The College of Agriculture, Forestry and Life Sciences (CAFLS) supports Clemson University's land-grant mission to provide education, research, and service to the public. The College of Agriculture, Forestry and Life Sciences serves more than 3,800 graduate and undergraduate students.

The College of Agriculture, Forestry and Life Sciences will be a new model for a 21st Century, multidisciplinary college of life-based sciences that prepares students to be leaders and innovators in their chosen careers. The shared biological foundation of the CAFLS Departments and School will stimulate student learning and undergraduate research across disciplines; will increase opportunities for team-based faculty research across departments, colleges and institutions; and will make available the latest scientific knowledge for the greater benefit of 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 63).

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 the mainstream of agricultural industry.

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

COMMUNICATIONS EMPHASIS AREA

Junior Year

First Semester
1 - AGED 1020 Agric. Ed. Freshman Seminar
2 - AGED 1030 Multiculturalism in Agric. Ed.
3 - AVS 1500 Introduction to Animal Science
4 - AVS 1510 Introduction to Animal Science Lab.
5 - BIOL 1030 General Biology I
6 - BIOL 1050 General Biology Lab. I
7 - HORT 1010 Horticulture
8 - Mathematics Requirement
9 - Oral Communication Requirement
10 - Technical Requirement
11 - 16-17

Second Semester
1 - AGED 1000 Orientation and Field Experience
2 - AGM 2050 Principles of Fabrication
3 - BIOL 1040 General Biology II
4 - BIOL 1060 General Biology Lab. II
5 - ENGL 1030 Accelerated Composition
6 - Social Science Requirement
7 - 17

Sophomore Year

First Semester
1 - AGED 2010 Intro. to Agricultural Education
2 - AGED 2040 Applied Agriculture Calculations
3 - BT 2200 Biosystems Technology I
4 - CH 1010 General Chemistry
5 - CH 1020 General Chemistry Lab.
6 - HORT 2120 Introduction to Turfgrass Culture
7 - HORT 2130 Turfgrass Culture Lab.
8 - 17

Second Semester
1 - CH 1020 General Chemistry
2 - COMM 2010 Intro. to Communication Studies
3 - AGM 2210 Surveying
4 - AGM 2210 Surveying
5 - Advanced Writing Requirement
6 - 16-17

Junior Year

First Semester
1 - AGED 3030 Mech. Technology for Agric. Ed.
2 - AGM 2210 Surveying
3 - CSEN 2020 Soils
4 - COMM 2010 Intro. to Communication Studies
5 - CSEN 2020 Soils
6 - Arts and Humanities (Non-Lit.) and STS Requirement
7 - 17

Second Semester
1 - EDF 3020 Educational Psychology
2 - ENGL 3020 Natural Resources Measurements
3 - HORT 4040 Plant Propagation
4 - HORT 4050 Plant Propagation Techniques Lab.
5 - Advanced Writing Requirement
6 - Departmental Communication Requirement
7 - Oral Communication Requirement
8 - 18

Senior Year

First Semester
1 - AGED 4070 Internship in Extension and Leadership Education
2 - 12-15 Total Semester Hours
3 - See General Education Requirements. This course must also satisfy the Science and Technology in Society Requirement.
4 - See advisor.
5 - See General Education Requirements. COMM 1500 or 2500 is recommended.
6 - Internship must meet departmental requirements for Communications Emphasis Area. See advisor.

LEADERSHIP EMPHASIS AREA

Junior Year

First Semester
1 - AGED 3030 Mech. Technology for Agric. Ed.
2 - AGM 2210 Surveying
3 - AGM 2210 Surveying
4 - CSEN 2020 Soils
5 - HORT 3030 Landscape Plants
6 - Advanced Writing Requirement
7 - Arts and Humanities (Literature) and STS Requirement
8 - 17

Second Semester
1 - EDF 3020 Educational Psychology
2 - ENRL 3020 Natural Resources Measurements
3 - HORT 4040 Plant Propagation
4 - HORT 4050 Plant Propagation Techniques Lab.
5 - Oral Communication Requirement
6 - Technical Requirement
7 - 18

Senior Year

First Semester
2 - AGED 4150 Leadership of Volunteers
3 - AGED 4160 Ethics and Issues in Agriculture and the Food and Fiber System
4 - MGT 2010 Principles of Management
5 - Arts and Humanities (Literature) Requirement
6 - Technical Requirement
7 - 18
Second Semester
12 - AGED 4070 Internship in Extension and Leadership Education
12
133–134 Total Semester Hours

See General Education Requirements.

See General Education Requirements. COMM 1500 or 2500 is recommended.

See advisor.

TEACHING EMPHASIS AREA

Junior Year
First Semester
3 - AGED 3030 Mech. Technology for Agric. Ed.
3 - AGM 2210 Surveying
4 - CSEN 4200 Soils
3 - HORT 3030 Landscape Plants
3 - Advanced Writing Requirement
16

Second Semester
3 - AGED 4160 Ethics and Issues in Agriculture
3 - HORT 3030 Landscape Plants
3 - Advanced Writing Requirement

Senior Year
First Semester
3 - AGED 3030 Mech. Technology for Agric. Ed.
3 - AGM 2210 Surveying
4 - CSEN 4020 Soils
3 - HORT 3030 Landscape Plants
3 - Advanced Writing Requirement

Second Semester
3 - AGED 4250 Teaching Agricultural Mechanics
3 - AGED 4030 Principles of Adult/Ext. Education
3 - AGED 4010 Instructional Methods in Ag. Ed.
1 - AGED 4000 Supervised Field Experience II
16

Second Semester
3 - AGED 4160 Ethics and Issues in Agriculture
3 - HORT 3030 Landscape Plants
3 - Advanced Writing Requirement

Second Semester
3 - AGED 4070 Internship in Extension and Leadership Education
3 - HORT 3030 Landscape Plants
3 - Advanced Writing Requirement

Sophomore Year
First Semester
3 - AGM 2190 Agribusiness and Food Systems
3 - AGM 2210 Surveying
4 - CH 1010 General Chemistry
2 - ENGR 2080 Engr. Graphics and Machine Design or
2 - ENGR 2090 Intro. to Engineering/Computer Graphics or
2 - ENGR 2100 Comp. Aided Design/Engr. Apps.
4 - PHYS 2000 Introductory Physics or
3 - PHYS 2070 General Physics I and
1 - PHYS 2090 General Physics I Lab.
16

Second Semester
3 - AGM 2060 Machinery Management
3 - AGM 3030 Calculations for Mechanized Agric.
4 - CH 1020 General Chemistry
3 - Arts and Humanities (Literature) Requirement
3 - Plant/Crop Science Requirement
16

Junior Year
First Semester
3 - AGM 3010 Soil and Water Conservation
3 - AGM 3190 Agribusiness Decision Analysis
3 - AGM 4050 Environmental Control in Animal Structures
3 - APEC 3020 Economics of Farm Management or
3 - MGT 2010 Principles of Management
4 - CSEN 4020 Soils
16

Second Semester
3 - AGM 4020 Drainage and Irrigation
3 - AGM 4520 Mobile Power
2 - EXST 3010 Introductory Statistics or
3 - MTHS 2030 Elem. Statistical Inference
1 - ART 3010 Art and Humanities (Non-Lit.) Requirement
2 - Minor Requirement
15

Senior Year
First Semester
1 - AGM 4000 Senior Seminar in AGM
3 - AGM 4060 Mechanical and Hydraulic Systems
3 - AGM 4600 Electrical Systems
3 - APEC 3190 Agribusiness Management or
3 - MGT 2010 Principles of Management
3 - MKT 3010 Principles of Marketing or
3 - APEC 3090 Econ. of Agricultural Marketing
3 - Minor Requirement
16

Second Semester
3 - AGM 4100 Precision Agriculture Technology
3 - AGM 4720 Capstone or
3 - AGM 4190 Agribusiness Inov.,/Entrepren.
3 - Minor Requirement
3 - Plant/Crop or Soil Science Requirement
3 - Social Science Requirement
15

124 Total Semester Hours

AGRICULTURAL MECHANIZATION AND BUSINESS

Bachelor of Science

The Agricultural Mechanization and Business major provides a program for students who desire training in areas relevant to dynamic agricultural enterprises. 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.

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.

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.

Additional information is available from the departmental offices or can be found at www.clemson.edu/cafis/safes/agmec/index.html

Freshman Year
First Semester
1 - AGM 1010 Intro. to Ag. Mech. and Business
3 - AGM 2050 Principles of Fabrication
3 - APEC 2020 Agricultural Economics or
3 - ECON 2110 Principles of Microeconomics
1 - BIOL 1030 General Biology I
1 - BIOL 1030 General Biology Lab. I
4 - MTHS 1020 Intro. to Mathematical Analysis
14

Second Semester
3 - ACCCT 2010 Financial Accounting Concepts
3 - BIOL 1040 General Biology II
1 - BIOL 1060 General Biology Lab. II
3 - COMM 1500 Intro. to Human Comm. or
3 - COMM 2500 Public Speaking
3 - ENGL 1030 Accelerated Composition
3 - Elective
16

Sophomore Year
First Semester
3 - AGM 2190 Agribusiness and Food Systems
3 - AGM 2210 Surveying
4 - CH 1010 General Chemistry
2 - ENGR 2080 Engr. Graphics and Machine Design or
2 - ENGR 2090 Intro. to Engineering/Computer Graphics or
2 - ENGR 2100 Comp. Aided Design/Engr. Apps.
4 - PHYS 2000 Introductory Physics or
3 - PHYS 2070 General Physics I and
1 - PHYS 2090 General Physics I Lab.
16

Second Semester
3 - AGM 2060 Machinery Management
3 - AGM 3030 Calculations for Mechanized Agric.
4 - CH 1020 General Chemistry
3 - Arts and Humanities (Literature) Requirement
3 - Plant/Crop Science Requirement
16
ANIMAL AND VETERINARY SCIENCES

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

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

Change of Major into Animal and Veterinary Sciences
Students who change majors into Animal and Veterinary Sciences must have a 2.5 minimum cumulative grade-point average.

ANIMAL AGRIBUSINESS CONCENTRATION

Freshman Year
First Semester
1 - AVS 1000 Orientation to Animal and Vet. Sci.
2 - AVS 1510 Introduction to Animal Science
3 - BIOL 1030 General Biology I and
4 - CH 1010 General Chemistry
5 - Arts and Humanities (Non-Lit.) Requirement1
16-17

Second Semester
1 - AVS 1030 Intro. to Animal Science Lab.
2 - AVS 3600 Principles of Animal Nutrition
3 - CSEN 4230 Field Crops—Forages
4 - ECON 2120 Principles of Macroeconomics
16

Junior Year
First Semester
4 - AVS 3010 Anat. and Phys. of Domestic Animals
5 - AVS 4100 Domestic Animal Behavior
2 - AVS Evaluation Requirement3
2 - AVS Techniques Requirement2
3 - Social Science Requirement1
16

Second Semester
2 - AVS Techniques Requirement2
2 - AVS Evaluation Requirement3
3 - MKT 3010 Principles of Marketing
3 - ECON 2120 Principles of Macroeconomics
15

EQUINE BUSINESS CONCENTRATION

Freshman Year
First Semester
1 - AVS 1000 Orientation to Animal and Vet. Sci.
2 - AVS 1510 Introduction to Animal Science
1 - AVS 1510 Introduction to Animal Science Lab.
1 - BIOL 1030 General Biology I and
1 - CH 1010 General Chemistry
2 - AVS Techniques Requirement2
16-17

Second Semester
3 - BIOL 1040 General Biology II and
1 - BIOL 1060 General Biology Lab. II or
5 - BIOL 1110 Principles of Biology II
4 - CH 1020 General Chemistry
3 - ENGL 1030 Accelerated Composition
3 - MTHS 1105 General Biology Lab. I or
3 - MTHS 1100 Principles of Biology I
4 - CH 1010 General Chemistry
3 - Arts and Humanities (Non-Lit.) Requirement1
16-17

Sophomore Year
First Semester
3 - ACCT 2010 Financial Accounting Concepts
3 - EXST 3010 Introductory Statistics
3 - MGT 2010 Principles of Management
3 - Elective
14

