421 Special Problems in Food Science
4 - MICRO 305 General Microbiology
3 - NUTR 451 Human Nutrition
3 - Departmental Requirement[1]
3 - Emphasis Area Requirement[2]
3 - Elective
17

Second Semester
3 - ENGL 304 Business Writing *or*
3 - ENGL 314 Technical Writing
1 - FD SC 417 Seminar
1 - FD SC 421 Special Problems in Food Science
4 - MICRO 407 Food and Dairy Microbiology
6 - Emphasis Area Requirement[2]
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 - FD SC 421 Special Problems in Food Science
13

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 418 Seminar
1 - FD SC 421 Special Problems in Food Science
3 - Emphasis Area Requirement[2]
16

122–125 Total Semester Hours

[1]AVS 305, 323, 418, FD SC 304, 430, or 431

[2]See advisor. Two credit hours of FD SC 421 are required in the emphasis area.

NUTRITION AND DIETETICS CONCENTRATION

Junior Year

First Semester
4 - BIOSC 222 Human Anatomy and Phys. I
1 - FD SC 491 Practicum
4 - MICRO 305 General Microbiology
3 - NUTR 451 Human Nutrition
3 - 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 417 Seminar
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 - FD SC 418 Seminar
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 491 Practicum
4 - NUTR 425 Medical Nutrition Therapy II
3 - NUTR 426 Community Nutrition
15

123–126 Total Semester Hours

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, useable 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 58.) 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 and Natural Resources Management Concentrations within the Environmental and Natural Resources degree program. See page 48 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 I[1]
1 - E N R 101 Intro. to Environ. and Natural Res. I
3 - MTHSC 102 Intro. to Mathematical Analysis
3 - Oral Communication Requirement[2]
15

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

Sophomore Year

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

Second Semester
3 - ENGL 314 Technical Writing
3 - FOR 206 Forestry Ecology
3 - Arts and Humanities (Non-Lit.) Requirement[2]
3 - Social Science Requirement[2]
3 - Minor Requirement[4]
15

Forestry Summer Camp

2 - FOR 251 Forest Communities
1 - FOR 252 Forest Operations
4 - FOR 253 Forest Mensuration
1 - FOR 254 Forest Products
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 - Elective
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 Requirement[4]
1 - Elective
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 Plan. in Forest Mgt.
3 - Minor Requirement[4]
15

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 Requirement[4]
15

130 Total Semester Hours

[1]CH 101 and 102 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.

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

[3]AP EC 257, ECON 200, 211, or 212

[4]To be selected by the middle of the sophomore year

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 I[1]
1 - PHYS 124 Physics Lab. I[1]
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) Requirement[2]
3 - Social Science Requirement[2]
17

Junior Year

First Semester
3 - BIOSC 461 Cell Biology
2 - BIOSC 462 Cell Biology Lab.
3 - ENGL 314 Technical Writing
3 - GEN 410 Fundamentals of Genetics I
1 - GEN 411 Fundamentals of Genetics I Lab.
3 - Science Requirement[3]
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 Requirement[4]
3 - Elective[5]
16

Senior Year

First Semester
3 - GEN 450 Comparative Genetics
3 - GEN 491 Directed Research in Genetics[6]
3 - Science Requirement[3]
3 - Social Science Requirement[2]
3 - Elective[5]
15

Second Semester
3 - GEN 491 Directed Research in Genetics[6]
2 - GEN 493 Senior Seminar
6 - Genetics Requirement[4]
4 - Elective[5]
15

122 Total Semester Hours

[1]Medical, 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.

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

[3]BIOSC 222, 223, PHYS 221, 223, or any courses at 300 level or above in BIOCH, BIO E, BIOSC, CH, EX ST, MTHSC, MICRO, and PHYS. Other courses must be approved by advisor.

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

[5]Two-semesters of a foreign language are strongly recommended.