Second Semester
2 - AVS Techniques Requirement2
3 - MKT 3010 Principles of Marketing
3 - ECON 2120 Principles of Macroeconomics
3 - Elective
14
16-18

Junior Year
First Semester
4 - AVS 3010 Anat. and Phys. of Domestic Animals
3 - AVS 4100 Domestic Animal Behavior
3 - AVS 4130 Animal Products
3 - LAW 3220 Legal Environment of Business
3 - Elective
15

Second Semester
2 - AVS Techniques Requirement2
2 - AVS Evaluation Requirement3
3 - FIN 3060 Corporation Finance
2 - AVS Experience-Based Activity4
2 - AVS Techniques Requirement2
16

Senior Year
First Semester
2 - AVS 4000 Animal and Veterinary Sciences
1 - AVS 4170 Animal Agribusiness Development
1 - AVS 4060 Seminars and Related Topics
2 - AVS Techniques Requirement2
16

Second Semester
2 - AVS Techniques Requirement2
3 - ECON 2120 Principles of Macroeconomics
3 - AVS 4530 Animal Reproduction
3 - AVS 4130 Animal Products
2 - AVS Experience-Based Activity4
2 - AVS Techniques Requirement2
16

1See General Education Requirements. APEC and ECON courses may not be used to fulfill the Social Science Requirement. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.
2Select from AVS 2000, 2010, 2030, 2040, 2050, 2060, 2090, 2110, 3020, 3090, 310, 3230, 4050 or 4350
3Select from AVS 3020, 3090, 310 or 3230
4Select from AVS 2000, 3000, 4410, 4420, 4430, 4440 or 4910
5Select from AVS 4500, 4010 or 4120
Senior Year

First Semester
1. AVS 3100 Animal Health
2. AVS 4000 Animal and Veterinary Sciences
   Professional Development
3. AVS 4060 Seminars and Related Topics
5. AVS 4160 Equine Exercise Physiology
6. AVS Experience-Based Activity
16

Second Semester
1. AVS 4100 Domestic Animal Behavior
2. AVS 4110 Advanced Equine Management
3. AVS 4170 Animal Agribusiness Development
4. Elective
14

121–124 Total Semester Hours

Second Semester
1. AVS 4100 Domestic Animal Behavior
2. AVS 4110 Advanced Equine Management
3. AVS 4170 Animal Agribusiness Development
4. Elective
14

PREVETERINARY AND SCIENCE CONCENTRATION

Freshman Year

First Semester
1. AVS 1000 Orientation to Animal and Vet. Sci.
2. AVS 1500 Introduction to Animal Science
3. BIOL 1030 General Biology I
4. BIOL 1050 General Biology Lab. I or
5. BIOL 1100 Principles of Biology I
6. CH 1010 General Chemistry
7. Arts and Humanities (Non-Lit.) Requirement
16-17

Second Semester
1. BIOL 1040 General Biology II
2. BIOL 1060 General Biology Lab. II or
3. BIOL 1110 Principles of Biology II
4. CH 1020 General Chemistry
5. ENGL 1030 Accelerated Composition
6. MTHS 1020 Intro. to Mathematical Analysis or
7. MTHS 1060 Calculus of One Variable
2. AVS Techniques Requirement
14-15

Sophomore Year

First Semester
1. CH 2230 Organic Chemistry
2. CH 2270 Organic Chemistry Lab.
3. PHYS 2070 General Physics I
4. PHYS 2090 General Physics I Lab.
5. Arts and Humanities (Literature) Requirement
6. AVS Techniques Requirement
7. Social Science Requirement
16

Second Semester
1. CH 2240 Organic Chemistry
2. CH 2280 Organic Chemistry Lab.
3. EXST 3010 Introductory Statistics or
4. MTHS 2030 Elem. Statistical Inference
5. PHYS 2080 General Physics II
6. PHYS 2100 General Physics II Lab.
7. AVS Techniques Requirement
8. Oral Communication Requirement
16

Junior Year

First Semester
1. AVS 3010 Anat. and Phys. of Domestic Animals
2. AVS 3000 Animal Health
3. AVS 3700 Principles of Animal Nutrition
4. BCHM 3010 Molecular Biochemistry or
5. BCHM 3050 Essential Elements of Bioch. or
6. BCHM 4060 Physiological Chemistry
3. Departmental Requirement
14

Second Semester
1. AVS 3750 Applied Animal Nutrition
2. AVS 4530 Animal Reproduction
3. GEN 3000 Fundamental Genetics
4. MICR 3050 General Microbiology
5. AVS Experience-Based Activity
16

Senior Year

First Semester
1. AVS 4000 Animal and Veterinary Sciences
   Professional Development
2. AVS 4010 Anat. and Phys. of Domestic Animals
3. AVS 3010 Anat. and Phys. of Domestic Animals
4. AVS 3050 Animal Reproduction
5. BCHM 4060 Physiological Chemistry
6. BCHM 4080 Professional Development
7. BCHM 4100 Anatomy and Physiology
8. Elective
16

Second Semester
1. BCHM 3010 Molecular Biochemistry
2. BCHM 3050 Essential Elements of Bioch.
3. CHM 3050 Essential Elements of Bioch.
4. BCHM 4060 Physiological Chemistry

1-2. AVS Techniques Requirement
16

1-2. AVS Techniques Requirement
16

APPLIED ECONOMICS AND STATISTICS

Bachelor of Science

The Applied Economics and Statistics — Agribusiness Emphasis Area curriculum provides strong training in economic and business principles as applied in agribusiness enterprises. Core classes in the major focus on agribusiness economics and management, leadership, marketing and sales, finance, accounting, and business skill development. Employment opportunities for graduates are many and diverse. Private sector opportunities include national and international careers in agribusiness management, banking, finance, sales, marketing, and public relations. Public sector opportunities include positions in organizations that promote food, agriculture, and natural resource interests; government agencies; and educational institutions. Moreover, the curriculum design provides graduates with the skills necessary to successfully establish their own businesses. By completing this curriculum, graduates will have fulfilled the requirements for an approved minor in the college, allowing students to tailor the program to meet specific career objectives.

The curriculum also emphasizes training on globalization, information technology, and interdisciplinary skills needed to analyze the complex interrelationships between the business, the environment and society. Students are encouraged to participate on a creative inquiry student research team and to take advantage of an internship and/or study abroad opportunity. The program provides an excellent background for professional or graduate study in several disciplines.

AGRICULTURAL AND FOOD SCIENCE

Freshman Year

First Semester
1. APEC 2020 Agricultural Economics
2. EXST 2220 Statistics in Everyday Life
3. MTHS 1020 Intro. to Mathematical Analysis
4. Natural Science Requirement
5. Oral Communication Requirement
16

Second Semester
1. APEC 2030 Agricultural Economics
2. ENGL 1030 Accelerated Composition
3. APEC 2040 Agricultural Economics
4. EXST 2220 Statistics in Everyday Life
5. Arts and Humanities (Non-Lit.) Requirement
15

Sophomore Year

First Semester
1. ACCT 2010 Financial Accounting Concepts
2. APEC 3020 Economics of Farm Management
3. ECON 2120 Principles of Macroeconomics
4. MGT 2100 Principles of Management
5. Arts and Humanities (Literature) Requirement
15

Second Semester
1. APEC 3020 Agricultural Economics
2. ENGL 1030 Accelerated Composition
3. EXST 3010 Introductory Statistics
4. APEC 3040 Agricultural Economics
5. Arts and Humanities (Non-Lit.) Requirement
16

Third Semester
1. ACCT 2010 Financial Accounting Concepts
2. APEC 3020 Economics of Farm Management
3. ECON 2120 Principles of Macroeconomics
4. MGT 2100 Principles of Management
5. Arts and Humanities (Literature) Requirement
15

Fourth Semester
1. ACCT 2010 Financial Accounting Concepts
2. APEC 3020 Economics of Farm Management
3. ECON 2120 Principles of Macroeconomics
4. MGT 2100 Principles of Management
5. Arts and Humanities (Literature) Requirement
15

APPLIED ECONOMICS AND STATISTICS

Bachelor of Science

The Applied Economics and Statistics — Agribusiness Emphasis Area curriculum provides strong training in economic and business principles as applied in agribusiness enterprises. Core classes in the major focus on agribusiness economics and management, leadership, marketing and sales, finance, accounting, and business skill development. Employment opportunities for graduates are many and diverse. Private sector opportunities include national and international careers in agribusiness management, banking, finance, sales, marketing, and public relations. Public sector opportunities include positions in organizations that promote food, agriculture, and natural resource interests; government agencies; and educational institutions. Moreover, the curriculum design provides graduates with the skills necessary to successfully establish their own businesses. By completing this curriculum, graduates will have fulfilled the requirements for an approved minor in the college, allowing students to tailor the program to meet specific career objectives.

The curriculum also emphasizes training on globalization, information technology, and interdisciplinary skills needed to analyze the complex interrelationships between the business, the environment and society. Students are encouraged to participate on a creative inquiry student research team and to take advantage of an internship and/or study abroad opportunity. The program provides an excellent background for professional or graduate study in several disciplines.

AGRICULTURAL AND FOOD SCIENCE

Freshman Year

First Semester
1. APEC 2020 Agricultural Economics
2. EXST 2220 Statistics in Everyday Life
3. MTHS 1020 Intro. to Mathematical Analysis
4. Natural Science Requirement
5. Oral Communication Requirement
16

Second Semester
1. APEC 2030 Agricultural Economics
2. ENGL 1030 Accelerated Composition
3. APEC 2040 Agricultural Economics
4. EXST 2220 Statistics in Everyday Life
5. Arts and Humanities (Non-Lit.) Requirement
15

Sophomore Year

First Semester
1. ACCT 2010 Financial Accounting Concepts
2. APEC 3020 Economics of Farm Management
3. ECON 2120 Principles of Macroeconomics
4. MGT 2100 Principles of Management
5. Arts and Humanities (Literature) Requirement
15

Second Semester
1. APEC 3020 Agricultural Economics
2. ENGL 1030 Accelerated Composition
3. EXST 3010 Introductory Statistics
4. APEC 3040 Agricultural Economics
5. Arts and Humanities (Non-Lit.) Requirement
16

Third Semester
1. ACCT 2010 Financial Accounting Concepts
2. APEC 3020 Economics of Farm Management
3. ECON 2120 Principles of Macroeconomics
4. MGT 2100 Principles of Management
5. Arts and Humanities (Literature) Requirement
15

Fourth Semester
1. ACCT 2010 Financial Accounting Concepts
2. APEC 3020 Economics of Farm Management
3. ECON 2120 Principles of Macroeconomics
4. MGT 2100 Principles of Management
5. Arts and Humanities (Literature) Requirement
15
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. BCHM 1030 Careers in Biochem. and Genetics
2. BIOL 1100 Principles of Biology I
3. CH 1010 General Chemistry
4. MTHS 1060 Calculus of One Variable I
Second Semester
1. BCHM 1110 Principles of Biology II
2. CH 1020 General Chemistry
3. ENGL 1030 Accelerated Composition
4. MTHS 1080 Calculus of One Variable II

Sophomore Year
First Semester
1. CH 2230 Organic Chemistry
2. CH 2270 Organic Chemistry Lab.
3. GEN 3020 Molecular and General Genetics
4. GEN 3030 Molecular and Gen. Genetics Lab.
5. PHYS 1220 Physics with Calculus I
Second Semester
1. CH 2280 Organic Chemistry Lab.
2. CH 2280 Organic Chemistry Lab.
3. PHYS 1230 Physics Lab. II
4. PHYS 1230 Physics Lab. II

Junior Year
First Semester
1. BCHM 4310 Physical Approach to Biochem.
2. BCHM 4330 General Biochemistry Lab. I
3. CH 3300 Introduction to Physical Chemistry
4. Science Requirement
5. Elective
Second Semester
1. BCHM 4320 Biochemistry of Metabolism
2. BCHM 4340 General Biochemistry Lab. II
3. BCHM 4360 Molecular Biol.; Genes to Proteins
4. PHIL 3260 Science and Values
5. Science Requirement

Senior Year
First Semester
1. BIOL 4610 Cell Biology
2. GEN (BCHM) 4400 Bioinformatics
3. Social Science Requirement
4. Elective
5. Elective

Second Semester
2. BCHM 4930 Senior Seminar
3. Science Requirement
4. Social Science Requirement
6. Elective
14
120-121 Total Semester Hours

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**
1. BIOL 1010 Frontiers in Biology I
2. BIOL 1100 Principles of Biology I
3. CH 1010 General Chemistry
4. COMM 1500 Intro to Human Comm. or COMM 2500 Public Speaking
5. MTHS 1060 Calculus of One Variable I

**Second Semester**
6. BIOL 1110 Principles of Biology II
7. CH 1020 General Chemistry
8. ENGL 1030 Accelerated Composition
9. MATH 1240 Physics Lab. I

**Sophomore Year**

**First Semester**
1. CH 2230 Organic Chemistry I
2. CH 2270 Organic Chemistry Lab. or CH 2210 Survey of Organic Chemistry
3. GEN 3000 Fundamental Genetics
4. Arts and Humanities (Literature) Requirement
5. Organismal Diversity Requirement
6. Elective

**Second Semester**
7. BCHM 3010 Molecular Biochemistry or BCHM 3050 Essentials Elements of Bioch.
8. BIOL 3350 Evolutionary Biology
9. Elective
10. Major Requirement
11. Social Science Requirement

**Junior Year**

**First Semester**
1. BIOL 4930 Senior Seminar
2. Major Requirement
3. Social Science Requirement
4. Elective

**Second Semester**
5. Major Requirement
6. Elective

**Senior Year**

**First Semester**
1. BIOL 4610 Cell Biology
2. BIOL 4620 Cell Biology Laboratory
3. PHYS 2070 General Physics I and
   1. PHYS 2090 General Physics I Lab. or
   3. PHYS 1220 Physics with Calculus I and
   1. PHYS 1240 Physics Lab. I
4. Ecology Requirement
5. Entomology Requirement

**Second Semester**
6. Elective
7. Social Science Requirement
8. Functional Biology Requirement
9. Elective

**ENTOMOLOGY EMPHASIS AREA**
See Biology Science curriculum for freshman year requirements.

**Sophomore Year**

**First Semester**
1. CH 2230 Organic Chemistry I
2. BIOL 4610 Cell Biology
3. BIOL 4620 Cell Biology Lab.
4. PHYS 2070 General Physics I and
5. PHYS 2090 General Physics I Lab. or
6. PHYS 2210 Physics with Calculus I and
7. PHYS 2230 Physics Lab. II
8. Arts and Humanities (Non-Lit.) Requirement
9. Functional Biology Requirement
10. Major Requirement

**Second Semester**
11. Elective
12. Social Science Requirement
13. Functional Biology Requirement

**Junior Year**

**First Semester**
1. BIOL 4610 Cell Biology
2. BIOL 4620 Cell Biology Laboratory
3. PHYS 2070 General Physics I and
4. PHYS 2090 General Physics I Lab. or
5. PHYS 1220 Physics with Calculus I and
6. PHYS 1240 Physics Lab. I
7. Ecology Requirement
8. Entomology Requirement
9. Elective
10. Social Science Requirement
11. Functional Biology Requirement

**Second Semester**
12. Elective
13. Social Science Requirement
14. Functional Biology Requirement
15. Elective

**ENTOMOLOGY EMPHASIS AREA**
See Biology Science curriculum for freshman year requirements.
PREPHARMACY EMPHASIS AREA

Freshman Year
First Semester
1 - BIOL 1010 Frontiers in Biology I
3 - BIOL 1030 General Biology I
1 - BIOL 1050 General Biology Lab. I
4 - CH 1010 General Chemistry
3 - COMM 1500 Intro. to Human Comm. or
3 - COMM 2500 Public Speaking
4 - MTHS 1060 Calculus of One Variable I

Second Semester
3 - BIOL 1040 General Biology II
1 - PHYS 1060 General Physics Lab. II
4 - CH 1020 General Chemistry
3 - ENGL 1030 Accelerated Composition
3 - Elective
1 - BIOL 1060 General Biology Lab. II

Sophomore Year
First Semester
3 - CH 2230 Organic Chemistry
1 - CH 2270 Organic Chemistry Lab. or
4 - CH 21020 Survey of Organic Chemistry
3 - GEN 3000 Fundamental Genetics
3 - Arts and Humanities (Literature) Requirement
3 - Organismal Diversity Requirement
2 - Elective

Second Semester
3 - BCHM 3010 Molecular Biochemistry or
3 - BCHM 3050 Essential Elements of Bioch.
3 - BIOL 3350 Evolutionary Biology
3 - CH 2240 Organic Chemistry and
1 - CH 2280 Organic Chemistry Lab.
3 - Social Science Requirement
3 - Elective

Junior Year
First Semester
4 - BIOL 3150 Functional Human Anatomy
3 - BIOL 4610 Cell Biology
2 - BIOL 4620 Cell Biology Laboratory
3 - PHYS 2070 General Physics I and
1 - PHYS 2090 General Physics I Lab.
3 - Arts and Humanities (Non-Lit.) Requirement
3 - Economics Requirement

Second Semester
4 - BIOL 3160 Human Physiology
3 - ENGL 3150 Scientific Writing and Comm.
3 - PHYS 2080 General Physics II and
1 - PHYS 2100 General Physics II Lab. or
3 - PHYS 2210 Physics with Calculus II and
1 - PHYS 2230 Physics Lab. II
3 - Arts and Humanities (Literature) Requirement
3 - Ecology Requirement

Senior Year
First Semester
2 - BIOL 4930 Senior Seminar
3 - Ecology Requirement
3 - Major Requirement
5 - Elective

Second Semester
4 - MICR 3050 General Microbiology
3 - Major Requirement
6 - Elective

121–122 Total Semester Hours

PHY
S 2210 Physics with Calculus II
S 1240 Physics Lab. I
S 1220 Physics with Calculus I

10 Survey of Organic Chemistry

1–2 extra credits from departmental course offerings at the 2000 level or higher.

First Semester
3 - Arts and Humanities (Non-Lit.) Requirement
4 - Arts and Humanities (Literature) Requirement
3 - Elective

Second Semester
1 - PHY
3 - PHY

122 Total Semester Hours

BIOL 1100 and 1110 are strongly recommended; however, BIOL 1030/1050 may substitute for BIOL 1100, and BIOL 1040/1060 may substitute for BIOL 1110. The remaining 1–2 credit hours required must be satisfied by completing 1–2 extra credits from departmental course offerings at the 2000 level or higher.

Most professional health sciences schools require two semesters of organic chemistry with laboratory.

At least one lecture and associated laboratory selected from BIOL 3010, 3020/3060, 3030/3070, 3040/3080, 3200, 4060/4070, 4250/4260 or other approved coursework at the 2000 level or higher.

ECON 2000, 2110, or 2120

Six credit hours must be selected from BIOL or MICR courses at the 3000 level or above or from the department-approved list.

BLUE
S 2230 Physics Lab. II

See Bachelor of Science curriculum for freshman year requirements.

Sophomore Year
First Semester
3 - CH 2230 Organic Chemistry and
1 - CH 2270 Organic Chemistry Lab. or
4 - CH 21020 Survey of Organic Chemistry
3 - GEN 3000 Fundamental Genetics
3 - Arts and Humanities (Literature) Requirement
3 - Organismal Diversity Requirement
2 - Elective

Second Semester
3 - BCHM 3010 Molecular Biochemistry or
3 - BCHM 3050 Essential Elements of Bioch.
3 - BIOL 3350 Evolutionary Biology
3 - CH 2240 Organic Chemistry and
1 - CH 2280 Organic Chemistry Lab.
3 - Social Science Requirement
3 - Elective

Junior Year
First Semester
3 - BIOL 4610 Cell Biology
2 - BIOL 4620 Cell Biology Lab.
3 - EXST 3110 Introductory Statistics I
3 - PHYS 2070 General Physics I and
1 - PHYS 2090 General Physics I Lab. or
3 - PHYS 1220 Physics with Calculus I and
1 - PHYS 1240 Physics Lab. I

Second Semester
4 - BIOL 4820 Quantitative Biology
3 - GEN 3150 Scientific Writing and Comm.
3 - PHYS 2080 General Physics II and
1 - PHYS 2100 General Physics II Lab. or
3 - PHYS 2210 Physics with Calculus II and
1 - PHYS 2230 Physics Lab. II
3 - Arts and Humanities (Literature) Requirement
3 - Ecology Requirement

Senior Year
First Semester
2 - BIOL 4930 Senior Seminar
3 - GEN 4400 Bioinformatics
3 - Functional Biology Requirement
3 - Social Science Requirement
2 - Elective

Second Semester
1 - BIOL 4910 Undergraduate Research
3 - Arts and Humanities (Non-Lit.) Requirement
3 - Elective

122 Total Semester Hours

BIOL 1100 and 1110 are strongly recommended; however, BIOL 1030/1050 may substitute for BIOL 1100, and BIOL 1040/1060 may substitute for BIOL 1110. The remaining 1–2 credit hours required must be satisfied by completing 1–2 extra credits from departmental course offerings at the 2000 level or higher.

Most professional health sciences schools require two semesters of organic chemistry with laboratory.

At least one lecture and associated laboratory selected from BIOL 3010, 3020/3060, 3030/3070, 3040/3080, 3200, 4060/4070, 4250/4260 or other approved coursework at the 2000 level or higher.

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

See advisor.

Four credit hours must be selected from BIOL or MICR courses at the 3000 level or above or CH 224/228, or from the department-approved list.

At least one course selected from BIOL 4410, 4420, 4430, 4460, 4700, or MICR 4010.

At least one course selected from BIOL 360, 4010, 4080, 4590, 4750, or 4800.

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

Sophomore Year
First Semester
3 - BIOL 2100 Introduction to Toxicology
3 - CH 2230 Organic Chemistry and
1 - CH 2270 Organic Chemistry Lab. or
4 - CH 21020 Survey of Organic Chemistry
4 - Organismal Diversity Requirement
3 - Partial Differential Equations Requirement
2 - Elective

Second Semester
3 - BCHM 3010 Molecular Biochemistry or
3 - BCHM 3050 Essential Elements of Bioch.
3 - EXST 3010 Introductory Statistics I
4 - Major Requirement
3 - Social Science Requirement
3 - Elective

Junior Year
First Semester
3 - BIOL 3350 Evolutionary Biology
3 - BIOL 4610 Cell Biology
2 - BIOL 4620 Cell Biology Lab.
3 - EXST 3110 Introductory Statistics II
3 - PHYS 2070 General Physics I and
1 - PHYS 2090 General Physics I Lab. or
3 - PHYS 1220 Physics with Calculus I and
1 - PHYS 1240 Physics Lab. I

Second Semester
4 - BIOL 4280 Quantitative Biology
3 - ENGL 3150 Scientific Writing and Comm.
3 - PHYS 2080 General Physics II and
1 - PHYS 2100 General Physics II Lab. or
3 - PHYS 2210 Physics with Calculus II and
1 - PHYS 2230 Physics Lab. II
3 - Arts and Humanities (Literature) Requirement
3 - Ecology Requirement

Senior Year
First Semester
2 - BIOL 4930 Senior Seminar
3 - GEN 4400 Bioinformatics
3 - Functional Biology Requirement
3 - Social Science Requirement
2 - Elective

Second Semester
1 - BIOL 4910 Undergraduate Research
3 - Arts and Humanities (Non-Lit.) Requirement
3 - Elective
BIOLOGICAL SCIENCES

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

Double Major in Biological Sciences/Science Teaching—Biological Sciences
The Bachelor of Arts Degree in Biological Sciences and Science Teaching—Biological Sciences prepares students for teaching biology on the secondary school level and for graduate study in any of the life science areas. See page 114 for the curriculum.