[6]To be taken over two semesters, preferably with the same faculty member

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.) Requirement[1]
3 - Social Science Requirement[1]
16

Second Semester
3 - ENGL 103 Accelerated Composition
1 - HORT 102 Experience Horticulture
3 - MTHSC 101 Essential Math. for Informed Soc.
4 - Laboratory Science Requirement[2]
3 - Social Science Requirement[1]
14

Sophomore Year

First Semester
4 - CH 105 Chemistry in Context I
3 - HORT 303 Landscape Plants
3 - Business Requirement[2]
4 - Plant Biology Requirement[2]
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) Requirement[1]
14

Summer

3 - HORT 271 Internship[3] *or*
3 - HORT 471 Advanced Internship[3]

Junior Year

First Semester
4 - CSENV 202 Soils
3 - Advanced Writing Requirement[1]
3 - Horticulture Specialization Requirement[2]
3 - Oral Communication Requirement[1]
3 - Spanish Language Requirement[2]
16

Second Semester
3 - BIOSC 401 Plant Physiology
1 - BIOSC 402 Plant Physiology Lab.
1 - HORT 409 Seminar
3 - Applied Science Requirement[2]
3 - Business Requirement[2]
3 - Horticulture Specialization Requirement[2]
14

Senior Year

First Semester
6 - Applied Science Requirement[2]
3 - Business Requirement[2]
6 - Horticulture Specialization Requirement[2]
15

Second Semester
3 - Applied Science Requirement[2]
6 - Horticulture Specialization Requirement[2]
4 - Laboratory Science Requirement[2]
1 - Elective
14

120 Total Semester Hours

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

[2]See advisor. Select from department-approved list.

[3]Internship 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 I[1]
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 II[1]
4 - CH 102 General Chemistry
3 - ENGL 103 Accelerated Composition
3-4 - Mathematics Requirement[2]
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) Requirement[3]
3 - Elective[4]
14

Second Semester
3 - BIOCH 301 Molecular Biochemistry[5]
1 - BIOCH 302 Molecular Biochemistry Lab.
3 - CH 224 Organic Chemistry
1 - CH 228 Organic Chemistry Lab.
3 - Arts and Humanities (Non-Lit.) Requirement[3]
3 - Microbiology Requirement[6]
3 - Social Science Requirement[3]
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 Requirement[6]
15

Second Semester
3 - ENGL 314 Technical Writing
4 - MICRO 412 Bacterial Physiology
3 - Microbiology Requirement[6]
3 - Virology Requirement[7]
3-4 - Elective[4,8]
16-17

Senior Year

First Semester
4 - MICRO 415 Microbial Genetics
4 - Microbiology Requirement[6]
3 - Social Science Requirement[3]
4 - Elective[4]
15

Second Semester
2 - BIOSC 493 Senior Seminar
4 - Microbiology Requirement[6]
9 - Elective[4]
15

124–126 Total Semester Hours

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

[2]MTHSC 108, 301, or EX ST 301

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

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

[5]BIOCH 305 does not substitute for BIOCH 301.

[6]See 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

[7]BIOSC 454 or MICRO 416

[8]Students 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 I[1]
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 II[1] *or*
4 - BIOSC 315 Functional Human Anatomy
4 - CH 102 General Chemistry
3 - ENGL 103 Accelerated Composition
3-4 - Mathematics Requirement[2]
14-16

Sophomore Year

First Semester
3 - CH 223 Organic Chemistry
1 - CH 227 Organic Chemistry Lab.
4 - MICRO 305 General Microbiology
3 - Arts and Humanities (Literature) Requirement[3]
3 - Elective
14

Second Semester
3 - BIOCH 301 Molecular Biochemistry
3 - CH 224 Organic Chemistry
1 - CH 228 Organic Chemistry Lab.
3 - PHIL 324 Philosophy of Technology *or*
3 - PHIL 326 Science and Values
3 - Biomedicine Requirement[4]
3 - Social Science Requirement[3]
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 314 Technical Writing
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 Requirement[3]
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 Requirement[4]
3 - Elective
15

122–124 Total Semester Hours

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

[2]MTHSC 108, 301, or EX ST 301

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

[4]BIOCH 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, graphic communications, materials, 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 Orientation[1]
3 - Social Science Requirement[2]
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 Science[1]
1 - PKGSC 103 Packaging Science E-Portfolio
14

Sophomore Year

First Semester[3]
4 - CH 201 Survey of Organic Chemistry *or*
  3 - CH 223 Organic Chemistry *and*
  1 - CH 227 Organic Chemistry Lab.
3 - COMM 250 Public Speaking
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]
15