Freshman Year
First Semester
1 - BIOL 1010 Frontiers in Biology I
2 - BIOL 1010 General Biology Lab
3 - GEN 1000 General Chemistry
4 - CH 1010 General Chemistry
5 - BIOL 1110 Principles of Biology I
6 - Elective
7 - Elective

Second Semester
1 - BIOL 1010 Frontiers in Biology II
2 - BIOL 1010 General Biology Lab
3 - GEN 1000 General Chemistry
4 - CH 1010 General Chemistry
5 - BIOL 1110 Principles of Biology II
6 - Elective
7 - Elective

Sophomore Year
First Semester
1 - BIOL 2230 Organic Chemistry I and
2 - BIOL 2230 Organic Chemistry Lab
3 - GEN 3000 General Genetics
4 - Foreign Language Requirement
5 - Social Science Requirement
6 - Minor Requirement

Second Semester
3 - BIOL 3350 Evolutionary Biology
4 - CH 3130 Quantitative Analysis
5 - CH 3130 Quantitative Analysis Lab
6 - Arts and Humanities (Literature) Requirement
7 - Functional Biology Requirement
8 - Elective

Junior Year
First Semester
3 - BIOL 3350 Evolutionary Biology
4 - BIOL 4610 Cell Biology
5 - BIOL 4620 Cell Biology Laboratory
6 - ENGL 3150 Scientific Writing and Comm.
7 - Foreign Language Requirement
8 - Ecology Requirement
9 - Minor Requirement

Second Semester
3 - Arts and Humanities (Non-Lit.) Requirement
4 - Foreign Language Requirement
5 - Ecology Requirement
6 - Minor Requirement

Senior Year
First Semester
2 - BIOL 4930 Senior Seminar
3 - PHYS 2070 General Physics I
4 - PHYS 2070 General Physics I Lab
5 - Functional Biology Requirement
6 - Social Science Requirement

Second Semester
3 - PHYS 2080 General Physics II
4 - PHYS 2080 General Physics II Lab
5 - Minor Requirement
6 - Elective

121-122 Total Semester Hours

*Required courses include at least one course selected from BIOL 4410, 4420, 4430, 4460, or CH 4010. At least one course selected from BIOL 4410, 4420, 4430, 4460, or CH 4010.

3 - ETOX 4300 Toxicology
4 - Major Requirement
5 - Social Science Requirement
6 - Elective

College of Agriculture, Forestry and Life Sciences

Second Semester
3 - BCHM 3010 Molecular Biochemistry or
4 - BCHM 3050 Essential Elements of Bioch.
5 - Foreign Language Requirement
6 - Major Requirement
7 - Organismal Diversity Requirement

140 Total Semester Hours

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

Freshman Year
First Semester
1 - BIOL 1010 Frontiers in Biology I
3 - BIOL 1030 General Biology I1
1 - BIOL 1050 General Biology Lab. I
4 - CH 1010 General Chemistry
3 - COMM 1500 Intro. to Human Comm. or
3 - COMM 2500 Public Speaking
4 - MTHS 1060 Calculus of One Variable I
16
Second Semester
3 - BIOL 1040 General Biology II1 and
1 - BIOL 1060 General Biology Lab. II1
4 - CH 1020 General Chemistry
3 - ENGL 1030 Accelerated Composition
3 - Statistics Requirement2
14
Sophomore Year
First Semester
4 - CH 2010 Survey of Organic Chemistry3
3 - GEN 3000 Fundamental Genetics4
4 - Foreign Language Requirement5
4 - Organismal Diversity Requirement6
15
Second Semester
3 - BCHM 3010 Molecular Biochemistry or
3 - BCHM 3050 Essential Elements of Bioch.4
3 - PSYC 2010 Introduction to Psychology
3 - Arts and Humanities (Non-Lit.) Requirement1
4 - Foreign Language Requirement5
3 - Social Science Requirement2
16
Junior Year
First Semester
4 - BIOL 3150 Functional Human Anatomy
3 - BIOL 3350 Evolutionary Biology
3 - BIOL 4610 Cell Biology
2 - BIOL 4620 Cell Biology Laboratory
3 - Foreign Language Requirement5
15
Second Semester
4 - BIOL 3160 Human Physiology
3 - Arts and Humanities (Non-Lit.) Requirement1
3 - Foreign Language Requirement5
6 - Minor Requirement6
16
Senior Year
First Semester
2 - BIOL 4930 Senior Seminar
3 - ENGL 3150 Scientific Writing and Comm.
3 - PHYS 2070 General Physics I
1 - PHYS 2090 General Physics I Lab.
3 - Ecology Requirement6
3 - Minor Requirement6
15
Second Semester
3 - PHYS 2080 General Physics II
1 - PHYS 2100 General Physics II Lab.
6 - Minor Requirement6
3 - Prerehabilitation Requirement6
2 - Elective
15
122 Total Semester Hours

1Rehabilitation programs require BIOL 1030/1050 and 1040/1060 or equivalent; however, BIOL 1100 and 1110 may substitute.
2At least one lecture and associated laboratory selected from BIOL 3010, 3020/3060, 3050/3070, 3040/3080, 3210/3220, 4250/4260, or other approved coursework at the 200 level or higher.
3At least one lecture and associated laboratory selected from BIOL 4410, 4420, 4430, 4460, 4700, or MCR 4300.
4BIOL 4780 or 4790 or MCR 3750. BIOL 4780 or 4790 is recommended for physical and occupational therapy programs. MCR 3750 is recommended for Physician Assistant programs.
5Students planning to take organic chemistry must take CH 1010 and 1020 and must satisfy the General Education Science and Technology in Society Requirement through another course.
6See advisor. Conservation Biology Concentration students or students planning to take organic chemistry must take CH 1010 and CH 1020 and must satisfy the General Education Science and Technology in Society Requirement through another course.

ENVIRONMENTAL AND NATURAL RESOURCES

Bachelor of Science

The Environmental and Natural Resources curriculum produces professionals who have a broad-based knowledge of natural resources and an ability to interact with other resource professionals to provide thoughtful solutions to environmental and natural resource problems. The world is blessed with an abundance of natural resources, but the problems associated with their conservation are immense. Protection of rare and endangered species, preventing and controlling invasions of exotics, protecting old growth forests, restoring degraded ecosystems, and balancing the resource demands of industry and the public are some of the environmental issues which are enmeshed in politicized environments. Three concentrations are offered within the Environmental and Natural Resources major, which is administered by the School of Agricultural, Forest, and Environmental Sciences. 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. The Natural Resource and Economic Policy Concentration provides more in-depth study in economics and policy applications.

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 1030 General Biology I
1 - BIOL 1050 General Biology Lab. I
4 - CH 1010 or 1050 (Chemistry Requirement)3
1 - ENR 1010 Intro. to Env. and Natural Res. I
3 - MTHS 1020 Intro. to Mathematical Analysis
3 - Oral Communications Requirement2
15
Second Semester
3 - BIOL 1040 General Biology II
1 - BIOL 1060 General Biology Lab. II
4 - CH 1020 or 1060 (Chemistry Requirement)3
1 - ENR 1020 General Physical Science
15
Junior Year
First Semester
3 - PSYC 2010 Introduction to Psychology
3 - BCHM 3010 Molecular Biochemistry
or
2 - Elective
15
Second Semester
15

CONSERVATION BIOLOGY CONCENTRATION

Sophomore Year
First Semester
3 - APEC 2570 Natural Resources, Environment, and Economics or
3 - ECON 2110 Principles of Microeconomics
4 - BIOL 3200 Field Botany and
1 - Elective or
2 - FOR 2050 Dendrology and
3 - FOR 2120 Forest Biology
3 - CH 2230 Organic Chemistry
4 - FNR 2040 Soil Information Systems or
4 - CSEN 2020 Soils
15
Second Semester
3 - GEN 3000 Fundamental Genetics
3 - WFB (BIOI) 3130 Conservation Biology
3 - Arts and Humanities (Literature) Requirement1
3 - Physical Environment Requirement2
3 - Taxonomy/Habitat Requirement3
15
Junior Year
First Semester
3 - BIOL 3350 Evolutionary Biology
3 - Arts and Humanities (Non-Lit.) Requirement1
3 - Ecology Requirement6
3 - Natural Resource Economics Requirement5
3 - Taxonomy/Habitat Requirement3
Second Semester
3 - ENGL 3140 Technical Writing
3 - ENR 3020 Natural Resources Measurements
3 - Ecology Requirement
3 - Physiology Requirement
3 - Taxonomy/Habitat Requirement
15

Senior Year
First Semester
3 - FOR (ENR) 4340 GIS for Landscape Planning
3 - Conservation Policy/Law Requirement
3 - Internship, Creative Inquiry or Directed Research
3 - Social Science Requirement
3 - Taxonomy/Habitat Requirement
15

Second Semester
3 - ENR (BIOL) 4130 Restoration Ecology
3 - ENR 4500 Conservation Issues
1 - FOR 4980 Senior Portfolio or
1 - WFB 4980 Senior Portfolio
6 - Taxonomy/Habitat Requirement
2 - Elective
15

120 Total Semester Hours

*Natural Resource and Economic Policy Concentration*

Sophomore Year
First Semester
3 - APEC 2570 Natural Resources, Environment and Economics
3 - ECON 3140 Intermediate Microeconomics
3 - ENR 4290 Environmental Law and Policy
3 - Advanced Writing Requirement
3 - Applied Economics Requirement
3 - Natural Science Requirement
15

Second Semester
3 - APEC 4470 Wildlife Economics
3 - ENSP 4000 Studies in Environmental Science
3 - EXST 4620 Statistics Applied to Economics
3 - Macroeconomics Requirement
3 - Natural Science Requirement
15

Junior Year
First Semester
3 - APEC 4750 Wildlife Economics
3 - ENSP 4000 Studies in Environmental Science
3 - EXST 4620 Statistics Applied to Economics
3 - Macroeconomics Requirement
3 - Natural Science Requirement
15

Second Semester
3 - APEC 4470 Wildlife Economics
3 - ENSP 4000 Studies in Environmental Science
3 - EXST 4620 Statistics Applied to Economics
3 - Macroeconomics Requirement
3 - Natural Science Requirement
15

Senior Year
First Semester
3 - APEC 4470 Wildlife Economics
3 - ENSP 4000 Studies in Environmental Science
3 - EXST 4620 Statistics Applied to Economics
3 - Macroeconomics Requirement
3 - Natural Science Requirement
15

Second Semester
3 - APEC 4470 Wildlife Economics
3 - ENSP 4000 Studies in Environmental Science
3 - EXST 4620 Statistics Applied to Economics
3 - Macroeconomics Requirement
3 - Natural Science Requirement
15

120 Total Semester Hours

*Natural Resources Management Concentration*

Sophomore Year
First Semester
4 - FNR 2040 Soil Information Systems
4 - CSEN 2020 Soils
2 - FOR 2050 Dendrology
3 - FOR 2210 Forest Ecology
3 - WFB 3000 Wildlife Ecology
3 - Arts and Humanities (Literature) Requirement
15

Second Semester
3 - APEC (CRD) 3570 Natural Res. Economics
3 - ECON 2120 Principles of Macroeconomics
3 - Arts and Humanities (Literature) Requirement
3 - Arts and Humanities (Non-Lit.) Requirement
3 - Elective
15
FOOD SCIENCE

Bachelor of Science

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

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

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

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

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

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

FOOD SCIENCE AND TECHNOLOGY CONCENTRATION

Freshman Year
First Semester
3 - BIOL 1030 General Biology I and
1 - BIOL 1050 General Biology Lab. I or
5 - BIOL 1100 Principles of Biology I
4 - CH 1010 General Chemistry
3 - COMM 1500 Intro. to Human Comm. or
3 COMM 2500 Creative Inquiry
1 - FDSC 1020 Perspectives in Food and Packaging Industries
1 - FDSC (PKSC) 4090 Total Quality Mgt. for the Food and Packaging Industries
4 - CH 2010 Survey of Organic Chemistry or
3 - CH 2230 Organic Chemistry and
1 - CH 2270 Organic Chemistry Lab.
1 - FDSC 4500 Creative Inquiry
1 - PHYS 1240 Physics Lab. I or
4 - PHYS 2000 Introductory Physics or
3 - PHYS 2070 General Physics I and
1 - PHYS 2090 General Physics I Lab.
3 - Arts and Humanities (Literature) Requirement
1 - Social Science Requirement
2 - Elective
15-17
Second Semester
3 - BIOL 1040 General Biology II and
1 - BIOL 1060 General Biology Lab. II or
5 - BIOL 1110 Principles of Biology II
4 - CH 1020 General Chemistry
3 - COMM 1500 Intro. to Human Comm. or
3 COMM 2500 Public Speaking
1 - FDSC 1020 Perspectives in Food and Packaging Industries
4 - CH 2010 Survey of Organic Chemistry or
3 - CH 2230 Organic Chemistry and
1 - CH 2270 Organic Chemistry Lab.
1 - FDSC 4500 Creative Inquiry
3 - Arts and Humanities (Non-Lit.) Requirement
1 - Social Science Requirement
2 - Elective
15

Sophomore Year
First Semester
4 - CH 2010 Survey of Organic Chemistry or
3 - CH 2230 Organic Chemistry and
1 - CH 2270 Organic Chemistry Lab.
1 - FDSC 4500 Creative Inquiry
3 - PHYS 1220 Physics with Calculus I and
1 - PHYS 1240 Physics Lab. I or
4 - PHYS 2000 Introductory Physics or
3 - PHYS 2070 General Physics I and
1 - PHYS 2090 General Physics I Lab.
3 - Arts and Humanities (Literature) Requirement
1 - Social Science Requirement
2 - Elective
17
Second Semester
3 - BCHM 3050 Essential Elements of Biochemistry
2 - BIOL 4340 Biological Chemistry Lab. Techniq.
3 - EXST 3010 Introductory Statistics
1 - FDSC 2140 Food Resources and Society
1 - FDSC 4500 Creative Inquiry
3 - Arts and Humanities (Non-Lit.) Requirement
2 - Electives

Junior Year
First Semester
1 - FDSC 3010 Food Regulations and Policy
1 - FDSC 4170 Seminar
1 - FDSC 4500 Creative Inquiry
4 - MICR 3050 General Microbiology
3 - NUTR 4510 Human Nutrition
1 - Departmental Requirement
2 - Emphasis Area Requirement
15
Second Semester
3 - ENGL 3040 Business Writing or
3 - ENGL 3140 Technical Writing
2 - FDSC 4030 Food Chemistry and Analysis
4 - FDSC 4100 Food Product Development
1 - FDSC 4500 Creative Inquiry
4 - MICR 4070 Food and Dairy Microbiology
3 - Emphasis Area Requirement
17

Senior Year
First Semester
3 - FDSC 3060 Food Service Operations or
3 - FDSC 3070 Restaurant Food Service Mgt.
3 - FDSC 4010 Food Chemistry I
3 - FDSC 4040 Food Preservation and Processing
2 - FDSC 4070 Quantity Food Production
1 - FDSC 4500 Creative Inquiry
3 - Emphasis Area Requirement
15
Second Semester
3 - BCHM 3050 Essential Elements of Biochem.
2 - BIOL 4340 Biological Chemistry Lab. Techniq.
3 - EXST 3010 Introductory Statistics
3 - NUTR 2040 Life Cycle Nutrition
3 - Arts and Humanities (Literature) Requirement
3 - Arts and Humanities (Non-Lit.) Requirement
17

NUTRITION AND DIETETICS CONCENTRATION

Freshman Year
First Semester
3 - BIOL 1030 General Biology I and
1 - BIOL 1050 General Biology Lab. I or
5 - BIOL 1100 Principles of Biology I
4 - CH 1010 General Chemistry
3 - COMM 1500 Intro. to Human Comm. or
3 COMM 2500 Public Speaking
1 - FDSC 1020 Perspectives in Food and Packaging Industries
1 - FDSC 1020 Intro. to Math. Analysis or
4 - MTHS 1020 Calculus of One Variable I
15-17
Second Semester
3 - BIOL 1040 General Biology II and
1 - BIOL 1060 General Biology Lab. II or
5 - BIOL 1110 Principles of Biology II
4 - CH 1020 General Chemistry
3 - ENGL 1030 Accelerated Composition
1 - FDSC 1020 Perspectives in Food and Nutrition Sciences
3 - PSYC 2010 Introduction to Psychology
15-16

Sophomore Year
First Semester
3 - APEC 2020 Agricultural Economics or
3 - ECON 2110 Principles of Microeconomics or
3 - ECON 2120 Principles of Macroeconomics
4 - CH 2010 Survey of Organic Chemistry or
3 - CH 2230 Organic Chemistry and
1 - CH 2270 Organic Chemistry Lab.
1 - NUTR 2160 Current Issues in Nutrition
3 - NUTR 2030 Principles of Human Nutrition
3 - PHYS 1220 Physics with Calculus I and
1 - PHYS 1240 Physics Lab. I or
4 - PHYS 2000 Introductory Physics or
3 - PHYS 2070 General Physics I and
1 - PHYS 2090 General Physics I Lab.
15-17
Second Semester
3 - BCHM 3050 Essential Elements of Biochem.
2 - BIOL 4340 Biological Chemistry Lab. Techniq.
3 - EXST 3010 Introductory Statistics
3 - NUTR 2040 Life Cycle Nutrition
3 - Arts and Humanities (Literature) Requirement
3 - Arts and Humanities (Non-Lit.) Requirement
17
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 63). The curriculum also provides the necessary prerequisites for graduate study.

For students interested in conservation biology, water, and natural resources, the School of Agricultural, Forest and Environmental Sciences also administers the Conservation Biology Concentration and the Natural Resources Management Concentration within the Environmental and Natural Resources degree program. See pages 51-52 for program details.

Freshman Year
First Semester
1 - FNR 1020 FNR Freshman Portfolio
2 - BIOL 1060 General Biology Lab. II
3 - MTHS 1020 Intro. to Mathematical Analysis
4 - CH 1010 General Chemistry

Second Semester
1 - BIOL 1030 General Biology I
2 - FOR 2520 Forest Operations
3 - FOR 2050 Dendrology
4 - EXST 3010 Introductory Statistics

Second Semester
1 - FNR 4990 Natural Resources Seminar
2 - FOR 4060 Forested Watershed Management
3 - FOR 4150 Forest Wildlife Management
4 - FOR 4250 Forest Resource Management Plan
5 - FOR 4980 Senior Portfolio
6 - Minor Requirement

Junior Year
First Semester
2 - FOR 3250 Remote Sensing in Forestry
3 - FOR 4080 Wood and Paper Products
4 - FOR 4180 Forest Resource Valuation
5 - FOR 4650 Silviculture
6 - Minor Requirement
1 - Internship, Creative Inquiry or Directed Research Requirement

Second Semester
1 - FOR 4100 Harvesting Processes
2 - FOR 4060 Forested Watershed Management
3 - FOR 4150 Forest Wildlife Management
4 - FOR 4250 Forest Resource Management Plan
5 - FOR 4980 Senior Portfolio
6 - Minor Requirement

LAND SURVEYING
EMPHASIS AREA
Freshman Year
First Semester
3 - BIOL 1030 General Biology I
4 - CH 1010 General Chemistry
1 - ENR 1010 Intro. to Environ. and Natural Res. I
3 - MTHS 1020 Intro. to Mathematical Analysis
3 - Oral Communication Requirement

Second Semester
3 - FOR 4070 Food and Dairy Microbiology
1 - NUTR 4180 Professional Dev. in Dietetics
1 - NUTR 4190 Professional Dev. in Nutrition
3 - NUTR 4550 Nutrition and Metabolism

Senior Year
First Semester
3 - ENGL 3040 Business Writing or
3 - ENGL 3140 Technical Writing
1 - MTHS 2020 Intro. to Statistics
1 - FNR 4900, 4900, or FOR 4190.

Second Semester
4 - FOR 3400 Forest Resource Economics
2 - FOR 4060 Forested Watershed Management
3 - FOR (ENR) 4160 Forest Policy and Admin.
4 - FOR 4100 Harvesting Processes
3 - FOR 4080 Wood and Paper Products

First Year
2 - FOR 3250 Remote Sensing in Forestry
3 - FOR 4080 Wood and Paper Products
3 - FOR 4180 Forest Resource Valuation
4 - FOR 4650 Silviculture
3 - Minor Requirement
1 - Internship, Creative Inquiry or Directed Research Requirement

Second Semester
2 - FOR 3020 Forest Biometrics
3 - FOR 3040 Forest Resource Economics
3 - FOR 3410 Wood Procurement Practices in the Forest Industry
4 - FOR 4130 Integrated Forest Pest Management
5 - FOR (ENR) 4340 GIS for Landscape Planning
1 - Internship, Creative Inquiry or Directed Research Requirement

First Semester
4 - FOR 3250 Remote Sensing in Forestry
3 - FOR 4080 Wood and Paper Products
3 - FOR 4180 Forest Resource Valuation
4 - FOR 4650 Silviculture
3 - Minor Requirement
1 - Internship, Creative Inquiry or Directed Research Requirement

Second Semester
2 - FOR 3020 Forest Biometrics
3 - FOR 3040 Forest Resource Economics
3 - FOR 3410 Wood Procurement Practices in the Forest Industry
4 - FOR 4130 Integrated Forest Pest Management
5 - FOR (ENR) 4340 GIS for Landscape Planning
1 - Internship, Creative Inquiry or Directed Research Requirement
Sophomore Year
First Semester
4 - FNR 2040 Soil Information Systems
2 - FOR 2050 Dendrology
3 - FOR 2210 Forest Biology
3 - Arts and Humanities (Literature) Requirement
3 - Economics Requirement
15

Second Semester
2 - ENGR 2100 Engr. Graphics for Civil Engr.
3 - ENGL 3140 Technical Writing
3 - FOR 2060 Forestry Ecology
3 - Arts and Humanities (Non-Lit.) Requirement
3 - Social Science Requirement
15

Forestry Summer Camp
2 - FOR 2510 Forest Communities
1 - FOR 2520 Forest Operations
4 - FOR 2530 Forest Mensuration
1 - FOR 2540 Forest Products
8

Junior Year
First Semester
2 - FOR 3020 Forest Biometrics
3 - FOR 3040 Forest Resource Economics
3 - FOR 3410 Wood Procurement Practices in the Forest Industry
4 - FOR 4130 Integrated Forest Pest Management
3 - (ENR) 4340 GIS for Landscape Planning
15

Second Semester
2 - AGM 2210 Surveying: Earthwork and Area Measurements
2 - FOR 3080 Remote Sensing in Forestry
3 - FOR 4080 Wood and Paper Products
3 - FOR 4180 Forest Resource Valuation
4 - FOR 4650 Silviculture
15

Summer
3 - FNR 4900 Field Training in Natural Resources

Senior Year
First Semester
4 - FOR 4100 Harvesting Processes
3 - FOR (ENR) 4160 Forest Policy and Admin.
3 - FOR 4170 Forest Resource Mgt. and Regulation
2 - FOR 4310 Rec. Resource Plan. in Forest Mgt.
3 - FOR 4330 GIS Applications
15

Second Semester
3 - BE 3220 Small Watershed Hydrology and Sedimentology
1 - FNR 4990 Natural Resources Seminar
2 - FOR 4060 Forested Watershed Management
3 - FOR 4150 Forest Wildlife Management
2 - FOR 4250 Forest Resource Management Plans
1 - FOR 4980 Senior Portfolio
1 - LAW 3330 Real Estate Law
15

130 Total Semester Hours

Second Semester
3 - FOR 4330 GIS for Landscape Planning
4 - FOR 4130 Integrated Forest Pest Management
3 - FOR 4650 Silviculture
3 - GEN 4180 Forest Resource Valuation
3 - FOR 2210 Forest Communities
3 - Arts and Humanities (Literature) Requirement
3 - Social Science Requirement
3 - Science Requirement
6 - Elective
15

Junior Year
First Semester
3 - FOR 4900 Field Training in Natural Resources
3 - FNR 4900 Field Training in Natural Resources
3 - Genetics Requirement
3 - Elective
14