Second Semester[3]
3 - CTE 180 Intro. to Tech. Drawing and CAD
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 Systems[1]
1 - PKGSC 206 Container Systems Lab.[1]
18

Summer

0 - CO-OP 101 Cooperative Education[4]

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 Packaging[5]
3 - PKGSC 430 Converting for Flexible Packaging
1 - PKGSC 454 Product and Package Eval. Lab.[5]
3 - Emphasis Area Requirement[6]
16

Second Semester
3 - ENGL 314 Technical Writing
3 - PKGSC 401 Packaging Machinery
3 - PKGSC 440 Packaging for Distribution
3 - Arts and Humanities (Literature) Requirement[2]
3 - Emphasis Area Requirement[6]
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 Requirement[6]
14

Second Semester
3 - AP EC 202 Agricultural Economics *or*
  3 - ECON 211 Principles of Microeconomics
1 - PKGSC 403 Packaging Career Preparation
3 - PKGSC 420 Package Design and Development
3 - Arts and Humanities (Non-Lit.) Requirement[2]
6 - Emphasis Area Requirement[6]
16

124 Total Semester Hours

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

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

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

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

[5]PKGSC 404 and 454 must be taken concurrently.

[6]Completion of an approved minor or emphasis area is required. Approved minors are Business Administration, Entrepreneurship, Environmental Engineering, Environmental Science and Policy, Management. Emphasis Areas consist of 15 credit hours selected from one of the following areas: Distribution and Transportation, Engineering Technology, Food and Health Care Packaging, Graphic Communications, Materials. See advisor.

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

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

First Year

First Semester
3 - BIOL 103 General Biology I
1 - BIOL 105 General Biology Lab. I
4 - CH 101 General Chemistry
4 - MTHSC 106 Calculus of One Variable I
3 - PSYCH 201 Introduction to Psychology
3 - Arts and Humanities (Non-Lit.) Requirement[1]
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) Requirement[2]
3 - History Requirement[3]
18

Second Semester
4 - BIOSC 223 Human Anatomy and Phys. II
3 - CH 224 Organic Chemistry
1 - CH 228 Organic Chemistry Lab.
3 - COMM 150 Intro. to Human Comm. *or*
3 - COMM 250 Public Speaking
3 - PHYS 208 General Physics II
1 - PHYS 210 General Physics II Lab.
3 - Science and Tech. in Society Requirement[4]
18

Third Year[5]

72–90 Total Semester Hours

[1]A A H 210 or MUSIC 210

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

[3]See advisor.

[4]See General Education Requirements.

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

PREREHABILITATION SCIENCES

The Prerehabilitation Sciences major includes 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.) Requirement[1]
3 - Mathematics Requirement[2]
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) Requirement[3]
3 - Arts and Humanities Requirement[1]
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 - Science and Tech. in Society Requirement[1]
17

Third Year[4]

90 Total Semester Hours

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

[2]See advisor.

[3]Select any ENGL course from General Education Arts and Humanities (Literature) Requirement.

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

PREVETERINARY MEDICINE

Under a regional plan, the South Carolina 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 of physics, eight 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 including 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 I[1]
4 - CH 101 General Chemistry
3 - MTHSC 102 Intro. to Math. Analysis[2] *or*
4 - MTHSC 106 Calculus of One Variable I[2]
1 - SSCS 101 Survey of Soils and Sustainable Crop Systems
3 - Arts and Humanities (Non-Lit.) Requirement[3]
16-17

Second Semester

5 - BIOL 111 Principles of Biology II[1]
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

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

[2]MTHSC 106 is recommended for students in the Agricultural Biotechnology Concentration.

[3]See 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 Concepts[1] *or*
3 - ECON 211 Principles of Microeconomics[1]
3 - SSCS 333 Agricultural Genetics
3 - Arts and Humanities (Literature) Requirement[2]
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 Requirement[2]
16

Second Semester

1 - CSENV 350 Practicum
3 - ENGL 314 Technical Writing
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 Requirement[3]
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 Requirement[3]
16

Second Semester

2 - CSENV 350 Practicum
3 - CSENV 417 Weed Ecology and Morphology
1 - SSCS 451 Agric. Biotech. and Global Society
9 - Emphasis Area Requirement[3]
15

124–126 Total Semester Hours

[1]ECON 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.

[2]See General Education Requirements.