Second Semester
3 - BIOL 4610 Cell Biology
3 - GEN 4410 Population and Quantitative Gen.
3 - GEN 4411 Population and Quantitative Genetics Lab.
3 - PHYS 3260 Science and Values
3 - Genetics Requirement
3 - Elective
3 - Elective
17

Senior Year
First Semester
3 - GEN 4500 Comparative Genetics
3 - Science Requirement
3 - Social Science Requirement
3 - Science Requirement
4 - Elective
15

Second Semester
2 - GEN 4930 Senior Seminar
6 - Genetics Requirement
3 - Science Requirement
4 - Elective
16

123 Total Semester Hours

Freshman Year
First Semester
5 - BIOL 100 Principles of Biology I
4 - CH 1010 General Chemistry
1 - GEN 1030 Careers in Biochem. and Genetics
4 - MTHS 1080 Calculus of One Variable II
14

Second Semester
5 - BIOL 1110 Principles of Biology II
4 - CH 1020 General Chemistry
3 - ENGL 1030 Accelerated Composition
4 - MTHS 1080 Calculus of One Variable II
16

Sophomore Year
First Semester
3 - CH 2230 Organic Chemistry
1 - CH 2270 Organic Chemistry Lab.
3 - COMM 1500 Intro. to Human Comm. or COMM 2500 Public Speaking
3 - GEN 3020 Molecular and General Genetics
3 - PHYS 1220 Physics with Calculus I
1 - PHYS 1240 Physics Lab. I
14

Second Semester
3 - BCHM 3010 Molecular Biochemistry
2 - BCHM 3020 Molecular Biochemistry Lab.
3 - CH 2240 Organic Chemistry
1 - CH 2280 Organic Chemistry Lab.
3 - EXST 3010 Introductory Statistics
3 - Arts and Humanities (Literature) Requirement
3 - Social Science Requirement
18

Second Semester
3 - BCHM 4400 Bioinformatics
3 - Science Requirement
1 - Elective
1

Junior Year
First Semester
3 - GEN 4200 Molecular Genetics and Gene Reg.
2 - GEN 4210 Molecular Genetics and Gene Regulation Lab.
3 - GEN (BCHM) 4400 Bioinformatics
3 - Science Requirement
1 - Elective
4
14

Second Semester
3 - BIOL 4610 Cell Biology
3 - GEN 4100 Population and Quantitative Gen.
2 - GEN 4111 Population and Quantitative Genetics Lab.
3 - PHYS 3260 Science and Values
3 - Genetics Requirement
3 - Elective
3 - Elective
17

Senior Year
First Semester
3 - GEN 4500 Comparative Genetics
3 - Science Requirement
3 - Social Science Requirement
3 - Science Requirement
4 - Elective
15

Second Semester
2 - GEN 4930 Senior Seminar
6 - Genetics Requirement
3 - Science Requirement
4 - Elective
16

123 Total Semester Hours

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

2. Biomedical, 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. See General Education Requirements.

3. A student is allowed to enroll in science and mathematics courses. No student may exceed a maximum of two attempts, excluding a W, to complete successfully any science or mathematics course.

4. Two semesters of a foreign language are strongly recommended.

5. APEC 2570, ECON 2000, 2110, or 2120 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.

6. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

7. Other courses must be approved by advisor. A maximum of nine credit hours from undergraduate research courses (4910, creative inquiry or similar courses) may be used towards the combined science and genetics requirements.

8. Students are encouraged to enroll in 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 1030 General Biology I
1 - BIOL 1050 General Biology Lab. I
4 - CH 1010 General Chemistry
3 - HORT 1010 Horticulture
4 - Spanish Language Requirement 1
15

Second Semester
3 - BIOL 1040 General Biology II
1 - BIOL 1060 General Biology Lab II
4 - CH 1020 General Chemistry
3 - ENGL 1030 Accelerated Composition
3 - MTHS 1020 Intro. to Mathematical Analysis
3 - Business Requirement 1
15

Sophomore Year

First Semester
3 - HORT 2100 Growing Garden Plants in the Fall
3 - HORT 3030 Landscape Plants
3 - MTHS 1010 Essential Math. for Informed Soc.
3 - Arts and Humanities (Non-Lit.) Requirement 2
4 - Plant Biology Requirement 1
16

Second Semester
4 - CSEN 2020 Soils
3 - HORT 2110 Growing Plants in the Spring
3 - Arts and Humanities (Literature) Requirement 2
3 - Social Science Requirement 2
13

Summer
3 - HORT 2710 Internship 1 or
3 - HORT 4710 Advanced Internship 1

Junior Year

First Semester
3 - HORT 3080 Sustainable Landscape Garden Design
3 - Business Requirement 1
3 - Horticulture Specialization Requirement 1
3 - Oral Communication Requirement 2
3 - Related Science Requirement 1
15

Second Semester
3 - BIOL 4010 Plant Physiology
1 - BIOL 4020 Plant Physiology Lab
3 - HORT 4040 Plant Propagation
1 - HORT 4050 Plant Propagation Techniques Lab.
3 - Horticulture Specialization Requirement 1
3 - Social Science Requirement 2
1 - Elective
15

Senior Year

First Semester
3 - HORT 4090 Senior Capstone Course
3 - Business Requirement 1
3 - Horticulture Specialization Requirement 1
3 - Related Science Requirement 1
3 - Elective
15

Second Semester
3 - Horticulture Specialization Requirement 1
6 - Related Science Requirement 1
2 - Elective
11
120 Total Semester Hours

See General Education Requirements. The Cross-Cultural Awareness Requirement and Science and Technology in Society General Education requirements must also be satisfied through these courses.

Internship must be completed in one or two semesters. Internship may be done fall, spring, or summer after completing HORT 2110. Prior approval is required for internships, and a 2.0 grade point average is required for registration.

Microbiology majors must make a C or better in all courses.

MICROBIOLOGY

Bachelor of Science

Microbiology deals with the study of bacteria, viruses, yeasts, filamentous fungi, protozoa, and uncellular 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 1100 Principles of Biology I 1
4 - CH 1010 General Chemistry
3 - COMM 1500 Intro. to Human Comm. or
3 - COMM 2500 Public Speaking
1 - MICR 1010 Microbes and Human Affairs
4 - MTHS 1060 Calculus of One Variable I
17

Second Semester
5 - BIOL 1110 Principles of Biology II 1
1 - CH 2280 General Chemistry
3 - ENGL 1030 Accelerated Composition
3 - Mathematical Sciences Requirement 2
15-16

Sophomore Year

First Semester
3 - CH 2230 Organic Chemistry
1 - CH 2270 Organic Chemistry Lab.
3 - ENGL 3150 Scientific Writing and Comm.
3 - Arts and Humanities (Literature) Requirement 3
3 - Social Science Requirement 3
3 - Elective 4
16

Second Semester
2 - BIOL 4340 Biol. Chemistry Lab. Techniques
3 - CH 2240 Organic Chemistry
1 - CH 2280 Organic Chemistry Lab.
3 - Arts and Humanities (Non-Lit.) Requirement 1
3 - Biochemistry Requirement 5
4 - General Microbiology Requirement 6
16

Junior Year

First Semester
3 - MICR 4010 Microbial Diversity and Ecology
3 - PHYS 2070 General Physics I and
1 - PHYS 2090 General Physics I Lab. or
3 - PHYS 1220 Physics with Calculus I and
1 - PHYS 1240 Physics Lab. I
6 - Microbiology Requirement 7
3 - Elective 8
16

Second Semester
3 - MICR 4120 Bacterial Physiology
2 - MICR 4500 Advanced Micro Lab I
3 - Microbiology Requirement 7
3 - Social Science Requirement 7
3 - Elective 4,8,9
14
Senior Year

First Semester
1. - CH 2330 Organic Chemistry  
2. - BIOL 4610 Cell Biology  
3. - MTHS 1110, 2030, or PHYS 2070 General Physics I and  
4. - MICR 4500 Advanced Micro Lab I  
5. - Elective  

Second Semester
1. - CH 2340 Organic Chemistry  
2. - MICR 4520 Advanced Micro Lab III  
3. - MICR 4930 Senior Seminar  
4. - Elective  
5. - Elective  

Junior Year

First Semester
1. - CH 2350 Organic Chemistry  
2. - BIOL 4620 Cell Biology Lab.  
3. - MIR 4101 Microbial Diversity and Ecology  
4. - PHYS 2090 General Physics I and  
5. - PHYS 1220 Physics with Calculus I Lab.  
6. - Elective  

Second Semester
1. - CH 2360 Organic Chemistry  
2. - MICR 4160 Introductory Virology  
3. - MICR 4170 Molecular Mechanisms of  
4. - Elective  

Sophomore Year

First Semester
1. - CH 2270 Organic Chemistry Lab.  
2. - ENGL 3150 Scientific Writing and Comm.  
3. - Arts and Humanities (Literature) Requirement  
4. - Social Science Requirement  
5. - Elective  

Second Semester
1. - CH 2280 Organic Chemistry Lab.  
2. - Arts and Humanities (Non-Lit.) Requirement  
3. - Biochemistry Requirement  
4. - Biomedicine Requirement  
5. - General Microbiology Requirement  

Senior Year

First Semester
1. - MICR 4140 Basic Immunology  
2. - MICR 4150 Microbial Genetics  
3. - MICR 4160 Introductory Virology  
4. - MICR 4520 Advanced Micro Lab II  
5. - Biomedicine Requirement  

Second Semester
1. - MICR 4900 Advanced Micro Lab II  
2. - MICR 4930 Senior Seminar  
3. - Biomedicine Requirement  
4. - Elective  

BIOMEDICINE CONCENTRATION

Freshman Year

First Semester
1. - BIOL 1100 Principles of Biology I  
2. - PHYS 2100 General Physics II Lab.  
3. - MICR 4930 Senior Seminar  
4. - Elective  
5. - Elective  

Second Semester
1. - BIOL 1110 Principles of Biology II  
2. - PHYS 2070 General Physics I and  
3. - PHYS 2090 General Physics I and  
4. - Elective  

Sophomore Year

First Semester
1. - CH 2270 Organic Chemistry  
2. - ENGL 3150 Scientific Writing and Comm.  
3. - Arts and Humanities (Literature) Requirement  
4. - Social Science Requirement  
5. - Elective  

Second Semester
1. - CH 2280 Organic Chemistry Lab.  
2. - Arts and Humanities (Non-Lit.) Requirement  
3. - Biochemistry Requirement  
4. - Biomedicine Requirement  
5. - General Microbiology Requirement  

Junior Year

First Semester
1. - CH 2330 Organic Chemistry  
2. - BIOL 4610 Cell Biology  
3. - MTHS 1110, 2030, or PHYS 2070 General Physics I and  
4. - MICR 4500 Advanced Micro Lab I  
5. - Elective  

Second Semester
1. - CH 2340 Organic Chemistry  
2. - MICR 4520 Advanced Micro Lab III  
3. - MICR 4930 Senior Seminar  
4. - Elective  

Senior Year

First Semester
1. - MICR 4140 Basic Immunology  
2. - MICR 4150 Microbial Genetics  
3. - MICR 4160 Introductory Virology  
4. - MICR 4520 Advanced Micro Lab II  
5. - Biomedicine Requirement  

Second Semester
1. - MICR 4900 Advanced Micro Lab II  
2. - MICR 4930 Senior Seminar  
3. - Biomedicine Requirement  
4. - Elective  

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, packaging, sales, design, purchasing, quality assurance, and customer services. Most career opportunities are in positions requiring technical knowledge combined with marketing and management skills.

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

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

Combined Bachelor of Science/Master of Science Degree Program

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

Freshman Year

First Semester
1. - BIOL 1050 General Biology Lab.  
2. - PHYS 2230 Physics Lab. II  
3. - Phys 2210 Physics with Calculus I Lab. or  
4. - PHYS 2240 Physics Lab. II  
5. - General Microbiology Requirement  

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2023-2024
Second Semester
3 - BIOL 1040 General Biology II
1 - BIOL 1060 General Biology Lab. II
4 - CH 1020 General Chemistry
3 - COMM 2500 Public Speaking
3 - ENGL 1030 Accelerated Composition
2 - PKSC 1020 Intro. to Packaging Science¹

Second Semester
3 - APEC 2020 Agricultural Economics or
3 - ECON 2110 Principles of Microeconomics
1 - PKSC 4030 Packaging Career Preparation
3 - PKSC 4200 Package Design and Development
1 - Arts and Humanities (Non-Lit.) Requirement²
6 - Emphasis Area Requirement⁶
16

Sophomore Year
First Semester¹
4 - CH 2010 Survey of Organic Chemistry or
3 - CH 2230 Organic Chemistry and
1 - CH 2270 Organic Chemistry Lab.
1 - PHYS 2070 General Physics I and
1 - PHYS 2090 General Physics I Lab. or
3 - PHYS 1220 Physics with Calculus I and
1 - PHYS 1240 Physics Lab. II
4 - PKSC 2020 Packaging Materials and Manuf.¹
4 - PKSC 2200 Product/Package Design and Prototyping
14

Second Semester¹
3 - PHYS 2070 General Physics II and
1 - PHYS 2160 General Physics II Lab. or
3 - PHYS 2210 Physics with Calculus II and
1 - PHYS 2230 Physics Lab. II
3 - PKSC 2010 Packaging Perishable Products
1 - PKSC 2040 Container Systems¹
1 - PKSC 2060 Container Systems Lab.¹
3 - Arts and Humanities (Literature) Requirement²
14

Summer
0 - COOP 1010 Cooperative Education⁴

Junior Year
First Semester
3 - ENGL 3140 Technical Writing
4 - GC 1030 Graphic Comm. I for Packaging Sci.
3 - EXST 3010 Introductory Statistics
3 - PKSC 4040 and 4540 must be taken concurrently.

First Semester
1 - Elective
3 - ECON 2000 Economic Concepts
4 - CH 1020 General Chemistry
1 - BIOL 1060 General Biology Lab. II
3 - PSYC 2010 Introduction to Psychology
4 - MTHS 1060 Calculus of One Variable I
4 - CH 1010 General Chemistry
1 - BIOL 1050 General Biology Lab. I
3 - BIOL 1030 General Biology I
16

Senior Year
First Semester
3 - EXST 3010 Introductory Statistics
4 - PKSC 4160 Appl. of Polymers in Packaging
4 - PKSC 4640 Food and Health Care Pkg. Syst.
3 - Emphasis Area Requirement⁶
14

Second Semester
3 - APEX 2020 Agricultural Economics or
3 - ECON 2110 Principles of Microeconomics
1 - PKSC 4030 Packaging Career Preparation
3 - PKSC 4200 Package Design and Development
1 - Arts and Humanities (Non-Lit.) Requirement²
6 - Emphasis Area Requirement⁶
16

124 Total Semester Hours

¹A C or better is required in this course for graduation.
²See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Require-ment. Note: Social Science Requirement must be in an area other than economics or applied economics. A 2000-level or higher foreign language course is recommended to satisfy the Arts and Humanities (Non-Literature) Requirement.
³Students interested in minors or emphasis areas should take any prerequisites in the sophomore year.
⁴At least one 15-week period of 40 hour weeks of Cooperative Education is required. A six month period is preferred. Two 10-week summer periods of 40 hour weeks with the same company are an option.
⁵PKSC 4040 and 4540 must be taken concurrently.
⁶Completion of any emphasis area or university approved minor is required. The approved course list of the four emphasis areas is available in the departmental undergraduate studies handbook or the department office. Emphasis areas consist of 15 credit hours selected from one of the following areas: Additional emphasis area courses may be approved by emphasis area coordinator:
Transportation and Engineering Technology; Food and Health Care Packaging; Package Design and Graphics; Materials.

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 preprofessional 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 allowing latitude for developing individualized undergraduate programs of study; however, most schools of medicine and dentistry require 16 semester hours of chemistry, including organic chemistry, eight hours of biological sciences, eight hours of physics, and six hours of mathematics. These requirements should be balanced with courses in vocabulary building, the humanities, and social sciences. The basic requirements in the natural sciences and as many of the courses in the humanities and social sciences as possible should be completed by the third year so students are prepared to take the Dental Admission Test or the Medical College Admission Test prior to applying to a professional school.

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

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

PREPHARMACY

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

For financial aid purposes, students in the Prepharmacy program are considered to be enrolled in a degree-seeking program.
Second Year
First Semester
4 - BIOL 2220 Human Anatomy and Phys. I
3 - CH 2230 Organic Chemistry
1 - CH 2270 Organic Chemistry Lab.
3 - PHYS 2070 General Physics I
1 - PHYS 2090 General Physics I Lab.
3 - Arts and Humanities (Literature) Requirement
3 - History or Philosophy Requirement
18

Second Semester
4 - BIOL 2230 Human Anatomy and Phys. II
3 - CH 2290 Organic Chemistry Lab.
3 - COMM 1500 Intro. to Human Comm. or
3 - COMM 2500 Public Speaking
3 - PHYS 2080 General Physics II
1 - PHYS 2100 General Physics II Lab.
3 - Science and Tech. in Society Requirement
4
72–90 Total Semester Hours

3See advisor.
4Select any ENGL course from General Education Arts and Humanities (Literature) Requirement.
5See General Education Requirements.
6Students planning to receive the Bachelor of Science in Preprofessional Studies degree are required to complete a minimum of 18 additional credit hours which must include MICR 3050, and successfully complete a year at an accredited pharmacy school. 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 1030 General Biology I
1 - BIOL 1050 General Biology Lab. I
4 - CH 1010 General Chemistry
3 - PSYC 2010 Introduction to Psychology
3 - Arts and Humanities (Non-Lit.) Requirement
3 - Science and Technology in Society Req.
17
Second Semester
3 - BIOL 1040 General Biology II
1 - BIOL 1060 General Biology Lab. II
4 - CH 1020 General Chemistry
3 - ENGL 1030 Accelerated Composition
3 - EXST 3010 Introductory Statistics
3 - SOC 2010 Introduction to Sociology
1 - Elective
18

Second Year
First Semester
4 - BIOL 2220 Human Anatomy and Phys. I
3 - PHYS 2070 General Physics I
1 - PHYS 2090 General Physics I Lab.
3 - PSYC 3400 Lifespan Developmental Psych.
3 - Arts and Humanities (Literature) Requirement
3 - Arts and Humanities Requirement
17
Second Semester
4 - BIOL 2230 Human Anatomy and Phys. II
3 - COMM 1500 Intro. to Information Technology
3 - PHYS 2080 General Physics II
1 - PHYS 3100 General Physics II Lab.
3 - Mathematics Requirement
18

Third Year
90 Total Semester Hours

3Select any ENGL course from General Education Arts and Humanities (Literature) Requirement.
3See advisor.
4Students planning to receive the Bachelor of Science degree must transfer to a degree-granting major. See advisor for requirements.

PREVETERINARY MEDICINE

Under a regional plan, the South Carolina Prevetenary 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. Application must be made directly to Tuskegee University.

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

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

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

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

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

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

Freshman Year
First Semester
5 - BIOL 1100 Principles of Biology I
4 - CH 1010 General Chemistry
3 - MTHS 1020 Intro. to Math. Analysis or
4 - MTHS 1060 Calculus of One Variable I
1 - SSCS 1010 Survey of Soils and Sustainable Crop Systems
3 - Arts and Humanities (Non-Lit.) Requirement
16-17

Second Semester
5 - BIOL 1110 Principles of Biology II
4 - CH 1020 General Chemistry
3 - ENGL 1030 Accelerated Composition
1 - EXST 3010 Introductory Statistics or
4 - MTHS 1080 Calculus of One Variable II or
4 - MTHS 2070 Multivariable Calculus
15-16

Second Semester
5 - BIOL 1100 Principles of Biology I
4 - CH 1010 General Chemistry
3 - ENGL 1030 Accelerated Composition
1 - EXST 3010 Introductory Statistics or
4 - MTHS 1080 Calculus of One Variable II or
4 - MTHS 2070 Multivariable Calculus
15-16

Junior Year
First Semester
3 - BIOL 2270 Organic Chemistry Lab.
3 - COMM 1500 Intro. to Human Comm. or
3 - COMM 2500 Public Speaking
3 - ECON 2000 Economic Concepts or
3 - ECON 2110 Principles of Microeconomics
3 - GEN 3000 Fundamental Genetics
3 - Arts and Humanities (Literature) Requirement
16

Second Semester
3 - APEC 2050 Agriculture and Society
3 - BIOL 3350 Evolutionary Biology
1 - CH 2240 Organic Chemistry
1 - CH 2280 Organic Chemistry Lab.
1 - CSEN 4550 Seminar
3 - Concentration Requirement
14

Senior Year
First Semester
3 - CH 2270 Organic Chemistry Lab.
2 - BIOL 4340 Biological Chem. Lab. Tech
1 - SSCS 4550 Agricultural Biotechnology
3 - Social Science Requirement
17

Second Semester
1 - CSEN (SSCS) 3500 Practicum
3 - ENGL 3140 Technical Writing
3 - COMM 2500 Public Speaking
1 - SSCS 3350 Agricultural Biotechnology
3 - Arts and Humanities (Literature) Requirement
15

1See General Education Requirements.
2Select from a department approved list. Courses to support proficiency in a foreign language also are encouraged.

SOIL AND WATER ENVIRONMENTAL SCIENCE CONCENTRATION
Freshman Year
First Semester
3 - CH 2230 Organic Chemistry and
1 - CH 2270 Organic Chemistry Lab. or
4 - CH 2100 Survey of Organic Chemistry
4 - CSEN 2020 Soils
3 - GEOL 1070 Physical Geology
1 - GEOL 1030 Physical Geology Lab.
3 - PHYS 2070 General Physics I and
1 - PHYS 2090 General Physics I Lab. or
3 - PHYS 1220 Physics with Calculus I and
1 - PHYS 1240 Physics Lab. I
16

Second Semester
3 - APEC 2050 Agriculture and Society
3 - BIOL 3350 Evolutionary Biology
3 - CH 2240 Organic Chemistry
1 - CH 2280 Organic Chemistry Lab.
1 - CSEN 4550 Seminar
3 - Concentration Requirement
14

Junior Year
First Semester
3 - BIOL 2270 Organic Chemistry Lab.
2 - BIOL 4340 Biological Chem. Lab. Tech
1 - SSCS 4550 Agricultural Biotechnology
3 - Social Science Requirement
17

Second Semester
1 - CSEN (SSCS) 3500 Practicum
3 - ENGL 3140 Technical Writing
3 - COMM 2500 Public Speaking
1 - SSCS 3350 Agricultural Biotechnology
3 - Arts and Humanities (Literature) Requirement
15

Second Semester
3 - CSEN 4900 Beneficial Soil Organisms in Plant Growth
3 - MICR 3050 General Microbiology
5 - Concentration Requirement
3 - Plant Science Requirement
16

Senior Year
First Semester
3 - CH 2270 Organic Chemistry Lab.
2 - BIOL 4340 Biological Chem. Lab. Tech
1 - SSCS 4550 Agricultural Biotechnology
3 - Social Science Requirement
15

Second Semester
3 - CSEN (SSCS) 3500 Practicum
3 - ENGL 3140 Technical Writing
3 - COMM 2500 Public Speaking
1 - SSCS 3350 Agricultural Biotechnology
3 - Arts and Humanities (Literature) Requirement
15

1See General Education Requirements.
2Select from a department approved list. Courses to support proficiency in a foreign language also are encouraged.