[3]Select 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) Requirement[1]
3 - Cross-Cultural Awareness Requirement[1]
4 - Emphasis Area Requirement[2]
14

Junior Year

First Semester
3 - COMM 250 Public Speaking
4 - MICRO 305 General Microbiology
5 - Emphasis Area Requirement[2]
3 - Plant Science Requirement[3]
15

Second Semester
3 - CSENV 475 Soil Physics and Chemistry
3 - CSENV 490 Beneficial Soil Organisms in Plant Growth
3 - ENGL 314 Technical Writing
1 - SSCS 401 Academic and Professional Dev. II
3 - Emphasis Area Requirement[2]
3 - Social Science Requirement[1]
16

Senior Year

First Semester
3 - CSENV 350 Practicum
2 - CSENV 403 Soil Genesis and Classification
1 - CSENV 455 Seminar
3 - Applied Spatial Technology Requirement[4]
3 - Emphasis Area Requirement[2]
3 - Field Scale Environmental Mgt. Requirement[5]
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 Requirement[2]
3 - Social Science Requirement[1]
16

124–126 Total Semester Hours

[1]See General Education Requirements.

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

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

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

[5]AG 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 Chemistry[1]
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 Chemistry[1]
1 - CH 228 Organic Chemistry Lab.[1]
3 - COMM 250 Public Speaking
3 - SSCS 333 Agricultural Genetics
3 - Plant Science Requirement[2]
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 Requirement[3]
3 - Plant Science Requirement[2]
3 - Social Science Requirement[4]
16

Second Semester
3 - BIOSC 401 Plant Physiology
1 - BIOSC 402 Plant Physiology Lab.
3 - CSENV 405 Plant Breeding
3 - CSENV 407 Introductory Weed Science
3 - ENGL 314 Technical Writing
2 - PL PA 411 Plant Disease Diagnosis I
1 - SSCS 401 Academic and Professional Dev. II
16

Senior Year

First Semester
3 - CSENV 417 Weed Ecology and Morphology
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 Requirement[3]
15-16

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) Requirement[4]
6 - Emphasis Area Requirement[3]
17

126–129 Total Semester Hours

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

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

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

[4]See 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.) Requirement[1]
3 - Social Science Requirement[1]
16

Second Semester
3 - ENGL 103 Accelerated Composition
1 - HORT 102 Experience Horticulture
3 - MTHSC 101 Essential Math for Informed Soc.
4 - Laboratory Science Requirement[2]
3 - Social Science Requirement[1]
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 Requirement[2]
15

Second Semester
4 - CH 106 Chemistry in Context II
3 - Applied Science Requirement[2]
3 - Arts and Humanities (Literature) Requirement[1]
3 - Business Requirement[2]
3 - Spanish Language Requirement[2]
16

Summer

3 - HORT 271 Internship[3] *or*
3 - HORT 471 Advanced Internship[3]

Junior Year

First Semester
4 - CSENV 202 Soils
3 - Advanced Writing Requirement[1]
3 - Applied Science Requirement[2]
3 - Business Requirement[2]
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 Requirement[2]
3 - Oral Communication Requirement[1]
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 Requirement[2]
4 - Laboratory Science Requirement[2]
3 - Soils Requirement[2]
13

Second Semester
3 - HORT (CSENV) 433 Landscape and Turf Weed Management
3 - Applied Science Requirement[2]
3 - Business Requirement[2]
3 - Horticulture Specialization Requirement[2]
3 - Soils Requirement[2]
15

122 Total Semester Hours

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

[2]See advisor. Select from department-approved list.

[3]Internship 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 have 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, recreational, 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 47 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 I[1]
1 - E N R 101 Intro. to Env. and Natural Res. I
3 - MTHSC 102 Intro. to Mathematical Analysis
3 - Oral Communication Requirement[2]
15

Second Semester
3 - BIOL 104 General Biology II
1 - BIOL 106 General Biology Lab. II
4 - CH 106 Chemistry in Context II[1] *or*
4 - PHYS 200 Introductory Physics[1]
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.) Requirement[2]
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 Requirement[2]
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) Requirement[2]
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 Requirement[3]
15

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

122 Total Semester Hours

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

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

[3]Select from department-approved list.

MINORS

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

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

See pages 36–39 for details.