Agricultural Biotechnology Concentration
Sophomore Year
First Semester
3 - CH 2270 Organic Chemistry Lab.
3 - COMM 1500 Intro. to Human Comm. or
3 - COMM 2500 Public Speaking
3 - ECON 2000 Economic Concepts or
3 - ECON 2110 Principles of Microeconomics
3 - GEN 3000 Fundamental Genetics
3 - Arts and Humanities (Literature) Requirement
16

Second Semester
3 - APEC 2050 Agriculture and Society
3 - BIOL 3350 Evolutionary Biology
3 - CH 2240 Organic Chemistry
1 - CH 2280 Organic Chemistry Lab.
1 - CSEN 4550 Seminar
3 - Concentration Requirement
14

Junior Year
First Semester
3 - CH 2270 Organic Chemistry Lab.
2 - BIOL 4340 Biological Chem. Lab. Tech
1 - SSCS 4550 Agricultural Biotechnology
3 - Social Science Requirement
17

Second Semester
1 - CSEN (SSCS) 3500 Practicum
3 - ENGL 3140 Technical Writing
3 - COMM 2500 Public Speaking
1 - SSCS 3350 Agricultural Biotechnology
3 - Arts and Humanities (Literature) Requirement
15

Junior Year
First Semester
3 - BIOL 2270 Organic Chemistry and
1 - BIOL 2270 Organic Chemistry Lab. or
4 - CH 2100 Survey of Organic Chemistry
4 - CSEN 2020 Soils
3 - GEOL 1070 Physical Geology
1 - GEOL 1030 Physical Geology Lab.
3 - PHYS 2070 General Physics I and
1 - PHYS 2090 General Physics I Lab. or
3 - PHYS 1220 Physics with Calculus I and
1 - PHYS 1240 Physics Lab. I
16

Second Semester
3 - APEC 2050 Agriculture and Society
3 - BIOL 3350 Evolutionary Biology
3 - CH 2240 Organic Chemistry
1 - CH 2280 Organic Chemistry Lab.
1 - CSEN 4550 Seminar
3 - Concentration Requirement
14

Senior Year
First Semester
3 - CH 2270 Organic Chemistry Lab.
2 - BIOL 4340 Biological Chem. Lab. Tech
1 - SSCS 4550 Agricultural Biotechnology
3 - Social Science Requirement
15

Second Semester
3 - CSEN (SSCS) 3500 Practicum
3 - ENGL 3140 Technical Writing
3 - COMM 2500 Public Speaking
1 - SSCS 3350 Agricultural Biotechnology
3 - Arts and Humanities (Literature) Requirement
15

Senior Year
First Semester
3 - CH 2270 Organic Chemistry Lab.
2 - BIOL 4340 Biological Chem. Lab. Tech
1 - SSCS 4550 Agricultural Biotechnology
3 - Social Science Requirement
15
Second Semester
3 - AGR (ENSP) 3150 Environment and Agric.
3 - BIOL 4010 Plant Physiology and
1 - BIOL 4020 Plant Physiology Lab.
1 - CH 2280 Organic Chemistry Lab. or 1 - CH 2270 Organic Chemistry Lab. or 1 - CH 2270 Organic Chemistry Lab. or
1 - CH 2270 Organic Chemistry Lab., and 2 - BHCHM 3050 Essential Elements of Biochemistry. and
3 - BIOL 4340 Biol. Chem. Lab Techniques
2 - COMM 1500 Intro. to Human Comm.
3 - COMM 2500 Public Speaking
3 - SSCS 3330 Agricultural Genetics
3 - Plant Science Requirement
16-17

Summer
3 - PLPA 4110 Plant Disease Diagnosis I

Junior Year
First Semester
3 - ECON 2110 Principles of Microeconomics
3 - CH 2230 Organic Chemistry 1 and
1 - CH 2270 Organic Chemistry Lab. or 4 - CH 210 Survey of Organic Chemistry
4 - CSEN 2020 Soils
3 - PLPA 3100 Principles of Plant Pathology
4

Second Semester
3 - APEC 2050 Agricultural Economics or
3 - BIOL 4100 Plant Physiology and
1 - BIOL 4220 Plant Physiology Lab.
1 - CSEN (BE) 4080 Land Treatment of Wastewater and Sludges
3 - Concentration Requirement
3 - Social Science Requirement
16

Senior Year
First Semester
3 - CSEN 4900 Beneficial Soil Organisms in Plant Growth
4 - ENT 4070 Applied Agricultural Entomology
6 - Concentration Requirement
13

Second Semester
3 - CSEN (SSCS) 3500 Practicum
3 - CSEN 4520 Soil Fertility and Management
1 - CSEN 4530 Soil Fertility Lab.
1 - CSEN 4550 Seminar
3 - Arts and Humanities (Literature) Requirement
6 - Concentration Requirement
17

124-126 Total Semester Hours

SUSTAINABLE CROP PRODUCTION CONCENTRATION

Sophomore Year
First Semester
3 - APEC 2020 Agricultural Economics or
3 - ECON 2110 Principles of Microeconomics
3 - CH 2230 Organic Chemistry 1 and
1 - CH 2270 Organic Chemistry Lab. or 4 - CH 210 Survey of Organic Chemistry
4 - CSEN 2020 Soils
3 - PLPA 3100 Principles of Plant Pathology
4

Second Semester
3 - APEC 2050 Agriculture and Society
3 - CH 2240 Organic Chemistry 2 and
1 - CH 2280 Organic Chemistry Lab. or 2 - BHCHM 3050 Essential Elements of Biochemistry and
2 - BIOL 4340 Biol. Chem. Lab Techniques
3 - COMM 1500 Intro. to Human Comm.
3 - COMM 2500 Public Speaking
3 - SSCS 3330 Agricultural Genetics
3 - Plant Science Requirement
16-17

Summer
3 - PLPA 4110 Plant Disease Diagnosis I

Junior Year
First Semester
3 - ENGL 3140 Technical Writing or
3 - CSEN 4520 Soil Fertility and Management
1 - CSEN 4550 Seminar
3 - Arts and Humanities (Literature) Requirement
6 - Concentration Requirement
17

Second Semester
3 - CSEN (SSCS) 3500 Practicum
3 - CSEN 4520 Soil Fertility and Management
1 - CSEN 4530 Soil Fertility Lab.
1 - CSEN 4550 Seminar
3 - Arts and Humanities (Literature) Requirement
6 - Concentration Requirement
17

124-126 Total Semester Hours

TURFGRASS Bachelor of Science
Turfgrass is a major part of our built environment and daily life, including home lawns, sports fields, and golf courses. Grassy 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 - CH 1010 General Chemistry
1 - HORT 1010 Horticulture
1 - HORT 4120 Advanced Turfgrass Management
3 - BIOL 4100 General Biology I
1 - BIOL 4100 General Biology Laboratory I
1 - CH 1010 General Chemistry
3 - ENGL 1030 Accelerated Composition
1 - HORT 1020 Experience Horticulture
4 -Related Science Requirement
16

Second Semester
3 - HORT 2120 Introduction to Turfgrass Culture
1 - HORT 2130 Turfgrass Culture Lab.
3 - HORT 4030 Landscape Plants
3 - MTHS 1010 Essential Math for Informed Soc.
4 - Plant Biology Requirement
14

Sophomore Year
First Semester
3 - HORT 2270 Turfgrass Science
1 - PLPA (ENT) 4080 Diseases and Insects of Turfgrasses
3 - HORT 3030 Landscape Plants
1 - HORT 3080 Beneficial Soil Organisms in Plant Growth
3 - Plant Science Requirement
4 - Elective
16

Second Semester
3 - HORT 2120 Introduction to Turfgrass Culture
1 - HORT 2130 Turfgrass Culture Lab.
3 - HORT 4030 Landscape Plants
3 - MTHS 1010 Essential Math for Informed Soc.
4 - Plant Biology Requirement
14

Junior Year
First Semester
3 - Arts and Humanities (Non-Lit.) Requirement or
3 - Business Requirement
6 - Related Science Requirement
3 - Social Science Requirement
1 - Elective
16

Second Semester
3 - BIOL 4010 Plant Physiology
1 - BIOL 4100 Plant Physiology Lab.
1 - CSEN 4520 Soil Fertility and Management
3 - HORT 4200 Applied Turfgrass Physiology
2 - PLPA (ENT) 4060 Diseases and Insects of Turfgrasses
3 - Horticulture Specialization Requirement
3 - Oral Communication Requirement
15

Summer
1 - PLPA (ENT) 4080 Diseases and Insects of Turfgrasses Laboratory

Senior Year
First Semester
3 - HORT 4120 Advanced Turfgrass Management
3 - Business Requirement
3 - Horticulture Specialization Requirement
3 - Related Science Requirement
3 - Soils Requirement
18

College of Agriculture, Forestry and Life Sciences
### Second Semester
- **HORT (CSEN) 4330 Landscape and Turf Management**
- **Horticulture Specialization Requirement\(^1\)**
- **Related Science Requirement\(^1\)**
- **Soils Requirement\(^1\)**

12

123 Total Semester Hours

\(^3\)See advisor. Select from department-approved list.

\(^4\)See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and the Science and Technology in Society Requirements.

\(^1\)Internship must be completed in one or two semesters. Internship may be done fall, spring, or summer after completing HORT 2120/2130. Prior approval is required for internships, and a 2.0 grade-point average is required for registration.

\(^2\)Note: Turfgrass majors must make a C or better in all HORT courses. Courses may be repeated as often as necessary to achieve the minimum grade.

### WILDLIFE AND FISHERIES BIOLOGY

**Bachelor of Science**

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

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

For students interested in conservation biology, water, and natural resources, the School of Agricultural, Forest, and Environmental Sciences also administers the Conservation Biology and Natural Resources Management Concentrations within the Environmental and Natural Resources degree program. See pages 51-52 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 School of Agricultural, Forest, and Environmental Sciences 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**
- **HORT 2120/2130. Prior approval is required for internships, and a 2.0 grade-point average is required for registration.**

**Second Semester**
- 3 - WFB 3000 Wildlife Biology
- 1 - WFB 3010 Wildlife Biology Lab.
- 3 - ENGL 1030 Accelerated Composition
- 3 - Cross-Cultural Awareness Requirement

12

122 Total Semester Hours

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

2Select from department-approved list.

### Sophomore Year

**First Semester**
- 3 - EXST 3010 Introductory Statistics
- 3 - BIOL 1040 General Biology II
- 3 - BIOL 1060 General Biology Lab. II

**Second Semester**
- 3 - Oral Communication Requirement
- 3 - MTHS 1020 Intro. to Mathematical Analysis
- 1 - ENR 1010 Intro. to Env. and Natural Res. I

15

### Junior Year

**First Semester**
- 3 - WFB 4300 Wildlife Conservation Policy
- 3 - Social Science Requirement

**Second Semester**
- 3 - WFB 4100 Wildlife Management Techniques
- 4 - BIOL 3200 Field Botany
- 3 - BIOL 3030 Vertebrate Biology

16

### Senior Year

**First Semester**
- 3 - FNR 4990 Natural Resources Seminar
- 3 - Approved Requirement

**Second Semester**
- 3 - WFB 4120 Wildlife Management
- 3 - WFB 4400 Non-Game Wildlife Management
- 3 - WFB 4620 Wetland Wildlife Biology

15

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

2Select 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
Architecture
Art
Athletic Leadership—not open to Marketing majors.
Biochemistry
Biological Sciences
Business Administration
Chemistry
Cluster
Communication Studies
Computer Science
Crop and Soil Environmental Science
Digital Production Arts
East Asian Studies
Economics
Education
English
Entomology
Entrepreneurship
Environmental Engineering
Environmental Science and Policy
Equine Business—not open to Animal and Veterinary Sciences majors
Film Studies
Financial Management
Food Science
Forest Resource Management
Genetics
Geography
Geology
Global Politics
Great Works
History
Horticulture—not open to Turfgrass majors
Legal Studies
Management
Management Information Systems
Mathematical Sciences
Microbiology
Military Leadership
Modern Languages
Music
Natural Resource Economics
Nonprofit Leadership
Packaging Science
Pan African Studies
Park and Protected Area Management
Philosophy
Physics
Plant Pathology
Political Science
Psychology
Public Policy
Religion
Russian Area Studies
Science and Technology in Society
Screenwriting
Sociology
Spanish-American Area Studies
Theatre
Therapeutic Recreation
Travel and Tourism
Turfgrass—not open to Horticulture majors
Urban Forestry
Wildlife and Fisheries Biology
Women’s Studies
Writing

See pages 39-42 for details.